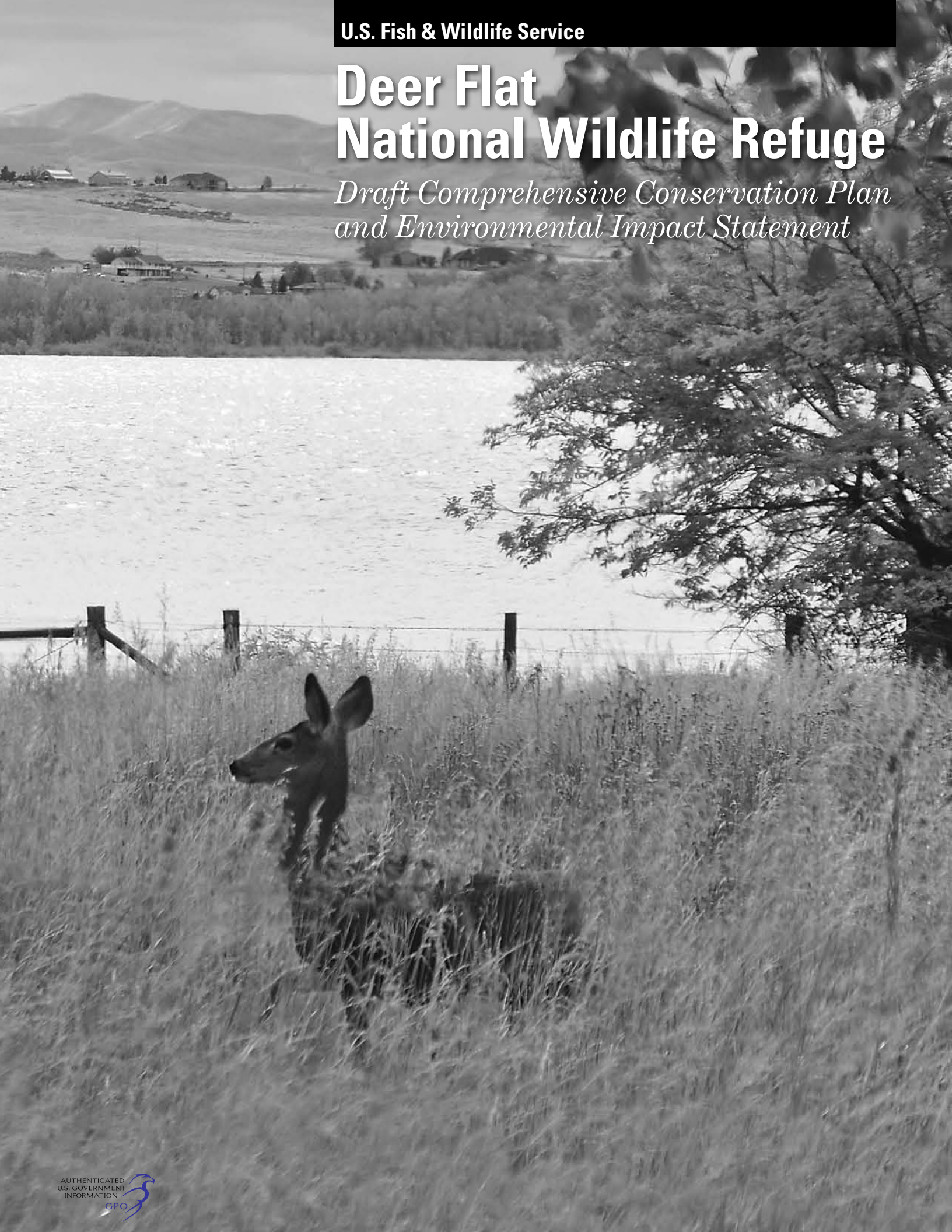
U.S. Fish & Wildlife Service

Deer Flat National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Impact Statement



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A Vision of Conservation

Deer Flat National Wildlife Refuge is enjoyed, appreciated, protected, and treasured as a place where wildlife comes first. The public actively supports and advocates for the Refuge purpose and programs. Residents of the Treasure Valley value the oases of wildlife habitat in their backyard, both at Lake Lowell and the Snake River Islands. The clean, clear waters and lush riparian landscapes of Lake Lowell and the Snake River Islands provide nesting, resting, and feeding habitat for spectacular concentrations of migratory birds and other wildlife. Reductions in disturbance to important nesting, breeding, resting and feeding areas allow wildlife in all Refuge habitats to successfully produce and raise their young thereby sustaining wildlife populations for future generations of Americans to enjoy. The removal of invasive and/or undesirable plant and animal species on the islands of the Snake River and at Lake Lowell provides habitats where songbirds, nesting waterfowl and colonial waterbirds, and native mammals thrive. Habitat goals are met without impacts to the irrigation resources of Lake Lowell.

The Refuge is a place where all visitors are able to enjoy and connect with nature and realize the value of wildlife and habitats. Staff and volunteers share their love of the Refuge and its resources with visitors. In addition to being a destination for hunting, fishing, wildlife photography and observation, children and adults learn in the outdoor "living classroom" that the Refuge provides. The Refuge also provides for other recreational uses that allow people to enjoy the outdoors without impacting wildlife and habitats. All public use opportunities maintain the integrity of the wildlife resources, instill in visitors the importance of protected open spaces, and provide memorable outdoor experiences for present and future generations of Americans.

Comprehensive Conservation Plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

The refuge headquarters and visitor center rests on the shore of Lake Lowell.
Addison Mohler/USFWS

Deer Flat National Wildlife Refuge
Draft Comprehensive Conservation Plan and Environmental Impact Statement

Canyon, Payette, Owyhee, and Washington Counties, Idaho, and Malheur County, Oregon

Lead Agency: U.S. Department of the Interior, Fish and Wildlife Service, Pacific Region

Cooperating Agency: U.S. Department of the Interior, Bureau of Reclamation, Snake River Area Office

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Abstract: The Fish and Wildlife Service is required to manage units of the National Wildlife Refuge System in accordance with a comprehensive conservation plan (CCP). This is the Draft CCP and Environmental Impact Statement (EIS) for Deer Flat National Wildlife Refuge (Refuge); in it, we address issues and opportunities; examine potential impacts on natural and cultural resources; and analyze the following range of alternatives, as required by the National Environmental Policy Act.

Alternative 1 (status quo alternative). Under Alternative 1, current wildlife, habitat, and public use management would continue. Invasive species control and limited restoration would be our habitat management focus. The no-wake zone on Lake Lowell would continue, and the lake would be closed from October 1 to April 14 for migratory birds. Compatible priority and other public uses would continue. No additional trail or lake access would occur. Limited invasive species control and restoration would occur on the Snake River Islands Unit, which would be open from June 1 to January 31 for free-roam activities and shoreline fishing.

Alternative 2 (Preferred Alternative). We would protect Lake Lowell's shoreline feeding and nesting sites for wintering and migratory birds under Alternative 2 by closing the lake from October 1 to April 14, establishing a 200-yard no-wake zone on the south side and in the Narrows, and expanding the southeast no-wake zone to Gotts Point. Nearly all existing recreation would continue; fishing and wildlife interpretation would be emphasized, and with increased law enforcement, Gotts Point would open to vehicles. We would increase wildlife inventory and monitoring (IM), invasive species control, and restoration on the Snake River Islands Unit, and we would adjust closures to protect nesting and wading birds. Wildlife observation and hunting for deer, upland species, and waterfowl would be allowed. Most islands would be open for shoreline fishing and free-roam activities from June 15 to January 31; heron- and gull-nesting islands would be open from July 1 to January 31.

Alternative 3. Under Alternative 3, we would protect Lake Lowell's wildlife resources by closing emergent plant beds in Murphy's Neck and from Parking Lots 3 to 8; closing the lake seasonally for wintering/migrating birds; closing areas within 500 yards of grebe-nesting sites; and implementing a seasonal 100-yard shoreline closure from Murphy's Neck to the Narrows, a 200-yard closure and no-wake zone in the southwest area, and a no-wake zone in the East Pool. Boating season would end earlier, on September 20, for a youth hunt. Upland bird and controlled waterfowl hunting would be allowed, horseback riding and dog walking would not, and bicycling would be limited. Wildlife IM, invasive species control, and restoration would increase on the Snake River Islands Unit; closure dates would change to protect birds. Wildlife observation and hunting would occur on the islands, which would be open from June 15 to January 31 for fishing and free-roam activities. Heron- and gull-nesting islands would be open from July 1 to January 31.

Alternative 4. Alternative 4 would provide the most protection for Lakes Lowell's wildlife resources by restricting boating to no-wake speeds only and closing the southeast end to public use. The lake would continue to be closed from October 1 to April 14, and portions of the Refuge would be closed to the public year-round. No horseback riding, dog walking, or bicycling would occur. Upland game hunting would not be allowed; however, waterfowl hunting would be allowed on the south side from Parking Lots 1 to 8. Wildlife IM, invasive species control, and restoration would increase on the Snake River Islands Unit, and closure dates would be adjusted to protect nesting and wading birds. Prescribed fire and aerial application of herbicide and/or seed may be used. Wildlife observation and hunting for deer, upland species, and waterfowl would occur on the islands, which would be open for fishing and free-roam activities from June 15 to January 31. Heron- and gull-nesting islands would be open from July 1 to January 31.

Public Comments: Public comments are due to Deer Flat National Wildlife Refuge by May 15, 2013.

Deer Flat
National Wildlife Refuge

Draft Comprehensive Conservation Plan
and
Environmental Impact Statement

Prepared by:
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U.S. Fish and Wildlife Service
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Executive Summary

This document is a summary of the combined Draft Comprehensive Conservation Plan and Environmental Impact Statement (Draft CCP/EIS) for the 15-year management of Deer Flat National Wildlife Refuge (NWR or Refuge), located in Canyon, Payette, Owyhee, and Washington Counties, Idaho, and Malheur County, Oregon. The U.S. Fish and Wildlife Service (Service) is required by the National Wildlife Refuge System Administration Act of 1966 (as amended) to develop and implement a CCP for the 15-year management of all national wildlife refuges. This Draft CCP/EIS evaluates and compares four alternatives for the conservation of fish, wildlife, and plants within Deer Flat NWR primarily through monitoring of their populations, reduction of human-caused disturbance, management and restoration of habitats, and control of invasive and feral species. The four draft alternatives also include management of wildlife-dependent public uses (i.e., the Service's "Big Six": wildlife observation and photography, hunting, fishing, environmental education, and interpretation) and nonwildlife-dependent uses in a manner that is compatible with the primary conservation purposes for Deer Flat NWR. The environmental consequences section of the Draft CCP/EIS evaluates the impacts from management activities and public uses on Refuge resources and is the basis for determining the compatibility of public uses. Appropriateness findings and compatibility determinations that are part of the Service's Preferred Alternative (Alternative 2) are included with the Draft CCP/EIS as appendices.

The three draft action alternatives (Alternatives 2-4) are the outcome of a public planning process that was initiated in 2010. The Service began the process of developing a CCP with release of a Notice of Intent in the Federal Register on July 15, 2010. Open houses were held on July 28, August 20, and August 21, 2010 at the Deer Flat NWR Visitor Center in Nampa, Idaho. Comments were also solicited on the preliminary draft alternatives at open houses on June 3, June 4, July 8, and July 9, 2011. For additional information see the Summary of Public Involvement in Appendix H.

We describe four alternatives for future management of the Refuge in Chapter 2, and we analyze each alternative's potential effects on the biological, cultural, recreational, and economic environment in Chapter 6. Alternative 2 is identified as the Preferred Alternative, because it would reduce disturbance to wildlife and habitats, positively impact habitats through removal of undesirable species and restoration and rehabilitation of desired species, and increase the quality and accessibility of wildlife-dependent recreation, while allowing for most current public uses to continue.

Refuge Information and Background

Deer Flat NWR encompasses approximately 11,000 acres and was originally established by Theodore Roosevelt in 1909 to provide a Refuge and breeding ground for migratory birds and other wildlife. The Refuge consists of an overlay on a nearly 9,000-acre Bureau of Reclamation (Reclamation) irrigation facility, adjacent uplands, and approximately 104 islands in the Snake River. As an overlay, management of the Refuge can not impede the irrigation purpose of the Reclamation Reservoir. The Refuge provides habitat for over 215 bird species including waterfowl, waterbirds, shorebirds, raptors, and passerines and is an important resting and wintering area for birds migrating along the Pacific Flyway. The Refuge has also documented over 25 species of mammals and invertebrates falling into 13 different scientific orders. Lake Lowell is the largest physical feature on the Refuge, providing open water, emergent vegetation, and mudflats. Other habitat types found on the Refuge include sagebrush-steppe uplands and riparian habitats. The Refuge provides opportunities for all six wildlife-dependent recreation activities as well as a variety of nonwildlife-

dependent activities. The Service manages the Refuge as part of the National Wildlife Refuge System (Refuge System).

Refuge Purposes, Vision, and Management Goals

The current Refuge purposes are:

- "as a refuge and breeding grounds for migratory birds and other wildlife" (Executive Order 7655, dated July 12, 1937).
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d, Migratory Bird Conservation Act)
- "suitable for—(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1, Refuge Recreation Act)
- "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2, Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended).

The Service's vision for Deer Flat NWR included in the Draft CCP/EIS is stated as follows:

> *Deer Flat National Wildlife Refuge is enjoyed, appreciated, protected, and treasured as a place where wildlife comes first. The public actively supports and advocates for the Refuge purpose and programs. Residents of the Treasure Valley value the oases of wildlife habitat in their backyard, both at Lake Lowell and the Snake River Islands. The clean, clear waters and lush riparian landscapes of Lake Lowell and the Snake River Islands provide nesting, resting, and feeding habitat for spectacular concentrations of migratory birds and other wildlife. Reductions in disturbance to important nesting, breeding, resting and feeding areas allow wildlife in all Refuge habitats to successfully reproduce and raise their young thereby sustaining wildlife populations for future generations of Americans to enjoy. The removal of invasive and/or undesirable plant and animal species on the islands of the Snake River and at Lake Lowell provides habitats where songbirds, nesting waterfowl and colonial waterbirds, and native mammals thrive. Habitat goals are met without impacts to the irrigation resources of Lake Lowell.*
>
> *The Refuge is a place where all visitors are able to enjoy and connect with nature and realize the value of wildlife and habitats. Staff and volunteers share their love of the Refuge and its resources with visitors. In addition to being a destination for hunting, fishing, wildlife photography, and observation, children and adults learn in the outdoor "living classroom" that the Refuge provides. The Refuge also provides for other recreational uses that allow people to enjoy the outdoors without impacting wildlife and habitats. All public use opportunities maintain the integrity of the wildlife resources, instill in visitors the importance of protected open spaces, and provide memorable outdoor experiences for present and future generations of Americans.*

This vision for Deer Flat Refuge would be achieved through management toward the following goals as stated in the Draft CCP/EIS.

Wildlife and Habitat Goals

Goal 1: Protect-, maintain, and enhance viable mudflat, emergent-bed, and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife.

Goal 2: Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Goal 3: Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Goal 4: Protect, maintain, and enhance shrub-steppe habitats characteristic of the historical Columbia Basin.

Goal 5: Protect, maintain and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife.

Goal 6: Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources.

Public Use and Cultural Resources Goals

Goal 1: Visitors of all ages will enjoy abundant native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat.

Goal 2: Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 3: Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 4: Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats.

Goal 5: Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors.

Goal 6: The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 7: The Refuge will protect and manage cultural resources and look for ways to gain new understanding of the history and cultural resources of both the Lake Lowell Unit and the Snake River Islands Unit.

Management Issues

The following major issues were identified and expressed by the public, various constituents, and Service staff, and have been analyzed and addressed during CCP development.

Wildlife and Habitat Management Issues

- How should Refuge habitats be managed for resident and migratory wildlife species?
- Which habitats should the Refuge consider priorities for active management?
- What types of biological research and monitoring priorities?
- What is the Refuge's role in improving water quality?
- How does the Refuge address the issue of invasive and undesirable nonnative plant and animal species?

Public Use Management Issues

- How can the Refuge provide more quality opportunities for wildlife-dependent recreation to visitors of differing abilities without creating an undesirable level of disturbance to wildlife and habitats?
- How can the Refuge provide opportunities for nonwildlife-dependent recreation in a way that does not negatively impact wildlife, habitats, and visitors engaging in wildlife-dependent recreation and education? How can the Refuge increase the quality of its waterfowl and upland hunts?
- How should limited Refuge resources be allocated between environmental education programs as compared to outreach and interpretation to the general visitor?
- How can the Refuge improve safety for its visitors and reduce the amount of illegal activity?

Management Alternatives

The Draft CCP/EIS includes four alternatives. Alternative 1 reflects the current management of Deer Flat NWR. Alternative 2 is the Service's preferred management alternative and is generally a more intensive approach to management of Refuge resources when compared with current management under Alternative 1. The primary emphasis of Alternative 2 is reduced disturbance to important breeding, nesting and feeding areas, the reduction of undesirable plant and animal species, and the improvement of compatible recreation opportunities. Alternative 3 represents a more restrictive management approach when compared with Alternative 1 or Alternative 2. Alternative 4 represents the most intensive management approach.

The Service has selected Alternative 2 as its Preferred Alternative because it best fulfills the Refuge's purposes and Service mission by providing needed protections for wildlife and habitats, while continuing to allow most recreational activities currently found on the Refuge. The dynamic seasonal

wildlife closures that would be implemented under Alternative 2 would allow the Refuge to adapt to changes in the nesting and feeding requirements of wildlife, while ensuring that only areas that are actively being used by wildlife are closed to potentially-disturbing activities. This technique provides more flexible protections for wildlife as well as more opportunities for compatible recreational uses, especially fishing, than the other action alternatives (Alternatives 3 and 4). Seasonal on-trail regulations would provide wildlife protection while still allowing users to experience Refuge habitats and increase the opportunity for wildlife viewing when wildlife are less sensitive to disturbance. Because of the improvement in wildlife protections, and the opportunity to interact with both traditional and nontraditional Refuge visitors in a way that promotes knowledge of, and involvement in the Refuge, its habitats and wildlife, the Preferred Alternative is expected to best achieve the Refuge's purpose and fulfill the Service's mission.

Alternative 1 (Status Quo, No Action Alternative)

Alternative 1 is the no action alternative required by the National Environmental Policy Act. Management of wildlife, habitat, and public uses would continue at current levels as described below.

Lake Lowell Unit

Management of Wildlife and Habitat. Management of Refuge wildlife would continue to involve basic population monitoring activities. Management of Refuge habitats would continue to involve primarily invasive species control and limited restoration. Invasive plant control would be conducted by one staff member and volunteers using mechanical, chemical, and biological controls.

A no-wake zone would continue to the southeast of Parking Lot 1, and the entire lake would close for winter migration from October 1 to April 14 each year. No other on-water protection would be provided for wildlife. The emergent vegetation along the shoreline of Lake Lowell would remain unprotected. This vegetation provides erosion control, nesting habitat for grebes and other birds, and foraging habitat for waterfowl and wading birds, as well as forage, nesting, and brood rearing habitat for numerous fisheries.

Management of Public Uses. Existing public uses would continue and include the "Big Six" wildlife-dependent recreational activities as well as nonwildlife-dependent activities such as horseback riding, biking, jogging, motorized boating, use of personal watercraft, waterskiing, picnicking, and swimming. Under Alternative 1, there are few actions that would alter when, where, or how public uses are allowed to occur within the Refuge. Nearly the entire Refuge would continue to be available for on-trail public recreation, including wildlife observation, photography, jogging, bicycling, on-leash dog walking, and horseback riding. No additional trail or lake access would be provided. Upland and waterfowl hunting would continue to be allowed between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract. A youth waterfowl hunt would continue to be hosted in current waterfowl hunt zones. A controlled deer hunt would continue to be allowed between Parking Lot 8 and the New York Canal. Gotts Point would remain closed to vehicular traffic, and limited bank fishing opportunities would exist around the lake. Lake users would continue to participate in numerous surface water recreational activities.

The lake would open to boating on April 15 and close on September 30. The current no-wake zone, from Parking Lot 1 east, would remain in place.

Environmental education would continue to be conducted for on- and off-site programs. Public contact with Deer Flat NWR staff would remain limited and intermittent due to the small number of Refuge employees. Opportunities for visitors to obtain additional information while visiting the Refuge would remain largely dependent on kiosks, brochures, and the availability of volunteers.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 1, management of Refuge wildlife would continue to involve basic population monitoring activities. Because of the logistical difficulties and small staff, limited invasive species control and/or restoration efforts would be conducted on the Snake River islands.

Management of Public Uses. Existing public uses would continue and include wildlife observation and deer, upland, and waterfowl hunting. The Snake River islands would continue to be open from June 1 to January 31 for off-trail, free-roam activities, including shoreline fishing.

Alternative 2 (Service Preferred): Protect Wildlife Using No-wake Zones and New Seasonal Closures while Providing for a Variety of Recreational Activities

Alternative 2 would emphasize connecting urban families to nature by providing access to new facilities as well as a wide range of wildlife-dependent and nonwildlife-dependent recreational activities. Activities would be managed differently than in the status quo alternative to protect wildlife, reduce conflicts between users, and increase safety. On Lake Lowell, the Refuge would protect shoreline feeding and nesting sites through no-wake zones and seasonal closures. Emphasis would be placed on developing the interpretive programs with the goal of increasing visitor awareness of Deer Flat NWR's purpose and goals and to encourage conservation-oriented visitor behavior. Gotts Point would be opened to vehicular traffic upon completion of a cooperative agreement with Canyon County for increased law enforcement presence.

Lake Lowell Unit

Management of Wildlife and Habitat. To provide needed protections for lake-dependent wildlife, a 200-yard no-wake zone is proposed along the south side of the lake between Parking Lots 1 and 8. The entire lake would continue to be closed for the benefit of wintering and migrating birds from October 1 to April 14 each year. No-wake zones would also be required in the Narrows, and the existing no-wake zone on the southeast end of the lake would be expanded to start at a line between Gotts Point and Parking Lot 1. Motorized boats would be allowed in the no-wake zones; however, boaters would be allowed to travel only at speeds that do not create a wake (generally <5 mph). Alternative 2 would also create seasonally closed areas, such as heron rookeries, eagle nests, and grebe nesting colonies, to protect bird species. An increase in habitat enhancement through invasive species removal and vegetation manipulation is proposed. Increases in wildlife and habitat research and assessments would be focused on providing a strong scientific base for future management decisions.

Management of Public Uses. The Preferred Alternative provides access for a wide range of outdoor recreational activities while putting in place measures (e.g., no-wake zones and seasonal closures) to protect wildlife. Management efforts would focus on increasing participation in all six priority wildlife-dependent recreational activities. Fishing and interpretation would be emphasized to serve a

growing urban and diverse population. Management of public uses would seek to connect people with nature and build support for wildlife conservation.

Snake River Islands Unit

Management of Wildlife and Habitat. Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the Integrated Pest Management Plan) and restoration efforts. Islands management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority (see Objective 2.2). Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue and include wildlife observation and deer, upland bird, and waterfowl hunting on over 1,200 acres. Most of the Snake River Islands Unit would be open for off-trail, free-roam activities, including shoreline fishing, from June 15 to January 31. Heron- and gull-nesting islands (four to six islands) would be open for off-trail, free-roam activities from July 1 to January 31.

Alternative 3: Protect Wildlife Using a No-wake Zone in the East Pool with Seasonal and Permanent Closures while Providing for a Variety of Recreational Activities

Under Alternative 3, the Refuge would protect habitat in nesting and feeding sites and in open-water habitat by establishing a no-wake zone in the East Pool, morning restrictions on wake-causing activities in the West Pool, and other seasonal and permanent closures. A no-wake zone in the East Pool would make that portion of the lake more suitable for fishing and wildlife observation. Overall, Alternative 3 attempts to increase the quality of wildlife-dependent recreation by eliminating horseback riding and dog walking and segregating high-speed boating from wildlife-dependent users. However, a drawback of the no-wake zone changes would be an increase in the amount of time it would take wildlife-dependent users to reach high-quality wildlife areas. Under Alternative 3, the Refuge would not be open to some activities including horseback riding and dog walking. Bicycling would only be allowed on the trail adjacent to the entrance road.

Lake Lowell Unit

Management of Wildlife and Habitat. Emergent plant beds in Murphy's Neck and emergent plant beds from Parking Lots 3 to 8 would be closed to human activity all year. The entire lake would be closed seasonally to protect wintering and migrating birds. All active and historical grebe nesting colonies would be closed to public use by establishing a 500-yard closure during boating season. There would be a 100-yard seasonal closure (from July 15 through September 30) to protect shorebird habitat along the shoreline from Murphy's Neck to the Narrows. A 200-yard closed area and a 200-yard no-wake zone would protect emergent beds and wildlife on the south side of the West Pool. An increase in habitat enhancement through invasive species removal and vegetation manipulation is proposed. Increases in wildlife and habitat research and assessments would be focused on providing a strong scientific base for future management decisions.

Management of Public Uses. Under Alternative 3, the lake would be open to use from April 15 to September 20 with only no-wake activities allowed in the East Pool and wake-causing activities allowed from noon to one hour before sunset in the West Pool. If feasible, a wildlife observation/photography boardwalk would be constructed between Parking Lots 1 and 3. To improve the quality of both upland and waterfowl hunting, upland game bird hunting would be allowed only on the east end of the Refuge from the west boundary of the Leavitt Tract to the entrance at Greenhurst Road. A controlled waterfowl hunt (e.g., permit system or sign-in/out) would be allowed only on the south side of the lake between Parking Lots 3 and 8 with a daily limit of 25 shotgun shells per hunter. Other wildlife-dependent activities would be allowed concurrent with the upland hunt and on the boardwalk on the south side of the lake. However, because there is a higher demand by waterfowl hunters and less visibility on the South Side Recreation Area, all trails in the waterfowl hunt area would be closed to the nonhunting public from Parking Lots 3 through 8. The boating season would end on September 20 in order to increase the quality of the youth hunt and reduce the possibility of unsafe hunter/boater interactions.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 3, Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the Integrated Pest Management Plan) and restoration efforts. The islands' management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority. Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue; these uses consist of wildlife observation and deer, upland and waterfowl hunting on 1,219 acres. Most of the Snake River Islands Unit would be open for off-trail, free-roam activities, including shoreline fishing, from June 15 to January 31. Heron- and gull-nesting islands (four to six islands) would be open for off-trail, free-roam activities from July 1 to January 31.

Alternative 4: Protect Wildlife with Entire Lake Designated as No-wake Zone with an Emphasis on Wildlife-dependent Recreation

Alternative 4 is the most protective alternative, providing wildlife restrictions not found in Alternatives 1 through 3. Habitat management would restore, maintain, or mimic natural ecosystem processes as often as possible. To provide adequate sanctuary for Refuge species, increase visitors' opportunities to appreciate wildlife, and provide the best possible wildlife-dependent recreational opportunities, fishing, hunting, wildlife observation, wildlife photography, environmental education, and interpretation would be the only recreational activities allowed on the Refuge. The entire lake would be a no-wake zone.

To provide a sanctuary for waterfowl, shorebirds, and waterbirds, as well as fish and other wildlife, all the emergent beds would be closed to public access.

Lake Lowell Unit

Management of Wildlife and Habitat. To reduce disturbance to feeding and resting wildlife, only boating at no-wake speeds would be allowed on Lake Lowell. All emergent beds and the southeast end of the lake would be closed to public use to protect nesting and feeding waterbirds, waterfowl, and shorebirds. The entire lake would continue to be closed for wintering and migrating birds from October 1 to April 14 each year. The shoreline from Murphy's Neck to the Narrows would be protected by a 100-yard closure that would be closed year-round to the public to provide undisturbed loafing and feeding habitat for shorebirds and waterfowl. Trees would be removed in this area to enhance mudflats for migrating shorebirds. An increase in habitat enhancement through invasive species removal and vegetation manipulation is proposed. Increases in wildlife and habitat research and assessments would be focused on providing a strong scientific base for future management decisions.

Management of Public Uses. Under Alternative 4, there are numerous actions that would alter when, where, and how public uses would be allowed. Boating would be allowed at no-wake speeds on all areas of the lake open to the public from April 15 to September 30. Several portions of the Refuge would be closed to all public activity (see Map 9). The Refuge would not be open to nonwildlife-dependent activities including horseback riding, pet walking, bicycling, and ice skating.

Alternative 4 includes several elements to protect wildlife and enhance recreational experiences at the Refuge. To minimize conflicts with and improve the quality of the waterfowl hunt program, upland game hunting under Alternative 4 would no longer be allowed at the Lake Lowell Unit. Waterfowl hunting would be allowed on the south side of the Lake Lowell Unit from Parking Lots 1 to 8 with a daily limit of 25 shotgun shells per hunter.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 4, Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the Integrated Pest Management Plan) and restoration efforts. The islands' management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority. Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue and include wildlife observation and deer, upland and waterfowl hunting on 1,219 acres. The Snake River Islands Unit would be open for off-trail, free-roam activities from June 15 to January 31. Under Alternative 4, shoreline fishing would also be available from June 15 to January 31 each year on all islands.

Environmental Consequences

Implementation of each alternative presented in the Draft CCP/EIS would be expected to cause both beneficial and adverse impacts to Refuge resources, recreation opportunities, and local communities and their economies. The following briefly summarizes the various impacts anticipated from each of the three alternatives.

Alternative 1 (Status Quo). Overall, we anticipate Alternative 1 would have the least positive impacts to wildlife and habitats. It would also have a negative impact on wildlife-dependent activities. These adverse impacts would result primarily from future increases in visitation and, limited protections for wildlife from human-caused disturbance. Specific negative impacts would be associated with:

- Continued high-speed use of areas adjacent to sensitive habitats and wildlife species,
- Continued use of upland areas adjacent to sensitive habitats and wildlife species,
- Continued use of all trails by nonwildlife-dependent users,
- Continuation of current invasive species control program with minimal mapping, monitoring and/or increase in removal area, and
- Increases in visitation.

Important beneficial impacts from Alternative 1 would result from partnerships that could be formed to explore water quality improvement projects.

Alternative 2 (Preferred Alternative). We anticipate Alternative 2 would have greater long-term beneficial impacts on fish, wildlife, plants, and their habitats, as well as on recreation opportunities, than Alternative 1. Beneficial impacts would be related primarily to:

- Targeted seasonal closures of foraging, resting and nesting areas,
- Increases in planning, monitoring, and coverage area of invasive species removal,
- Enhancement of riparian, mudflat and emergent habitats through vegetation removal,
- A smaller increase in visitation than that found in Alternative 1,
- Increased access to quality hunting and fishing opportunities for youth and visitors with mobility impairments,
- Increases in visitor facilities, including a visitor contact station, trails, and blinds,
- Retargeting of the environmental education and interpretation programs to reach more on-site visitors,
- Opportunities for separation of nonwildlife-dependent uses from wildlife-dependent uses through the use of designated trails and no-wake zones,
- Seasonal opportunities for off-trail travel, and
- Partnerships to improve water quality.

Short-term adverse impacts may occur to air quality, visitors, wildlife, or habitats from research and restoration activities. Long-term negative effects may be felt by some hunters as nonhunters are allowed off-trail. Some long-term negative effects to wildlife and habitats may occur from the construction of new public use facilities.

Alternative 3. Alternative 3 is expected to result in additional beneficial impacts to wildlife, habitats, and nonconsumptive wildlife-dependent public uses than Alternative 2 but would negatively impact nonwildlife-dependent users more than Alternatives 1 and 2. Positive impacts from Alternative 3 would be related primarily to:

- Increases in habitat and wildlife protection from human-caused disturbance through larger and longer closures and no-wake zones than those found in Alternative 2,
- Regulations allowing upland uses on-trail only,

- Increases in planning, monitoring, and coverage area of invasive species removal,
- Enhancement of riparian, mudflat, and emergent-bed habitats through vegetation removal,
- A decrease in visitation from current levels, which would lead to less habitat and wildlife disturbance,
- Increased access to quality hunting and fishing opportunities for youth and visitors with mobility impairments,
- Increases in visitor facilities including a boardwalk, visitor contact station, trails, and blinds,
- Retargeting of the environmental education and interpretation programs to reach more on-site visitors,
- Increases in the quality of wildlife-dependent recreation through the removal of almost all nonwildlife-dependent upland uses, and
- Partnerships to improve water quality.

Negative impacts in Alternative 3 would mostly affect nonwildlife-dependent and consumptive wildlife-dependent recreation. Negative impacts to public uses from Alternative 3 would be related primarily to:

- Reductions in waterfowl and upland hunting acreage at Lake Lowell,
- Increased difficulty in reaching fishing sites in the East Pool due to the no-wake zone,
- Containment of high speed watercraft to the West Pool,
- Removal of almost all nonwildlife-dependent upland recreation, and
- Increases in closed areas over Alternative 2.

The enforcement of on-trail regulations would be expected to negatively impact wildlife observers and photographers.

Alternative 4. Alternative 4 is expected to result in the most long-term beneficial impacts to wildlife, habitats, and nonconsumptive wildlife-dependent public uses but would negatively impact nonwildlife-dependent users more than Alternatives 1, 2, and 3. Positive impacts from Alternative 4 would be related primarily to:

- Increases in habitat and wildlife protection from human-caused disturbance through larger and longer closures and no-wake zones than those found in Alternative 3,
- Regulations allowing upland uses on-trail only,
- Increases in planning, monitoring, and coverage area of invasive species removal,
- Enhancement of riparian, mudflat, and emergent-bed habitats through vegetation removal,
- Lower visitation rates then under Alternative 3, which would lead to less habitat and wildlife disturbance,
- Increased access to quality hunting and fishing opportunities for youth and visitors with mobility impairments,
- Increases in visitor facilities including a visitor contact station, trails, and blinds,
- Improvements to the environmental education program to better meet the needs of teachers,
- Increases in the quality of wildlife-dependent recreation through the removal of almost all nonwildlife-dependent uses, and
- Partnerships to improve water quality.

Negative impacts in Alternative 4 would mostly affect nonwildlife-dependent and consumptive wildlife-dependent recreation. Negative impacts to public uses from Alternative 4 would be related primarily to:

- Reductions in waterfowl hunting acreage at Lake Lowell,
- Removal of upland hunting from Lake Lowell,
- Increased difficulty in reaching fishing sites in the East Pool due to the entire lake being a no-wake zone,
- Removal of nonwildlife-dependent on-water recreation, and
- Removal of almost all nonwildlife-dependent upland recreation,

The enforcement of on-trail regulations would be expected to negatively impact wildlife observers and photographers.

More detailed information about the effects of various alternatives on wildlife, habitat, and public use can be found in Chapter 6.

Western screech owl
©Dick McKee

Chapter 1 Introduction and Background

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1.1 Introduction

Deer Flat National Wildlife Refuge (Refuge or NWR), located near the city of Nampa in southwest Idaho, is managed by the U.S. Fish and Wildlife Service (Service or FWS) as part of the National Wildlife Refuge System (NWRS or Refuge System). The mission of the NWRS is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. In this Draft Comprehensive Conservation Plan and Environmental Impact Statement (CCP/EIS) for the Refuge, we describe four alternatives for managing the Refuge for 15 years.

President Theodore Roosevelt established the Refuge in 1909 as the Deer Flat Reservation (Executive Order [E.O.] 1032), on Deer Flat Reservoir (Lake Lowell), the first reservoir completed for the Bureau of Reclamation's (Reclamation) Boise Project. Most of the Refuge is an overlay on Lake Lowell. The Refuge was established to provide refuge and breeding grounds for migratory birds and other wildlife, subject to use by the Department of Interior for reclamation work (E.O. 7655). This means that the Service has an obligation to manage uses of the Refuge consistent with the National Wildlife Refuge System Administration Act (Act) (16 U.S.C. 668dd-668ee, et seq.) and other laws, regulations, and policies governing the Refuge System, but our management may not interfere with operation of the reservoir for irrigation purposes. In 1994, compatibility determinations were created for upland uses occurring at the Refuge, but due to unanswered questions about administrative control, none were completed for on-water uses at that time. As a result of a pre-planning task prior to initiation of the CCP process, the Service and Reclamation concluded that in fact the US Fish and Wildlife Service National Wildlife Refuge System has jurisdiction over surface water and public uses on Lake Lowell. Now, because it has been determined that the Service has responsibility for the management of all public uses within the Refuge, including on-water recreational uses, these uses must be examined as part of the CCP process to ensure that they are legally compatible with the purposes of the Refuge.

The Refuge encompasses nearly 11,700 acres within two units: the Lake Lowell Unit and Snake River Islands Unit (see Maps 1 and 2). According to geographic information system (GIS) estimates, the Lake Lowell Unit covers more than 10,500 acres within Idaho's Canyon County, including the 9,000-acre overlay area on Lake Lowell. The Snake River Islands Unit includes approximately 1,200 acres on more than 104 islands scattered along 113 miles of the Snake River, between two states (Idaho and Oregon) and five counties (Canyon, Payette, Owyhee, and Washington Counties in Idaho; and Malheur County in Oregon).

1.2 History of the Landscape

The presettlement landscape of southwest Idaho was much different than it is today. Native Americans hunted and gathered on the lands in and around the Refuge, finding rich sources of food. The hills were filled with sagebrush, rabbitbrush, and native bunchgrasses that provided homes for wildlife ranging from burrowing owls to spadefoot toads, beetles to badgers, and butterflies to sparrows.

Euro-Americans, who traveled through this part of Idaho in the late 1800s and early 1900s and eventually settled here, recognized the harsh reality that little rain—less than 10 inches a year—fell upon this high desert environment. Even though occasional springs supplied much-needed water that fed grasses and attracted deer and elk, settlers realized that it was not enough to carve out a life.

By 1904, Idaho's first water reclamation project was initiated at Minidoka, which became the site of the first hydroelectric dam in the West. Impressed by the Minidoka Project, State Engineer D.W. Ross, and J.H. Lowell, President of the Boise-Payette Water Users Association, successfully lobbied Congress to fund an irrigation project for Boise, Idaho. When Federal funding fell short of what was needed, J.H. Lowell organized local farmers and raised matching funds to support the project. In 1906 work on the Deer Flat Reservoir began as part of the Boise-Payette Project. Materials from local quarries and the work of local citizens helped build the reservoir. When Deer Flat Reservoir was completed, it was the largest human-made reservoir on earth, held in by three dams and one dike. The longest dam, called the Lower Embankment (Lower Dam), stretches 1.5 miles. The tallest dam at 74 feet, the Upper Embankment (Upper Dam) is 0.75 mile long. The Deer Flat Reservoir was critical to the development of the Boise Basin.

In 1909, only three days after water was diverted from the Boise River into the New York Canal to fill Deer Flat Reservoir, President Theodore Roosevelt established the reservoir as the nation's twenty-first national wildlife refuge, calling it Deer Flat Bird Reservation (E.O. 1032). This overlay Refuge on Reclamation's irrigation reservoir was established to provide refuge and breeding grounds for migratory birds and other wildlife.

Reclamation operated Deer Flat Reservoir until April 1, 1926, when operation was turned over to the Boise Project Board of Control (Board of Control). The Board of Control was formed by contracts between Reclamation and five irrigation districts—Big Bend, Boise-Kuna, Nampa & Meridian, New York, and Wilder—representing the water users that make up the project. Reclamation retained the operation and maintenance of certain parts of the system, referred to as the "reserved works."

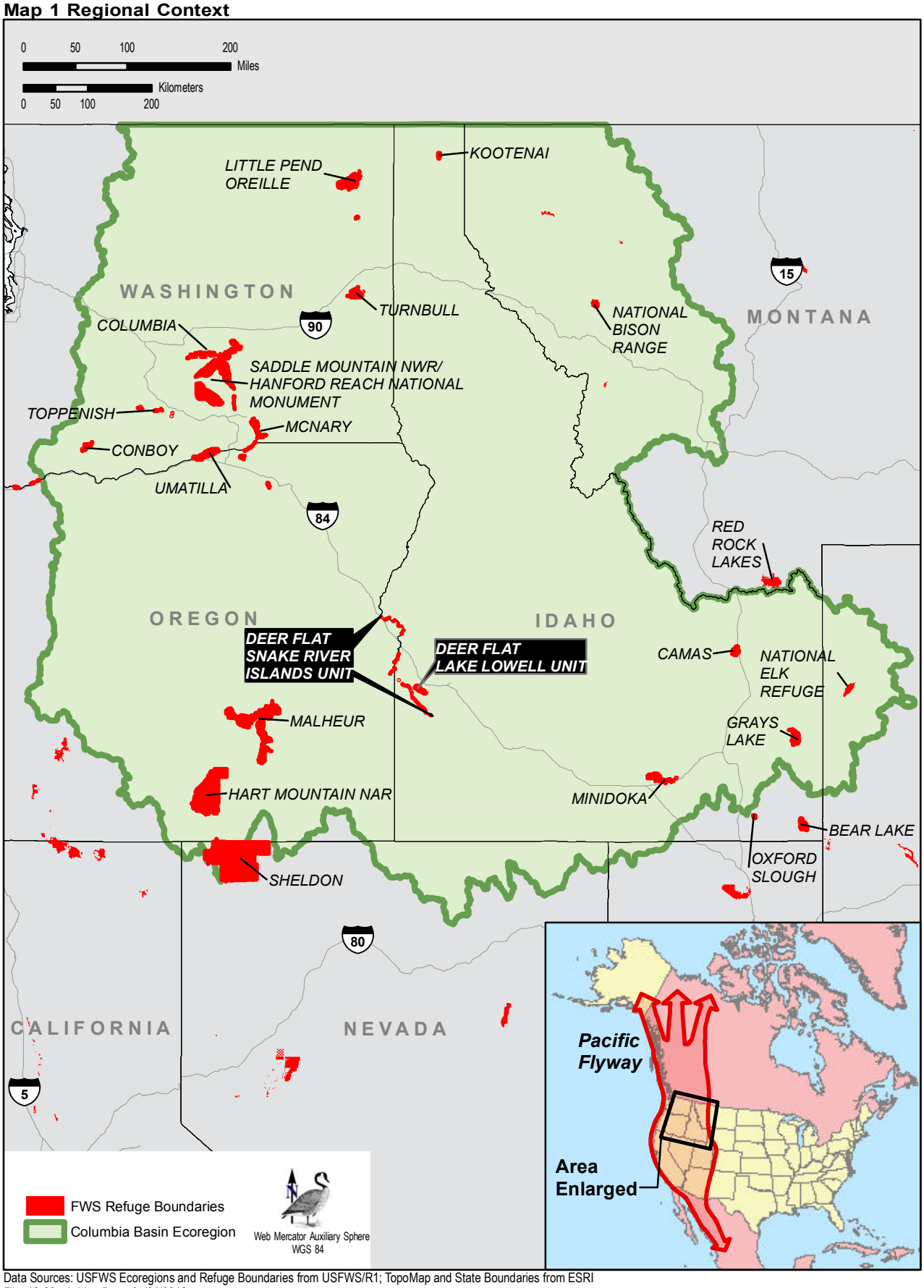
The Deer Flat Bird Reservation remained the only national wildlife refuge in southwest Idaho until 1937, when, through the efforts of President Franklin D. Roosevelt and J. Clark Salyer, 36 islands in the Snake River were designated as the Snake River Islands National Wildlife Refuge. Both Refuges were managed by the Deer Flat Bird Reservation, which was re-established and renamed Deer Flat Migratory Waterfowl Refuge (E.O. 7655).

In 1940, the Refuges were renamed the Deer Flat National Wildlife Refuge and the Snake River National Wildlife Refuge, and in 1963 the Refuges were consolidated as two units of Deer Flat National Wildlife Refuge. Deer Flat Reservoir was renamed Lake Lowell in 1948 in recognition of J.H. Lowell's work to develop the reservoir, and in 1976, the Lower and Upper Dams were included on the National Register of Historic Places because of their role in Idaho's history.

1.3 Biological Significance of the Refuge

Nestled in the rolling sagebrush hills of southwest Idaho, the Refuge provides a variety of wildlife habitats, including the open waters and wetland edges of the Lake Lowell Unit, sagebrush uplands and riparian forest around the lake, and grassland and riparian forests on the Snake River Islands Unit. Lake Lowell provides a resting and wintering area for migratory birds along the Pacific Flyway in the fall and winter, and important areas for nesting species in spring and summer. The Refuge is recognized by the National Audubon Society as a State Important Bird Area (Audubon 2012).

Map 1 Regional Context



Data Sources: USFWS Ecoregions and Refuge Boundaries from USFWS/R1; TopoMap and State Boundaries from ESRI
File: 12-005-1 Map Date: 05/04/2012

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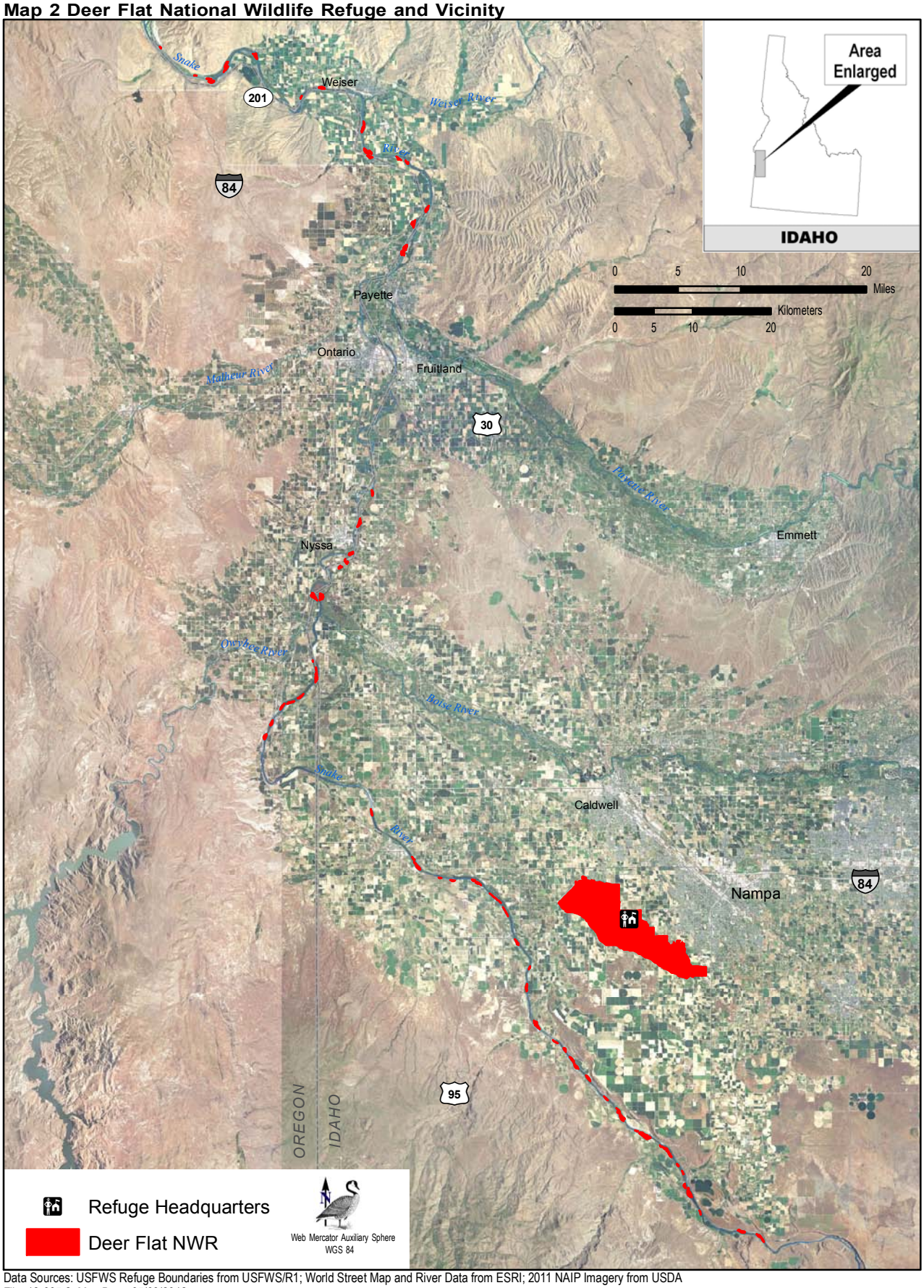
Map 2 Deer Flat National Wildlife Refuge and Vicinity



Data Sources: USFWS Refuge Boundaries from USFWS/R1; World Street Map and River Data from ESRI; 2011 NAIP Imagery from USDA
File: 12-005-2 Map Date: 05/03/2012

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In spring, bald eagles, ospreys, and great horned owls nest on both Refuge units, with most feeding nestlings by the end of April. In April and May, great blue herons, black-crowned night herons, and double-crested cormorants nest in large rookeries on some of the island in the Snake River Islands Unit, and up to 10,000 pairs of California gulls nest on Smith Island.

In early summer, western grebes dance on Lake Lowell while resident bald eagles look for food for their young. Visitors can see large numbers of white pelicans on the lake and large broods of Canada geese on pastures and fields adjacent to the Snake River. By late July and early August, mallards and wood ducks begin to congregate on the lake, looking for food in flooded vegetation.

As irrigation waters recede in late summer and early fall, the large exposed mudflats provide important feeding areas for shorebirds such as dowitchers, sandpipers, godwits, yellowlegs, and plovers, migrating south to wintering areas. The Intermountain West Shorebird Regional Plan (Oring et al. 2000) names Lake Lowell as one of only two sites in Idaho where more than 5,000 shorebirds were observed in more than half of the years surveyed.

As fall sets in, the number of birds using the Refuge increases. Resident flocks of ducks and up to 6,000 Canada geese are usually on Lake Lowell by the second week of October. As colder weather drives migrating ducks and geese south, migratory birds join the resident birds at the lake. Some birds pass through, while others spend the winter. By mid-November, the goose population peaks at up to 15,000 birds. Duck populations peak in mid-December, with up to 70,000 ducks using Lake Lowell annually. Mallards predominate, but small numbers of northern pintail, American wigeon, green-winged teal, wood duck, common merganser, and northern shoveler are also present. The Snake River also provides a winter home for a variety of ducks and geese.

Emergent vegetation along the edges of the lake, such as smartweed, provides a food source for waterfowl, nesting material for on-water nesting birds such as western and Clark's grebes, and cover for fish. Lake Lowell provides habitat for one of the three largest nesting colonies of western grebes in Idaho (pers. comm., C. Moulton 2010). Western and Clark's grebes are considered species of greatest conservation need by Idaho Department of Fish and Game (IDFG), because appropriate nesting sites are lacking (IDFG 2005).

Bald eagles, osprey, great blue herons, and other colonial nesting birds are attracted to the riparian areas of the Lake Lowell and Snake River Islands Units. The upland habitats of the Lake Lowell and Snake River Islands Units provide habitat for nesting California gulls and Canada geese and a variety of other native wildlife. The Snake River Islands' grassland, shrub, and riparian forest habitats and surrounding waters provide habitat throughout the year for herons, cormorants, songbirds, and predators, such as foxes, coyotes, red-tailed hawks, and American kestrels.

1.4 Proposed Action

We are proposing to implement a CCP for Deer Flat National Wildlife Refuge. This document is the Refuge's Draft CCP/EIS. CCPs set forth management guidance for a refuge for a period of 15 years, as required by the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee, et seq.), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). The Refuge System Administration Act requires CCPs to identify and describe:

- The purposes of a refuge;

- The fish, wildlife and plant populations, their habitats, and the archaeological and cultural values found on a refuge;
- Significant problems that may adversely affect wildlife populations and habitats and solutions for correcting or mitigating the effects of those problems;
- Areas suitable for administrative sites or visitor facilities; and
- Opportunities for fish- and wildlife-dependent recreation.

National Wildlife Refuge System planning policy (602 FW 3, June 2000) states that the purpose of CCPs is to "describe the desired future conditions of a refuge and provide long-range guidance and management direction to achieve refuge purposes; help fulfill the National Wildlife Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System; … and meet other mandates."

The proposed action in this Draft CCP/EIS is to implement Alternative 2, which has been identified as the Service's Preferred Alternative. We have developed and examined three other alternatives for future management of the Refuge and identified anticipated effects (see Chapter 6) for each alternative, pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347). A fifth alternative was partially developed then dismissed due to its similarity to Alternative 3.

The goals, objectives, and strategies under Alternative 2 (Preferred Alternative) best achieve the purpose and need for the CCP, while maintaining balance among the varied management needs and programs. Alternative 2 represents the most balanced approach for achieving the Refuge's purposes, vision, and goals; contributing to the Refuge System's mission; addressing relevant issues and mandates; and managing the Refuge consistent with the sound principles of fish and wildlife management. For details on the specific components and actions constituting the range of alternatives, see Chapter 2.

1.5 Purpose and Need for Action

The need for the CCP is to provide reasonable, scientifically grounded guidance for ensuring that over a period of 15 years, as directed by the National Wildlife Refuge System Administration Act of 1966, as amended, Deer Flat NWR will achieve the following purposes:

- Enhance, maintain, and protect Refuge habitats (including mudflats, emergent beds, and open water habitats of Lake Lowell, riparian forests, nonlake wetland habitats, and shrub-steppe habitat) for the benefit of migratory birds and other wildlife.
- Gather sufficient scientific information to guide responsible adaptive management decisions.
- Provide visitors compatible wildlife-dependent and nonwildlife-dependent recreational opportunities that foster an appreciation and understanding of the Refuge's fish, wildlife, plants, and their habitats, and have limited impacts to wildlife.
- Initiate and nurture relationships and develop cooperative opportunities to promote the importance of the Refuge's wildlife habitat, and support Refuge stewardship.
- Protect and manage the Refuge's cultural resources, and identify new ways to gain an understanding of the Lake Lowell and Snake River Islands Units' history and cultural resources.

1.6 Legal and Policy Guidance

The Refuge is part of the National Wildlife Refuge System, managed within a framework provided by legal and policy guidelines. The Refuge System is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems.

1.6.1 The U.S. Fish and Wildlife Service

The Refuge System is managed by the U.S. Fish and Wildlife Service, an agency within the Department of the Interior. The Service is the principal Federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife populations and their habitats. The mission of the Service is: "working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people." Although we share this responsibility with other Federal, State, Tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, endangered and threatened species, and certain anadromous fish and marine mammals. The Service has similar trust responsibilities for the lands and waters we administer to support the conservation and enhancement of fish, wildlife, plants, and their habitats. The Service also enforces Federal wildlife laws and international treaties for importing and exporting wildlife, assists with State fish and wildlife programs, and helps other countries develop wildlife conservation programs.

1.6.2 National Wildlife Refuge System

The needs of wildlife and their habitats come first on national wildlife refuges, in contrast to other public lands that are managed for multiple uses. Refuges are guided by various Federal laws and executive orders, Service policies, and international treaties. Fundamental are the mission and goals of the NWRS and the designated purposes of the refuge unit as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge.

Key concepts and guidance of the Refuge System derive from the National Wildlife Refuge System Administration Act of 1966 as amended (16 U.S.C. 668dd-668ee, et seq.); the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4), as amended; Title 50 of the Code of Federal Regulations (C.F.R.); and the Fish and Wildlife Service Manual. The National Wildlife Refuge System Administration Act is implemented through regulations covering the NWRS, published in Title 50, subchapter C of the C.F.R. These regulations govern general administration of units of the Refuge System.

1.6.2.1 National Wildlife Refuge System Mission and Goals

The mission of the Refuge System is to "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended).

The goals of the National Wildlife Refuge System, as articulated in the Mission Goals and Purposes Policy (601 FW 1) are to:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.

- Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that are strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

1.6.2.2 National Wildlife Refuge System Administration Act

Of all the laws governing activities on national wildlife refuges, the Refuge Administration Act undoubtedly exerts the greatest influence. The National Wildlife Refuge System Improvement Act (Improvement Act) amended the Refuge System Administration Act in 1997 by including a unifying mission for all national wildlife refuges as a system, a new process for determining compatible uses on refuges, and a requirement that each refuge be managed under a comprehensive conservation plan, developed in an open public process.

The Refuge Administration Act states that the Secretary shall provide for the conservation of fish, wildlife and plants, and their habitats within the Refuge System, as well as ensure that the biological integrity, diversity, and environmental health of the System are maintained. House Report 105-106 accompanying the Improvement Act states "the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." Biological integrity, diversity, and environmental health are critical components of wildlife conservation. As later made clear in the Biological Integrity, Diversity and Environmental Health Policy (601 FW 3), "the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions."

Under the Refuge Administration Act, each refuge must be managed to fulfill the Refuge System mission as well as the specific purposes for which it was established. The Refuge Administration Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge.

Additionally, the Refuge Administration Act identifies six priority wildlife-dependent recreational uses for the Refuge System (the "Big Six"). These uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Under the Refuge Administration Act, the Service is to grant these six wildlife-dependent public uses special consideration in the planning for, management of, and establishment and expansion of units of the NWRS. The overarching goal for wildlife-dependent public use programs is to enhance opportunities and access to quality wildlife-dependent visitor experiences on refuges, while managing refuges to conserve fish, wildlife, plants, and their habitats. When determined compatible on a refuge-specific basis, these six uses assume priority status among all uses of the refuge in question. The Service is to make extra efforts to facilitate priority wildlife-dependent public use opportunities.

When preparing a CCP, refuge managers must re-evaluate all general public, recreational, and economic uses (even those occurring to further refuge habitat management goals) proposed or

occurring on a refuge for appropriateness and compatibility. No refuge use may be allowed or continued unless it is determined to be appropriate and compatible. Generally, an appropriate use is one that contributes to fulfilling a refuge's purposes, the Refuge System mission, or goals or objectives described in a refuge management plan. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Appropriate use and updated compatibility determinations for existing and proposed uses for the Deer Flat Refuge are in Appendices A and B of this Draft CCP/EIS.

The Refuge Administration Act also requires that in addition to formally established guidance, the CCP must be developed with the participation of the public. Issues and concerns articulated by the public play a role in guiding alternatives considered during the development of the CCP, and with the formal guidance, can play a role in selection of the preferred alternative. It is Service policy to develop CCPs in an open public process; we are committed to securing public input throughout the process. Appendix H of the Draft CCP/EIS details public involvement that has occurred so far in the CCP process.

1.6.3 Other Laws and Mandates

Many Federal laws, executive orders, Service policies, and international treaties govern the Service and Refuge System lands. Examples include the Migratory Bird Treaty Act of 1918, Refuge Recreation Act of 1962, National Historic Preservation Act of 1966, and the Endangered Species Act of 1973. For additional information on laws and other mandates, a list and brief description of Federal laws of interest to the Service can be found in the Laws Digest at http://www.fws.gov/laws/Lawsdigest.html.

The Service has developed or revised numerous policies and Director's Orders to reflect the mandates and intent of the Improvement Act. Some of these key policies include the Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3); the Compatibility Policy (603 FW 2); the Comprehensive Conservation Planning Policy (602 FW 3); Mission, Goals, and Purposes (601 FW 1); Appropriate Refuge Uses (603 FW 1); Wildlife-Dependent Public Uses (605 FW 1); wilderness-related policies (610 FW 1-5); and the Director's Order for Coordination and Cooperative Work with State Fish and Wildlife Agency Representatives on Management of the National Wildlife Refuge System. These policies and others in draft or under development can be found at http://refuges.fws.gov/policymakers/nwrpolicies.html.

In developing a CCP, refuges must consider these broader laws and policies as well as Refuge System and ecosystem goals and visions. The CCP must be consistent with these and also with the Refuge's purpose.

1.7 Refuge Establishment and Purposes

1.7.1 Legal Significance of the Refuge Purpose

The purpose for which a refuge was established or acquired is of key importance in refuge planning. Refuge purposes must form the foundation for management decisions. They are the driving force in the development of the refuge vision statements, goals, objectives, and strategies in a CCP and are critical to determining the compatibility of existing and proposed refuge uses. The purposes of a

refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Unless the establishing law, order, or other document indicates otherwise, purposes dealing with the conservation, management, and restoration of fish, wildlife, and plants, and the habitats on which they depend, take precedence over other purposes in the management and administration of any unit. Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict. When an additional unit is acquired under an authority different from the authority used to establish the original unit, the addition takes on the purpose(s) of the original unit, but the original unit does not take on the purpose(s) of the newer addition. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the mission.

1.7.2 History of Refuge Establishment and Purposes

President Theodore Roosevelt originally established Deer Flat Bird Reservation in 1909 as a "preserve and breeding grounds for native birds" (E.O. 1032). As an overlay refuge, the purpose of the Refuge can in no way impede the irrigation purpose of the Reclamation reservoir. In 1937, President Franklin D. Roosevelt revoked E.O. 1032 and re-established the Refuge as the Deer Flat Migratory Waterfowl Refuge to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691) to serve "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge, respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Per national policy, any lands (including those in the Snake River Islands Refuge) that were added to Deer Flat Refuge assume the purposes for which Deer Flat Refuge was established, as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

The current Refuge purposes are:

- "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655, dated July 12, 1937).
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d, Migratory Bird Conservation Act)
- "suitable for—(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1, Refuge Recreation Act)
- "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2, Refuge Recreation Act).

For more information on Refuge establishment, see Appendix I.

1.7.3 Land Status and Ownership

Tables 1-1 and 1-2 and Maps 2 and 3 show the lands associated with the Refuge. The acreage figures are generated from our geographic information systems (GIS).

Table 1-1. Land Ownership Status

Refuge/Unit	Refuge Lands Owned in Fee (acres[1])	Refuge Lands Overlaid on Reclamation Lands (acres[1])	Total Acres[1]
Lake Lowell Unit	626	9,993	10,619
Snake River Islands Unit	1,219	0	1,219
Deer Flat NWR	**1,845**	**9,993**	**11,838**

[1] Acres generated from GIS are rounded to the nearest acre.

Table 1-2. Acquisition Authorities

Land Tracts	Acquisition Authority	Total Acres[a]
Lake Lowell Tract 4 (Refuge Maintenance Area)	Migratory Bird Conservation Commission	73
Lake Lowell Tract 5 (Gotts Point)	Migratory Bird Conservation Commission	61
Lake Lowell Tract 8	Migratory Bird Conservation Commission	13
Lake Lowell Tract 51 (Leavitt Tract)	Migratory Bird Conservation Commission	80
All other Refuge lands	Executive Orders, Presidential Proclamation, Public Land Orders and Mitigation	11,612

[a] Rounded to the nearest acre.

1.7.4 Special Designation Lands

1.7.4.1 Important Bird Area

The Important Bird Areas (IBA) program is a global effort to identify the most important areas for maintaining bird populations and focusing conservation efforts on protecting these sites. Within the United States, the program has been promoted and maintained by the American Bird Conservancy (ABC) and the National Audubon Society (Audubon). The ABC coordinates the identification of nationally significant IBAs, while Audubon identifies sites in individual states that provide critical habitat for birds. This effort recognizes that habitat loss and fragmentation are the most serious threats to birds across North America and around the world. By working through partnerships, principally the North American Bird Conservation Initiative, to identify those places that are critical to birds during some part of their life cycle (breeding, wintering, feeding, migrating), the IBA program hopes to minimize the effects that habitat loss and degradation have on bird populations.

Idaho's IBA program was launched in 1996 as a partnership between Idaho Partners in Flight and the Idaho Audubon Council. Since 1997, the IBA Technical Committee has encouraged and reviewed nominations for potential IBAs. To date, 55 sites have been officially recognized as IBAs in Idaho, representing 3.8 million acres of public and private wetland and upland habitat throughout the state. The IBA Program in Idaho is currently housed in the Nongame and Endangered Wildlife Program of the Idaho Department of Fish and Game (IDFG 2005).

In order to be identified as an IBA, sites must meet criteria in at least one of the following categories: species of conservation concern (e.g., threatened and endangered species); range-restricted species (species vulnerable because they are not widely distributed); species that are vulnerable because their populations are concentrated in one general habitat type or biome; and species, or groups of similar species (such as waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregative behavior (Audubon 2012).

Deer Flat Refuge was identified as a State IBA based on three criteria: importance for waterfowl (State Criteria D4ii), for other colonial waterbirds (State Criteria D4iv), and for shorebirds (State Criteria D4v). Waterfowl, especially Canada geese and mallards, use the Refuge for breeding, as a wintering area, and as a migratory stopover. Colonial waterbirds nest on both Lake Lowell and the Snake River Islands Units of the Refuge, including California gulls, great blue herons, black-crowned night herons, double-crested cormorants, and western and Clark's grebes. The mudflats at Lake Lowell are such a highly used stopover for shorebirds during summer and fall migration, that Lake Lowell is one of only two sites in Idaho with greater than 5,000 shorebirds observed in more than half the years it was surveyed (Oring et al. 2000). Some of the shorebirds present in late summer and fall include pectoral, least, Baird's, solitary, spotted, and stilt sandpipers; marbled godwits; and long-billed dowitchers.

1.8 Relationship to Ecosystem Management Efforts

When developing a CCP, the Service considers the goals and objectives of existing national, regional, state, and ecoregion/ecosystem efforts, plans, and assessments. The CCP is to be consistent with existing plans and assist in meeting their conservation goals and objectives (602 FW 3). This section summarizes some of the key plans reviewed by the CCP planning team during development of the Draft CCP/EIS.

1.8.1 Relationship to Previous Refuge Plans

Because this is the first CCP written for the Refuge, it will be the first management plan to fully implement the National Wildlife Refuge System Improvement Act of 1997. Although earlier plans made attempts to address conflicts between public use and wildlife, these plans made little mention of the scientific information used to determine the appropriate actions to take. Plans created after the passage of the National Wildlife Refuge Administration Act of 1966 are summarized here, because in that period, guidance for Refuge activities more closely aligns with the guidance provided for CCPs in the National Wildlife Refuge System Improvement Act.

- A Master Plan was developed in 1968 with a Recreation Management Plan completed shortly thereafter. These plans express a need to put wildlife first: "Foremost among refuge objectives is the preservation and management of the waterfowl and other wildlife resources. Public use of the refuge is and will continue to be a subordinate refuge objective" (USFWS 1970). The public use regulations at this time did not allow any motorized boats in the southeast end of the Refuge (USFWS 1968). The Recreation Management Plan also states, "Those uses associated with wildlife and wildlife environments are regarded as highest in objective even though they may be lower in number of participation visits than other uses," making it clear wildlife-dependent activities were to receive higher priority status than nonwildlife-dependent uses.

- A Master Plan written around 1980 boasts a wide variety of crops being grown around the Refuge including cereal grains, and corn. The planners go on to express concerns about the conversion of agricultural land to urban areas, and of wildlands to agricultural lands (USFWS 1980). The planners also imply that Refuge visitation would increase because high gasoline prices would spur users to stay close to home.
- A Refuge Management Plan was also signed in 1990 and had a draft update in 1996 (USFWS 1996). This plan emphasizes the Refuge's importance to wildlife and wildlife-dependent recreation. This plan states the need for clearly defined jurisdiction over recreational activities.

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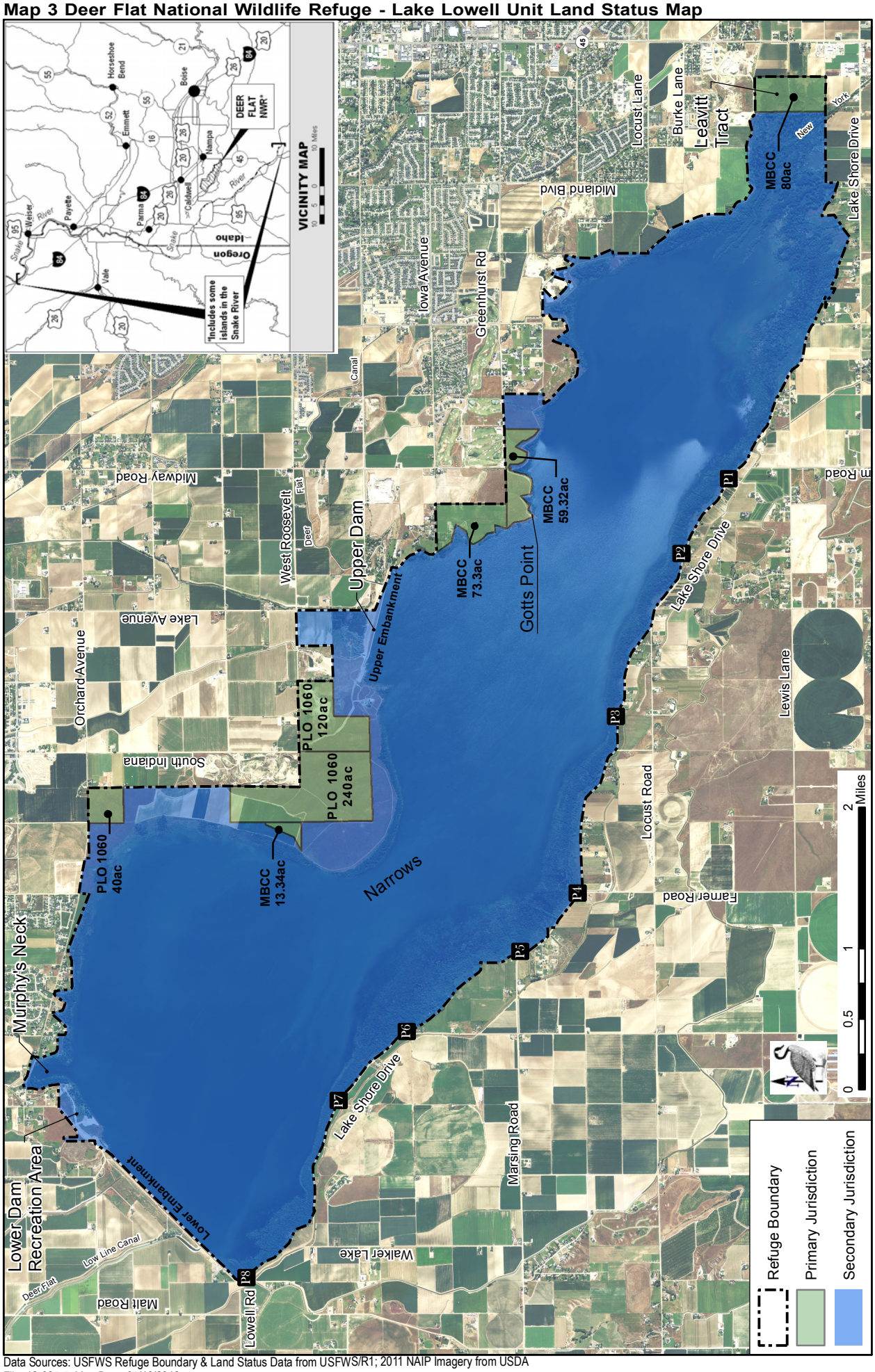
Map 3 Deer Flat National Wildlife Refuge - Lake Lowell Unit Land Status Map



Data Sources: USFWS Refuge Boundary & Land Status Data from USFWS/R1; 2011 NAIP Imagery from USDA
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1.8.2 Relationship of Refuge CCP to Other Ecosystem Planning and Assessment Efforts

A brief summary of the major regional conservation plans and efforts we considered in the development of this CCP and the priority resources of concern (see Appendix E) follows.

Landscape Conservation Cooperatives. Interior Secretary Ken Salazar directed Department of the Interior bureaus to initiate the development of the Landscape Conservation Cooperative (LCC) network as a response to landscape-scale stressors, including climate change (Secretarial Order Number 3289, September 2009). The LCC network is composed of 22 individual LCCs, and Deer Flat Refuge lies within both the Great Basin LCC and the Great Northern LCC. These LCCs are public-private partnerships composed of States, Tribes, Federal agencies, nongovernmental organizations, universities, and others. The LCCs develop science-based conservation plans across a large geographic area to address environmental challenges and ensure the sustainability of America's land, water, wildlife, and cultural resources (www.fws.gov/science/shc/lcc.html). Through this CCP, we will identify opportunities to obtain and share survey and research data on wildlife, habitat, and biological processes.

Idaho Comprehensive Wildlife Conservation Strategy (IDFG 2005). In 2001, the U.S. Congress began to appropriate Federal funds through the State Wildlife Grants program to assist states with fish and wildlife conservation efforts. Along with this new funding came the responsibility of each state to develop a comprehensive wildlife conservation strategy (CWCS). IDFG prepared its CWCS in 2005 (IDFG 2005) to coordinate the efforts of partners working toward the conservation of wildlife and wildlife habitats across the state. The aim of Idaho's CWCS is to provide a common framework that will enable conservation partners to jointly implement a long-term approach for the benefit of species of greatest conservation need (SGCN). The CWCS identifies 229 SGCN (103 invertebrates, and 126 vertebrates) and associated habitats; provides an ecological, habitat-based framework to aid in the conservation and management of SGCN; recommends actions to improve the population status and habitat conditions of SGCN; and describes an approach for long-term monitoring to assess the success of conservation efforts and to integrate new information as it becomes available. The CWCS "promotes proactive conservation to ensure cost-effective solutions instead of reactive measures enacted in the face of imminent losses" (IDFG 2005).

Pacific Flyway Management Plan for the Pacific Population of Western Canada Goose (Subcommittee on Pacific Population of Canada Geese [SPPCG] 2000). This plan provides guidelines to wildlife agencies responsible for the management of the Pacific population of Western Canada geese. The plan aims to maintain the distribution of the Pacific population of Western Canada geese while optimizing recreational opportunities and controlling depredation and nuisance problems. The plan provides several management recommendations, including population monitoring, harvest management, and research.

North American Waterfowl Management Plan **and** ***Coordinated Implementation Plan for Bird Conservation in Idaho, Version 2005*** (North American Waterfowl Management Plan Committee [NAWMPC] 2004 and Intermountain West Joint Venture [IWJV] 2005, respectively). *The North American Waterfowl Management Plan* is an international action plan, signed by the United States, Canada, and Mexico, to conserve migratory birds throughout the continent. The goal of the plan is to return waterfowl populations to their 1970s levels by conserving wetland and upland habitats.

Transforming the goals into on-the-ground actions is accomplished through partnerships called joint ventures. Joint ventures are made up of individuals, corporations, conservation organizations, and local, State, Provincial, and Federal agencies. Habitat joint ventures restore and enhance wetlands and associated upland habitats.

Partners in Flight, North American Landbird Conservation Plan (Rich et al. 2004). *The North American Landbird Conservation Plan* gives Partners in Flight Watch List status to birds that it deems are threatened by loss or degradation in habitat, and small or declining populations or species distribution. It also identifies "stewardship species" that should be considered in conservation planning due to their representation of large avifaunal biomes. The plan identifies research and monitoring needs and attempts to create estimates of landbird species populations.

Idaho Bird Conservation Plan, Version 1 (Idaho Partners in Flight 2000). *The Idaho Bird Conservation Plan* focuses on restoring and maintaining high-priority habitats with the goal of maintaining healthy communities of priority bird species. Three of the four priority habitats identified by the plan (i.e., riparian, nonriverine wetlands, and sagebrush shrublands) can be found on Deer Flat NWR. The plan provides strategies for meeting habitat and population objectives for these priority species and habitats.

Intermountain West Regional Shorebird Plan, Version 1 (Oring et al. 2000). *The United States Shorebird Conservation Plan* (Brown et al. 2001) includes 11 regional plans reflecting major shorebird flyways and habitats within the United States. The Intermountain West Regional Working Group was formed under the auspices of the national plan to formulate shorebird management goals for the Intermountain West. The purpose of this management plan is to address shorebird management needs on a regional basis while considering both Pacific Flyway and national levels of need.

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) notes that perhaps a million shorebirds breed in the Intermountain West and millions more migrate through the area each year. The plan recognizes that finding ample high-quality fresh water will be the greatest challenge faced by shorebirds in the Intermountain West in the future. The regional plan articulates seven goals, plus associated objectives and strategies related to habitat management, monitoring and assessment, research, outreach and planning. The planning goal includes objectives to coordinate shorebird planning and projects with other migratory bird initiatives and specifically with the Intermountain West Joint Venture. The Intermountain West Regional Shorebird Plan identifies 11 shorebird species that regularly breed in the region, as well as 23 additional species that are annual migrants.

North American Waterbird Conservation Plan* and *Intermountain West Waterbird Conservation Plan (Kushlan et al. 2002 and Ivey and Herziger 2006, respectively). *The North American Waterbird Conservation Plan* attempts to "sustain the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and nonbreeding waterbirds … throughout the lands and waters of North America" (Kushlan et al. 2002). It includes goals for species and populations, habitats, education and information, and coordination and integration. One strategy under the coordination and integration goal seeks to develop regional step-down plans.

The Intermountain West Waterbird Conservation Plan (Ivey and Herziger 2006). *The Intermountain West Waterbird Conservation Plan* is one of several regional step-down plans designed to implement the *North American Waterbird Conservation Plan*. Waterbirds are wetland-dependent species including both colonial breeders (e.g., gulls, terns, most grebes, cormorants,

herons, egrets, ibis, and pelicans), and solitary nesting marshbirds (e.g., cranes, rails, coots, bitterns, and loons). Shorebirds and waterfowl are covered by other bird conservation initiatives and are therefore excluded from this plan. The goal of this plan is to maintain healthy populations, distributions, and habitats of waterbirds throughout the Intermountain West region.

Columbia Plateau Ecoregional Assessment (Andelman et al. 1999). *The Columbia Plateau Ecoregional Assessment* attempts to identify an approach to maintaining long-term viability of imperiled species and natural systems on an ecosystem level. The assessment recognizes that management actions are often needed that would cross agency, governmental, and geographical boundaries. The assessment ties together site-specific conservation actions to a regional scale to help effect change on a larger scale. The conservation goal for the Columbia Plateau Ecoregion as set forth by the assessment is "the long-term survival of all viable native species and community types in the ecoregion" (Andelman et al. 1999).

1.9 Planning and Issue Identification

1.9.1 Planning Process Overview

A core planning team identified priority Refuge species, a work plan, a communication and outreach plan, and preliminary issues to be addressed in the CCP. See Appendix J for a list of core planning team members.

To ensure that the CCP/EIS was developed collaboratively with the larger community of scientists, land managers, and partners, valuable input was sought from an extended team whose members participated in wildlife habitats and public use reviews during preplanning; this extended team also provided technical expertise, assisted with data collection, and reviewed and provided feedback during development of the Draft CCP/EIS. The extended team consisted of various professionals from other agencies and divisions within the Service. See Appendix J for a list of extended team members.

Early in the planning process, the core planning team identified several priority resources of concern for the Refuge (see Chapter 4 and Appendix E) based on a thorough review of regional plans and input from extended team members during a wildlife and habitat review in 2008. Wildlife and habitat goals and objectives were designed around the habitat requirements of species designated as priority resources of concern. The analytical framework for identifying the resources of concern and for devising appropriate conservation objectives and strategies was based on the Service's draft *Identifying Resources of Concern and Management Priorities for a Refuge: A Handbook* (USFWS 2009b).

Public use planning centered on developing goals, objectives and strategies around the Refuge System's six priority wildlife-dependent public uses—hunting, fishing, wildlife observation and photography, and environmental education and interpretation—and existing, compatible nonwildlife-dependent public uses, as well as the transportation and infrastructure associated with both types of uses.

Our planning process benefitted from public input, which began in July 2010 with public scoping of issues and opportunities to include in the CCP. During July, August, and September 2010, public comments were solicited through the distribution of planning updates, in our public scoping

meetings, and through outreach to stakeholder groups. Public scoping continued in September 2010, when we held public work sessions to generate strategies to use in the creation of CCP/EIS alternatives. In December 2010, a planning update was issued summarizing the public comments we received during public scoping.

In May 2011, a planning update was issued to solicit comments on an interim planning product, our preliminary draft alternatives. The preliminary draft alternatives were created to give the public an idea of the spectrum of alternatives that the Refuge was considering and ask for comments on how to improve these alternatives. Public comments were solicited on the preliminary alternatives through public open houses and outreach to stakeholder groups. In addition, extended team meetings that included representatives from IDFG, the Boise Project Board of Control, Oregon Department of Fish and Wildlife (ODFW), and others, were held in June 2011 to discuss the merits and issues of the preliminary draft alternatives and strategies. In October 2011, a planning update was issued summarizing public comments and the potential revisions to the preliminary draft alternatives resulting from those comments. A more detailed summary of public involvement to date is in Appendix H.

The CCP process facilitates incremental development of the CCP/EIS with public involvement at key steps. An internal draft of the Refuge's CCP/EIS was distributed to extended team reviewers in April 2012 for comments. We considered all comments from the public and extended team during the development and evolution of our alternatives for this Draft CCP/EIS. We are opening a public comment period of 45 days or more on the Draft CCP/EIS, and we may modify Alternative 2, the Preferred Alternative, in the Final CCP/EIS based on the input we receive from the public and from other agencies and organizations. Thirty days after the Final CCP/EIS has been released to the public, the Regional Director for the Service's Pacific Region can select an alternative for implementation. We will document the decision in a Record of Decision, and announce it in a Federal Register notice and planning update.

1.9.2 Major Issues to be Addressed in the CCP

The planning team evaluated the issues and concerns raised during public scoping. Issues are defined as matters of controversy, dispute, or general concern over resource management activities, the environment, land uses, or public use activities. Identifying issues to address in the CCP is an important part of the planning process. Issues influenced the types of information we gathered and helped us define alternatives for the CCP. It is the Service's policy to focus planning and analysis on major issues that are within the Refuge's jurisdiction and that have a positive or negative effect on the Refuge's resources. The following issues, concerns, and opportunities were considered in the development of the Draft CCP/EIS.

1.9.2.1 Wildlife and Habitat Management

- **How should Refuge habitats be managed for resident and migratory wildlife species?** Other than invasive species removal and post-wildfire restoration activities, there has been minimal habitat manipulation at the Lake Lowell Unit in recent years. We identify opportunities to improve nesting and resting habitats for migratory birds in the Draft CCP/EIS, through habitat adjustments and more efficient and effective methods of invasive species removal across the Refuge.

- **Which habitats should the Refuge consider priorities for active management?** Recent habitat management projects have been focused on the Lake Lowell Unit, with very little occurring on the Snake River Islands Unit. Given the importance of healthy riparian habitats along the river corridor, the possibility of shifting habitat management priorities to the Snake River Islands Unit is analyzed in the Draft CCP/EIS, as are strategies that would increase the efficiency and effectiveness of our island habitat management.

- **What are our biological research and monitoring priorities?** In order to better manage Refuge habitats for the good of wildlife, the Refuge needs to gain a better understanding of how:
    - Wildlife use the Refuge;
    - Wildlife/human interactions affect wildlife use of the Refuge;
    - Wildlife use patterns change over time; and
    - Environmental factors (e.g., contaminants) impact wildlife.
- **What is the Refuge's role in improving water quality?** Although water quality issues are not within the management authority of the Refuge, contaminants in the lake may have an impact on wildlife resources and recreational opportunities at the Refuge. Before looking at ways to reduce contaminants, we must first identify and quantify their presence, and assess their impacts on the public and wildlife. Once there is a better understanding of the contaminants issue, the Refuge will be able to work with partners to address the problem and look for solutions.

- **How does the Refuge address the issue of invasive and undesirable nonnative plant and animal species?** Controlling invasive plant species on the Refuge is challenging. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species. Propagules from invasive plants spread to new areas easily from clothing or equipment. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife.

  Some of the first Refuge Managers documented issues with feral cats and dogs on the Refuge. This problem has expanded as the human population near the Refuge continues to increase. These invasive animals can negatively impact wildlife in many ways (e.g., destroying nests and killing or chasing wildlife). Carp are another species that affect wildlife by reducing water quality, destroying habitat, and feeding on smaller fish and fish eggs. What strategies would efficiently and effectively control invasive and undesirable nonnative species?

1.9.2.2 Public Use Management

- **How can the Refuge provide more quality opportunities for wildlife-dependent recreation to visitors of differing abilities without creating an undesirable level of disturbance to wildlife and habitats?** Refuges are tasked with providing hunting, fishing, wildlife observation and photography, and environmental education and interpretation opportunities for the public, without negatively impacting the purpose of the Refuge (i.e., refuge and breeding grounds for migratory birds and other wildlife). Regional populations and Refuge visitation have increased substantially in recent years. Increased visitation is likely to increase disturbance to wildlife, possibly to levels that may alter wildlife movements, impact productivity, and reduce available food resources. In the CCP we identify

ways to increase the quality of and opportunities for these wildlife-dependent activities without increasing disturbance to an unacceptable level. We also identify ways to increase accessibility of these wildlife-dependent Refuge activities for people of all levels of physical ability.

- **Can the Refuge provide opportunities for nonwildlife-dependent recreation in a way that does not negatively impact wildlife, habitats, and visitors engaging in wildlife-dependent recreation and education?** The population surrounding the Refuge and visitation to the Refuge has increased over time. This has resulted in greater demand for nonwildlife-dependent recreation such as high-speed boating, jogging, bicycling, and other activities, which increases the potential for impacts to wildlife, habitats, and wildlife-dependent visitors. If nonwildlife-dependent uses are to continue on the Refuge, we must balance these uses with protecting wildlife and habitat and providing quality wildlife-dependent uses.

- **How can the Refuge increase the quality of its waterfowl and upland hunts?** Some hunters have voiced concerns in the past about the crowded conditions surrounding the waterfowl hunt at Lake Lowell Unit. There is also question as to whether or not the Refuge can provide a quality upland hunt opportunity. Strategies meant to reduce hunter conflict, increase safety, and assess the quality of Refuge hunting opportunities are addressed in the plan.

- **How should limited Refuge resources be allocated between environmental education programs as compared to outreach and interpretation to the general visitor?** Many visitors do not know that they are on a national wildlife refuge or what the purpose of the Refuge is. Would it be better to increase interpretive programs for the general visitor, so they have a better understanding of what a national wildlife refuge is and have an opportunity to experience the Refuge in a new way? Or is it better to continue to focus on structured environmental education programs for children from local schools.

- **How can the Refuge improve safety for its visitors and reduce the amount of illegal activity?** In the past, there were at least two dual-function Refuge Law Enforcement (LE) officers. Currently, the Refuge does not have a Refuge LE officer assigned to it. The Service's Zone LE officer, who is responsible for eastern Oregon, eastern Washington, all of southern Idaho, and northern Nevada, provides LE assistance. Assistance is also provided by the Canyon County Sheriff's Office, the Canyon County Marine Deputies, and IDFG Conservation Officers, but these agencies have their own priorities and obligations. In order to decrease illegal activity without increasing the burden on local law enforcement, the Refuge may need to implement technological solutions such as automatic gates, cameras, and better lighting. Developing agreements with other law enforcement agencies to enforce Refuge regulations could improve visitor experiences.

1.9.3 Issues outside the Scope of the CCP

Although CCPs are very comprehensive plans, no single plan can cover all issues. The planning team has compiled a list of issues that are currently considered to be outside the scope of this CCP.

- **Deer hunting.** A new Lake Lowell Unit deer hunt was addressed in a recent environmental assessment (USFWS 2011a) and hunt package. The hunt was approved in September 2012

and began in October 2012. Because impacts of the Lake Lowell deer hunt were so recently assessed, the Lake Lowell deer hunt is outside of the scope of the CCP.

- **Development.** Development that reduces habitat, impacts wildlife, or increases pollution outside of the Refuge borders could impact the wildlife and habitats of the Refuge. We may discuss partnering with local entities to identify areas of concern for future development in the CCP, but the Refuge does not have the authority to restrict or direct future county or city development on lands outside the Refuge. Managing development outside the Refuge's boundary is within the management control of city and county governments, not the USFWS.

- **Fisheries management.** Service policy requires us to develop a fisheries management plan. The plan will be developed in close coordination with IDFG.

- **Lake Lowell water levels.** The Refuge received comments expressing concern that using the water in Lake Lowell to meet biological goals and objectives would reduce the amount of water available to local irrigators. The Refuge is an overlay refuge on a Reclamation reservoir, and Reclamation has primary jurisdiction over the manipulation of water levels of Lake Lowell. The executive order that established Deer Flat NWR states the Refuge does not have the legal authority to manipulate water levels.

- **Reclamation Zone activities.** The Reclamation Zones are located to the west of the Lower Dam and to the north of the Upper Dam. These areas are within the boundary of the Refuge but are legally managed by Reclamation. Management of all activities in these areas is outside the scope of the CCP.

- **Refuge boundary.** No modifications to the Refuge boundary were considered or are proposed in this Draft CCP/EIS. Individual boundary issues are researched as issues arise.

- **Restructuring of priority and nonpriority recreational activities.** Because the concepts of priority/nonpriority and wildlife-dependent/nonwildlife-dependent are found in the National Wildlife Refuge System Administration Act of 1966, as amended, and are a matter of law, making changes to these categories is not within the scope of the CCP.

- **Snake River boating.** The Snake River is considered navigable waters and is not managed by the Service. This issue is not within the jurisdiction of Deer Flat NWR, and therefore it is outside of the scope of the CCP.

- **Snake River water flows.** Water levels on both the Snake River and Lake Lowell are outside of the management control of the Service.

- **Water quality control.** Although water quality is extremely important to the health of the wildlife and habitats of Deer Flat NWR, many of the forces influencing water quality are not within the management control of the USFWS. Refuge staff may partner with other agencies to create solutions to the water quality problem and assist in implementation of the total maximum daily load plan proposed by the Department of Environmental Quality.

1.10 Refuge Goals

Refuge management goals are descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose, but they do not define measurable units. Goals must support the Refuge vision and describe the desired end result.

1.10.1 Wildlife and Habitat Goals

Goal 1: Protect, maintain, and enhance viable mudflat, emergent–bed, and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife.

Goal 2: Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Goal 3: Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Goal 4: Protect, maintain, and enhance shrub-steppe habitats characteristic of the historical Columbia Basin.

Goal 5: Protect, maintain and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife.

Goal 6: Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources.

1.10.2 Public Use and Cultural Resources Goals

Goal 1: Visitors of all ages will enjoy native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat.

Goal 2: Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 3: Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 4: Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats.

Goal 5: Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors.

Goal 6: The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 7: The Refuge will protect and manage its cultural resources and look for ways to gain new understanding of the history and cultural resources of both the Lake Lowell Unit and the Snake River Islands Unit.

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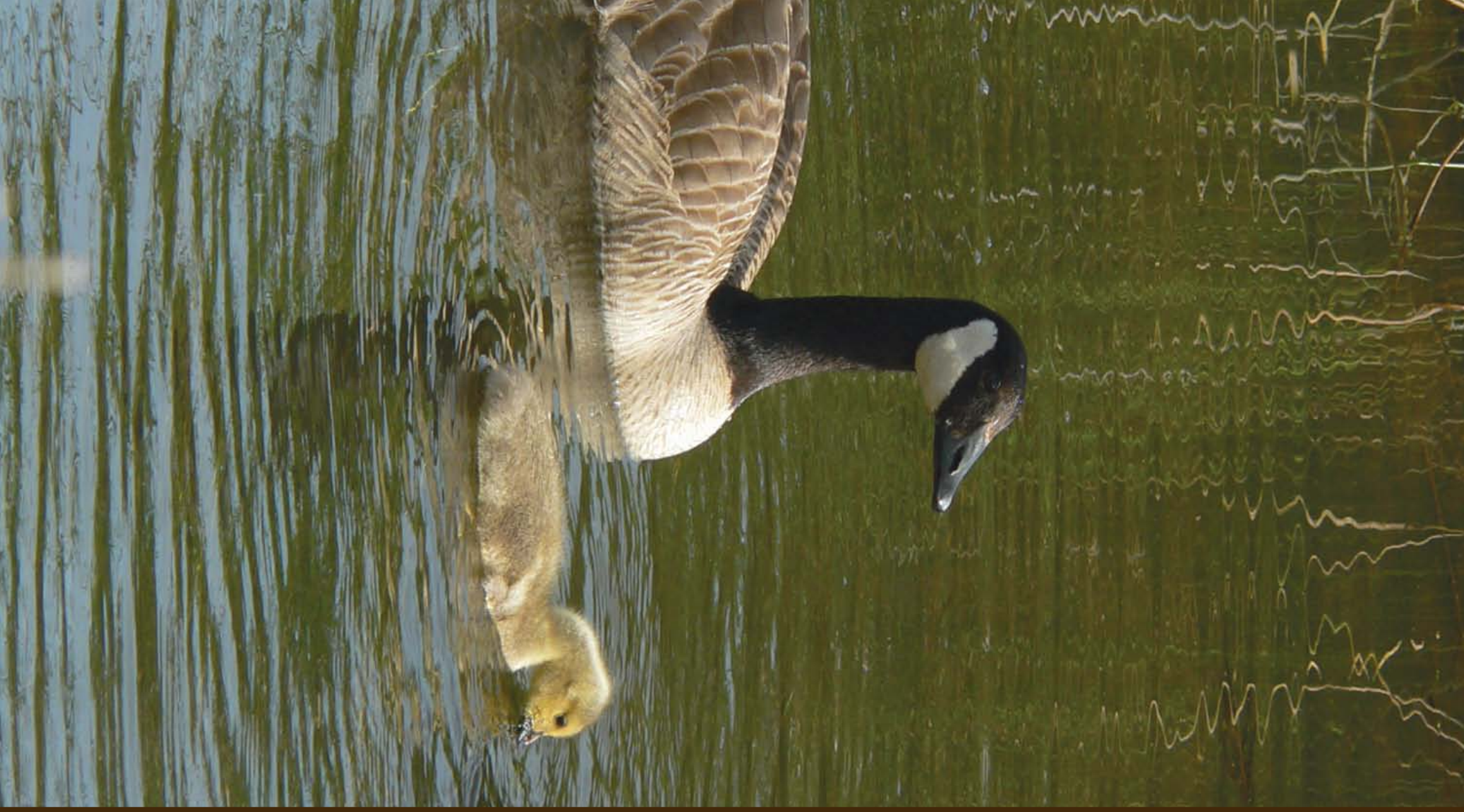

Canada goose and gosling
Jennifer Brown-Scott, USFWS

Chapter 2 Alternatives, Goals, Objectives, and Strategies

Chapter 2 Alternatives, Goals, Objectives, and Strategies

2.1 Considerations in Alternative Designs

The Refuge's purposes (see Chapter 1) serve as the foundation on which this long-term conservation plan is constructed as mandated by the NWRS Administration Act of 1966, as amended (16 U.S.C. 668dd-668ee, et seq.). Deer Flat Refuge's purposes and natural resource considerations are therefore fundamental in formulating alternatives for this CCP. In drafting the alternatives for this plan, the Service also reviewed and considered a variety of resource, social, economic, and organizational aspects important for managing the Refuge. These background conditions are described more fully in Chapters 1, 3, 4, and 5. As is appropriate for a national wildlife refuge, resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) states that "the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

Alternatives development was an iterative process that began with the planning team developing the draft Refuge vision statement, goals, and objectives. After reviewing available scientific reports and studies to better understand ecosystem trends and the latest scientific recommendations for species and habitats, the core team generated a list of important issues related to the management of the Refuge through a collaborative process involving FWS staff, cooperating agencies, and local stakeholders. The general public provided comments during the first scoping comment period from July through September 2010 and again in response to preliminary draft alternatives from May through July 2011. All substantive comments submitted during these steps were considered in developing these alternatives (see Appendix H for a detailed discussion of public involvement). Due to issues raised about safety, negative impacts to priority public uses, and interest in preserving some lower impact nonpriority public uses, a new alternative was added to the draft alternatives. This alternative is presented as Alternative 2, the Preferred Alternative.

2.2 Actions/Alternatives Considered but Dismissed

The alternatives development process under NEPA is designed to allow the planning team to consider a wide range of issues and feasible management actions. Actions and alternatives that are not feasible, are unsafe, that impact critical resources, or are incompatible with Refuge goals may be considered but then eliminated from further analysis. During the alternatives development process, the planning team considered the actions detailed below. All of these actions were ultimately eliminated from further analysis for the reasons provided.

Public Access in Closed Areas. Deer Flat NWR, like many refuges, has explicit purposes that were put in place over the past century. One of these purposes is "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds (16 U.S.C. 715d, Migratory Bird Conservation Act)." Year-round and seasonal closures give the animals that use these areas a place to rest, feed, breed, and raise young with reduced disturbance. Therefore, closure of areas year-round or seasonally would continue to be an important management tool at Deer Flat NWR.

Additional Nonwildlife-dependent Uses. Several nonwildlife-dependent uses that currently do not occur on the Refuge were considered but eliminated from further study. These activities have been determined to have unacceptable levels of disturbance to wildlife or unacceptable public safety

issues, or they would interfere with users engaged in compatible wildlife-dependent uses. Therefore, these uses were not included in the range of alternatives. Based on guidance in the Service's Appropriate Uses Policy 603 FW 1 (2006), these uses were determined to be not appropriate. For further details, see Appendix A.

Loop Bike Trail. A proposal to install a bike trail inside the Refuge boundary around the entire Lake Lowell Unit was considered but rejected because it would remove habitat and increase disturbance to wildlife and wildlife-dependent recreationists. In addition, the existence of wildlife closure areas on the Refuge would make it impossible to have a bike loop around the entire lake. This proposal may be best explored by other entities as an easement on land adjacent to the Refuge.

Changes to Existing Farming Program and Force-account Farming. The Refuge considered several options for cooperative farming as goals and objectives were developed, including restoration of existing farm ground to native habitat, expanding the cooperative farming program, moving to force-account farming, or maintaining the status quo. Currently, cooperators farm approximately 258 acres of Refuge land to provide food and browse for migratory waterfowl; however those crops are exhausted within a few days by the birds.

Expanding the cooperative farming program on the Refuge would require converting native habitat to cropland and acquiring additional water rights. It would also require either recruiting additional cooperative farmers or doing force-account farming with Refuge staff. Because force-account farming would require additional staff and the purchase of farming equipment, this option was eliminated due to the extensive cost and labor involved.

In addition, the Refuge does not have sufficient water rights for the existing crop acreages, and converting additional acreage to crops would only exacerbate this problem. Even maintaining cooperative farming at its current status would require that an additional well be installed near Farm Field 5. The remnant sagebrush-steppe habitat, (including the acreage that was considered for conversion to agricultural lands) provides habitat for wildlife including meadowlarks, badgers, mule deer, and loggerhead shrikes. It also provides an opportunity for the visiting public to view and learn about this habitat and its associated wildlife.

The proposal to expand farming was therefore considered but rejected because the high cost would not be balanced by significant benefit to wintering waterfowl or other wildlife. The proposal to eliminate farming was considered but rejected because restoration of 280 acre of cropland to sagebrush-steppe habitat would be extremely costly for minimal gain. The remnant sagebrush-steppe habitat does not connect to off-site larger habitat tracts that would benefit sagebrush-steppe-dependent species. However, the current crops provide food for wintering waterfowl (primarily geese), pheasant, deer, and mourning doves.

Fire Tower Conversion. The suggestion that the Civilian Conservation Corps fire tower be renovated into an observation platform was considered but rejected because of concerns about safety, accessibility, feasibility, and the cost of creating an additional entrance to the Refuge.

Fishing. The Refuge considered requiring lead-free fishing tackle and, when the bass fishery is catch and release, barbless hooks. Lead-free tackle and barbless hooks were rejected after discussion with IDFG.

Preliminary Draft Alternative 4. During public scoping, it became clear that the relatively minor differences between preliminary draft Alternatives 3 and 4 did not support the need for separate alternatives. Therefore, to reduce confusion, preliminary draft Alternatives 3 and 4 are now represented by a single alternative (Alternative 3). This document's Alternative 4 was initially presented in as preliminary draft Alternative 2.

2.3 Alternatives

2.3.1 Features Common to All Alternatives

Adaptive Management. Adaptive management is an approach to resource management that emphasizes adjusting management practices in response to what has been learned. Based on 522 DM 1 (Adaptive Management Implementation Policy), the FWS would use adaptive management for conserving, protecting and, where appropriate, restoring lands and resources. Within 43 C.F.R. 46.30, adaptive management is defined as a system of management practices based on clearly identified outcomes, where monitoring evaluates whether management actions are achieving desired results (objectives). Adaptive management decisions are based on the best available science, common sense, experience, experimentation, new scientific discoveries, and monitoring.

The recently published *Department of the Interior Adaptive Management Technical Guide* (http://www.doi.gov/initiatives/AdaptiveManagement/index.html) also defines adaptive management as a decision process that "promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood." Adaptive management accounts for the fact that complete knowledge about fish, wildlife, plants, habitats, and the ecological processes supporting them may be lacking. The role of natural variability contributing to ecological resilience also is recognized as an important principle for adaptive management. It is not a "trial and error" process; instead, adaptive management emphasizes learning while doing. It is based on available scientific information and the best professional judgment of Refuge staff while considering site-specific biotic and abiotic factors on the Refuge.

Assessing and Monitoring Effects of Climate Trends and Climate Change. As stated in the Department of the Interior's Secretarial Order 3226 and the Service's Climate Change Strategic Plan, the Service considers and analyzes climate change in its decisions, long-range plans, and other activities. Habitat conditions and wildlife populations are directly and indirectly sensitive to climatic conditions, namely precipitation and temperature and changes to hydrologic conditions. As described in greater detail in Chapter 3, the subbasin's hydrology is particularly sensitive to changes in climate because snowmelt dominates seasonal runoff and the rain/snow balance is sensitive to temperature.

Combined changes to temperature, precipitation, and hydrology can affect the Refuge's habitats and species directly, such as the timing of migratory arrival of birds, many other phenologic responses, and changes in species' ranges and physiology. These combined changes can also affect species indirectly, such as added vulnerability to other stressors (including increasing invasive species and pathogens). These indirect effects highlight the importance of monitoring habitats and species to establish potential correlations and adaptation options.

Knowledge and monitoring of regional and local climate trends on Refuge resources would be used to assess potential changes or enhancements to the Refuge's management actions and techniques and/or their timing, using the adaptive management approach described below.

The Refuge would monitor wildlife corridor analyses, vulnerability assessments, and other efforts, including those underway at a landscape scale, such as the Great Northern Landscape Conservation Cooperative (LCC). LCCs are formal science-management partnerships between the Service, Federal agencies, States, Tribes, nongovernmental organizations, universities, and other entities to address climate change and other biological stressors in an integrated fashion. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs.

Biological Integrity. The Administration Act directs the FWS to "ensure that the biological integrity, diversity, and environmental health of the [NWRS] are maintained for the benefit of present and future generations of Americans." The policy is an additional directive for the FWS to follow while achieving the Refuge's purposes and the NWRS mission. It provides for consideration and protection of the broad spectrum of native fish, wildlife, and habitat resources found on the Refuge. When evaluating the appropriate management direction for the Refuge (e.g., in compatibility determinations), the FWS would use sound professional judgment to determine the Refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment would incorporate field experience, knowledge of Refuge resources, an understanding of the Refuge's role within the ecosystem, applicable laws and best available science, including consultation with others both inside and outside the FWS.

Cultural Resource Protection and Section 106 Compliance. Actions that may affect cultural resources would be reviewed by the Regional Archaeologist. Those undertakings that are found to have the potential to affect cultural resources would undergo further examination and evaluation, under Section 106 of the National Historic Preservation Act (NHPA), dependent on the nature and extent of the effect.

Deer Hunt at Lake Lowell Unit. A Lake Lowell Unit deer hunt was implemented under a different planning process (USFWS 2011a) and began in fall 2012. This hunt would continue under all alternatives.

Feral and/or Nuisance Animal Control. The proximity of Deer Flat NWR to an urban interface lends itself to the reality of feral animals running at large on Refuge property. The extent of feral animal use and presence within Refuge boundaries and the amount of impact on trust resources has not been formally studied and is currently unknown. However, sighting of feral animals on Deer Flat Refuge is a common occurrence by visitors, staff, and volunteers. Incidents of dumping unwanted pets onto the Refuge are also common. During the life of this plan, all alternatives would include provisions for addressing a feral animal problem including the assessment of impacts to the resources and appropriate measures of control. Controlling pest species can have a variety of positive impacts including: (1) The reduction of damage to Refuge resources and facilities; (2) The protection of humans, wildlife, and domestic animals from diseases carried by pest species; (3) The prevention of damage to adjacent private landowners; (4) The control of exotic and/or feral species so that native wildlife species can thrive; and (5) The protection of quality wildlife-oriented recreational experiences by the public.

Outside of assessments and studies on the impacts of feral animals, dogs and cats will be dealt with on the Refuge as authorized by 50 C.F.R. 28.43, Destruction of Dogs and Cats: "Dogs and cats running at large on a national wildlife refuge and observed by an authorized official in the act of killing, injuring, harassing or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife."

Fire Management. Fire management activities would conform to guidelines contained in USFWS policy and an approved fire management plan for the Refuge. The current fire management plan can be found in Appendix K.

Implementation Subject to Funding Availability. After the CCP is completed, actions would be implemented over a period of 15 years as funding becomes available. Draft project priorities and projected staffing/funding needs are included in Appendix C.

Invasive Species Control and Integrated Pest Management. In accordance with 517 DM 1 and 569 FW 1, an integrated pest management (IPM) approach would be used, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as *pests*) on Refuge lands. IPM would involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to nontarget species and the Refuge environment. Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide would be needed on Refuge lands, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under Refuge jurisdiction.

Environmental harm by pest species would refer to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites, or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. Environmental harm also can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and/or abundance of native wetland plants that provide forage during the winter.

Environmental harm may involve detrimental changes in ecological processes. For example, cheatgrass infestations in shrub-steppe habitat greatly can alter fire return intervals, displacing native species and communities of bunchgrasses, forbs, and shrubs. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by fire-promoting grasses that alter entire plant and animal communities and eliminate or sharply reducing populations of many native plant and animal species can also greatly increase firefighting costs.

See Appendix G for the Refuge's IPM program documentation to manage pests for this CCP. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on Refuge lands, where necessary. Throughout the life of the CCP, most proposed pesticide uses on Refuge lands would be evaluated for potential effects to Refuge biological resources and environmental quality. These potential effects would be documented in "Chemical Profiles" (see Appendix G). Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance

would be approved for use on Refuge lands where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles. However, pesticides may be used on Refuge lands where substantial effects to species and the environment are possible (i.e., effects exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Maintenance and Updating of Existing Facilities. Periodic maintenance and updating of Refuge buildings and facilities would be necessary regardless of the alternative selected. Periodic updating of facilities is necessary for safety and accessibility, to reduce the Refuge's carbon footprint, and to support staff and management needs. When existing facilities are modified or new facilities and programs developed, the Refuge would use principles of universal design so that they would be usable by all people to the greatest extent possible, without separate or segregated access for people with disabilities.

Monitoring Effects of Public Use Programs on Wildlife. Staff would monitor the effects of public use on wildlife and consider modifications to the location, timing, and/or type of public use if disturbance to wildlife or habitat degradation reaches unacceptable levels.

Monitoring Quality of Public Use Programs. Visitor use surveys would assess the quality of the fishing, hunting, environmental education, interpretation, wildlife observation, and photography programs. Quality for priority wildlife-dependent uses is defined in Refuge policy by several elements (605 FW 1):

- Promotes safety of participants, other visitors, and facilities;
- Promotes responsible behaviors and compliance with applicable laws and regulations;
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives;
- Minimizes or eliminates conflict with other users;
- Minimizes conflicts with neighboring landowners;
- Promotes accessibility and availability to a broad spectrum of the public;
- Promotes resources stewardship and conservation;
- Promotes public understanding and increase public appreciation of natural resources and the Refuge's and National Wildlife Refuge System's role in managing and protecting these resources;
- Provides reliable/reasonable opportunities to experience wildlife;
- Uses facilities that are accessible and blend into the natural setting; and
- Uses visitor satisfaction to help define and evaluate programs.

Mosquito Abatement. Mosquito control activities began on the Refuge in 2000 to prevent the spread of western equine encephalitis and West Nile virus. Mosquito monitoring (primarily *Culex* species) begins in mid-April with weekly sampling on the Refuge. Treatments typically begin in early May and continue until September with the first frost. The larvicide *Bacillus thuringiensis israelensis* (Bti) is used on the Refuge and applied by the Canyon County Mosquito Abatement District using several methods: backpack sprayer, hydraulic-powered spray equipment, and aerially in accordance with a Special Use Permit (SUP) issued annually by the Refuge. Aerial application began in 2004 to reduce wildlife disturbance from ground applications.

Response to Mosquito-Borne Diseases. Mosquito populations on Refuge lands would be allowed to fluctuate and function unimpeded unless they pose a threat to wildlife and/or human health. We recognize mosquitoes are native invertebrates inhabiting aquatic habitats, which provide a forage base for fish and wildlife including migratory birds. To protect human and wildlife health and safety, the State or a local vector control agency would be allowed to control mosquito populations on refuge lands. Pesticide treatments (larvicides, pupacides, or adulticides) would be allowed on Refuge lands only if local, current population monitoring and/or disease surveillance data indicate Refuge-based mosquitoes pose a health threat to humans and/or wildlife. As previously described, mosquito treatments would be allowed on Refuge lands in accordance with IPM principles applicable to all pests (see Appendix G). Proposed pesticide uses for mosquito control would use appropriate and practical BMPs, where possible, given potential effects documented in Chemical Profiles.

After approval of the CCP, a disease contingency plan would be prepared addressing response to mosquito-borne disease outbreaks on and/or adjacent to Refuge lands. The disease contingency plan also would include other information such as the history of mosquito-borne diseases on and/or adjacent to the Refuge as well as measures to protect Refuge visitors, Service-authorized agents, and Service employees when a health threat or emergency is identified by health officials.

Participation in Planning and Review of Regional Development Activities. The Service would actively participate in planning and studies pertaining to development, transportation, recreation, contamination, and other potential concerns that may affect Refuge resources. The Service would continue to cultivate working relationships with County, State, and Federal agencies to stay abreast of current and potential developments and would use outreach and education as needed to raise awareness of Refuge resources and their dependence on the local environment.

Prohibit Ice Skating, Ice Fishing and Cross-country Skiing on the Lake. Safety is a major concern for recreational users that rely on the structural integrity of the ice on Lake Lowell to enjoy their sport. According to the National Weather Service (accessed online at http://www.rssweather.com/climate/Idaho/Boise/), average monthly high temperatures in the Treasure Valley do not reach freezing levels. Combining this with high winds and long fetch makes the freezing of the water on Lake Lowell very unpredictable and any frozen areas of the lake unsafe. Signs are posted near recreation areas warning the public to stay off the ice because systematic ice evaluations by qualified personnel are not conducted on Lake Lowell.

Lake Lowell is currently closed to boating from October 1 through April 14 to provide habitat for wintering waterfowl, reduce disturbance from human-caused flushing events and improve public safety. Under all action alternatives, the lake would be closed to all human access during those months, including ice fishing and ice skating. For more information, please see the Ice Skating Appropriate Use Determination in Appendix A, and the Fishing and Wildlife Observation, Photography, Interpretation, and Environmental Education Compatibility Determinations in Appendix B.

Reductions in the Refuge's Carbon Footprint. The Service has developed the Strategic Plan for Responding to Accelerating Climate Change in the 21st Century (2009), and a five-year action plan outlining specific actions needed to implement the strategic plan. The action plan calls for the Service to make its operations carbon-neutral by 2020. The Refuge would work toward this goal by replacing its current vehicles with more fuel-efficient vehicles and by building appropriately sized, energy-efficient facilities, as funding becomes available. The Refuge would also reduce the carbon footprint of land management activities by using energy-efficient techniques where feasible and in

line with management goals. The Refuge would also explore ways of offsetting any remaining carbon balance, such as carbon sequestration.

Research. Research projects would be allowed on the Refuge in accordance with Service policy guidelines and SUP provisions. Researchers focusing on the Refuge's high-priority research projects would be given enhanced consideration. See the Research Compatibility Determination (Appendix B) for further details.

State Coordination. The Service would continue to maintain regular discussions with the IDFG and ODFW. Key topics of discussion include management of Canada geese and other waterfowl, depredation, wildlife monitoring, hunting, and fishing seasons and regulations, and management of species listed at the Federal and State levels. The Refuge would continue to coordinate with IDFG on the stocking of the following fish species at the Lake Lowell Unit: largemouth bass, smallmouth bass, bluegill, channel catfish, black crappie, yellow perch, rainbow trout, and Lahontan cutthroat trout. Stocking of any other fish species would require additional planning. The Refuge is committed to developing a cooperative agreement with the State of Idaho for resident fish and wildlife management.

Step-down Management Plans. The Refuge will complete step-down plans to provide additional detail for habitat management, visitor services management, fisheries management, and the inventory and monitoring program within five years of implementation of the CCP. Hunt plans would also be created for any newly proposed hunts or for expansion of any existing hunts.

Tribal Consultation and Coordination. All appropriate and necessary consultation with Tribes would be undertaken prior to implementing any action. Two Executive Orders (E.O. 13007, Sacred Sites, and E.O. 13175, Tribal Consultation and Coordination), as well as the NHPA, NEPA, and Archaeological Resources Protection Act (ARPA) have specific references for fulfilling coordination and consultation requirements.

Urban Refuge. With its close proximity to the cities of Nampa, Caldwell, and Boise, and as the surrounding area is developed, Deer Flat NWR has become an increasingly urban refuge. Between 1990 and 2010, the population of Canyon County doubled, from 90,000 to over 180,000 (U.S. Census 2012a). Because of its proximity to a large urban area, the potential for the Refuge to connect urban dwellers to nature—and thereby build support for the Refuge System mission—is high.

Volunteer Opportunities and Partnerships. Volunteer opportunities and partnerships are key components of the successful management of public lands and are vital to Refuge programs, plans, and projects, especially in times of static or declining budgets. Currently the Refuge makes use of volunteers in invasive species control, habitat restoration, maintenance, visitor surveys, and public use programs. In the future, successful implementation of native habitat restoration, survey, and monitoring activities, and environmental education (EE) and interpretation programs would require the use of partnerships and volunteers.

Wilderness Review. Service CCP policy requires that a wilderness review be completed for all CCPs. If it is determined that the potential for wilderness designation is found, the process moves on to the wilderness study phase. As part of the process for this Draft CCP/EIS, the planning team completed a wilderness review that can be found in Appendix D. This review concluded that Refuge lands are not suitable for wilderness designation.

Work with Board of Control and Bureau of Reclamation on Water Level Prescriptions and Shared Efficiencies. Deer Flat Reservoir (renamed Lake Lowell in 1948) was built as part of Reclamation's Boise-Payette Project between 1906 and 1908. Providing irrigation to the surrounding lands was the project's sole purpose at its inception. Although the Refuge's primary purpose is to "provide a refuge and breeding ground for migratory birds and other wildlife," the Refuge may not impede the purpose of the reservoir for irrigation. The irrigation purpose puts the administrative responsibility for water level management with Reclamation and the Board of Control.

Reservoir water level declines throughout the irrigation season (April to September) when irrigation outflow exceeds water inflow from the New York Canal. This results in fairly low water levels in the lake in July and August. Using data acquired from the Lake Lowell Hydromet Station (http://www.usbr.gov/pn/hydromet/dfcgi.html), the average elevation was estimated to range from 2,520 to 2,516 during this time period. Many species, both plant and animal, can adapt and/or use habitat where water levels fluctuate, and sometimes even benefit from the changes. For example, low water levels in Lake Lowell in mid-to-late July expose mudflats that provide foraging habitat for migrating shorebirds. However, when water levels drop too low in June and early July, emergent plant beds can dry out, and grebe and other on-water nests can be left on dry land. If that happens, the adults will often abandon the colony, or the nests will be destroyed by predators.

Because the Board of Control, in cooperation with Reclamation, manages the water level, Refuge staff would continue to explore with Board of Control the possibility of maintaining a water level appropriate to provide nesting and foraging habitat for grebes, fish, and other wildlife from April through July, while still meeting the Board of Control's mission of providing water to irrigators. Based on 2010-2011 nesting surveys, this would be at or above an elevation of approximately 2,520 feet. However, Refuge staff would continue to monitor waterbird nesting to determine appropriate target water levels. In addition, the Refuge would explore with the Board of Control the possibility of dropping water level to at or below approximately 2,515 feet by September 1 to provide mudflats for foraging shorebirds while still meeting the Board of Control's irrigation mission.

Refuge staff would also like to work with Board of Control staff to improve both agencies efficiency by finding ways to assist each other's purpose, such as working together on water conservation educational projects.

Work with Partners to Improve Lake Lowell Water Quality. Lake Lowell has significant water quality problems that affect both wildlife and recreationists. The Federal Clean Water Act (CWA; 33 U.S.C. 1251 et seq.) requires that States and Tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and Tribes, pursuant to Section 303 of the CWA, are to adopt water-quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for States and Tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water-quality standards). Lake Lowell is on this list. For waters identified on this list, States and Tribes must develop a total maximum daily load (TMDL) for the pollutants that is set at a level expected to achieve water quality standards. Idaho Department of Environmental Quality (IDEQ) published the final TMDL for pollutants in Lake Lowell in 2010 (IDEQ 2010).

Lake Lowell's water quality problems have been developing for approximately 100 years and will take considerable time and money to improve. The Refuge is very concerned about water quality impacts on both wildlife and Refuge visitors and plans to be an active partner in working toward

improving the water quality of the lake. Several strategies for addressing water quality are included in this CCP:

- Work toward reducing carp population (Wildlife and Habitat Objectives 1.1 and 1.4)
- Conduct water-quality monitoring to aid in evaluating the current TMDL (Wildlife and Habitat Objective 6.3)
- Promote the use of CARB star-rated motors at the level of 2 stars and above (Public Use Objective 1.4)
- Develop a water quality education program (Public Use Objective 4.1)
- Develop a working group to investigate potential water-quality improvement actions (Public Use Objective 6.2)
- Work closely with Board of Control to implement best management practices to reduce sediment runoff as well as evaluate current canal maintenance practices and identify areas for improvement (e.g., planting, geowebbing, contouring; Public Use Objective 6.2)
- Attend applicable water quality meetings with IDEQ and the Lower Boise Watershed Advisory Group to develop partnerships, increase knowledge, and leverage resources (Public Use Objective 6.2)

It has been brought to the attention of Refuge staff that siltation of the lake may also be an issue in the future. Areas that are currently used for nesting and angling appear to be silting in, which would eventually make them unusable for these activities. There is currently no plan to reduce future siltation or correct the current siltation issues. The Refuge would work with the Board of Control and Reclamation to identify ways to reduce future siltation and correct current siltation issues without damaging wildlife habitat or impeding the delivery of irrigation water.

2.3.2 Features Common to All Action Alternatives (Alternatives 2-4)

Assess Feasibility of Fees. A feasibility assessment would be conducted to evaluate whether to charge an entrance and/or boat launch fee to provide funding to maintain visitor facilities and hire visitor services and law enforcement staff. Criteria to consider would include impacts to the community, the cost-benefit ratio of charging and collecting a fee, and other relevant factors.

Conduct Community Outreach. Many Refuge visitors do not realize that they are at a National Wildlife Refuge or, if they do, they do not understand the mission of Deer Flat NWR and the NWRS and how national wildlife refuges differ from County parks. In addition, many local community members do not realize that there is a nearby national wildlife refuge. To increase community awareness, support, and appreciation for the Refuge and its purpose, the Refuge would conduct outreach with off-site audiences focusing particularly on adjacent landowners, local municipalities, and local community groups, because they have high potential to deliver Refuge messages to key audiences. Outreach programs would cover the same themes as those eventually identified for EE (see Public Use Objective 4.1) as well as basic information about Refuge programs (e.g., hunting regulations).

Enhance Law Enforcement. The law enforcement program would be enhanced to increase compliance with Refuge regulations and decrease trespass and vandalism. Methods may include hiring an officer and adding lighting, automatic gates, and security cameras.

Emphasize Snake River Islands Unit. Under all action alternatives, Refuge staff would emphasize management of the Snake River Islands by increasing wildlife inventory and monitoring efforts and increasing invasive species control and restoration efforts. The islands' management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority (see Wildlife and Habitat Objective 2.2). Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used including prescribed fire and aerial application of herbicide and/or seed.

Expand Hunting. Opportunities for hunting of additional species would be addressed in a future step-down planning efforts occurring in close coordination with IDFG. Changes proposed to current hunting opportunities can be found in Section 2.5.2.

Improvements in Hunting Safety. Hunting and nonhunting areas would be clearly marked with signs, both on land and water, to notify nonhunters of hunt area boundaries and to notify waterfowl hunters when they reach the end of a hunt zone. Signs would also be erected on the Refuge boundary reminding upland hunters not to shoot across or toward the boundary to reduce the potential for shot to travel onto private lands and public roads.

Improve Safety and Traffic Flow. A transportation study for the Lower Dam Recreation Area and the east Upper Dam boat launch would identify site planning, signs, and other mechanisms to reduce congestion and provide parking availability information to allow people to detour to other launches when a parking lot is full. To increase pedestrian safety near the east Upper Dam boat launch, the Refuge would work with the County Highway District to identify and install safety features such as crosswalks between the Refuge and the County park. The on-refuge parking areas along Iowa Avenue would be removed or blocked because there is no designated access to the lake at those locations and pedestrian safety has been of concern. Finally, parking at Parking Lot 7 would be restricted to the parking area and not be allowed between the parking area and the lakeshore in order to facilitate access for visitors launching boats.

Limit Organized Group Activities. Nonwildlife-dependent competitive events and group training for competitive events (e.g., cross-country training/meets, and sailing regattas) would not be allowed because they exclude the general public, increase wildlife disturbance, affect the quality of wildlife-dependent activities, require additional management resources, and increase safety concerns. Sailing regattas are run along a set buoyed course. Having a "race course" for minimally maneuverable sailboats in the middle of the many other high-speed activities would create a safety hazard. Weddings, reunions, birthday parties, and other gatherings would be allowed only at the Lower Dam Recreation Area by SUP. Permits would require special conditions that may include restrictions on tent size, attendance, noise-causing devices, or any other items that could impact visitor safety or the ability for other visitors to use the Refuge in an unobstructed way. A fee may be assessed for the SUP. See also the Competitive and Group Jogging, Competitive and Group Cycling, and Competitive and Group Rowing Appropriate Use Determinations in Appendix A, and the Recreational Boating Compatibility Determination in Appendix B.

Wildlife-dependent group activities (e.g., fishing tournaments) could be allowed by an SUP that would limit the number of participants, times of use, and areas of use so they would not cause an undue impediment to other wildlife-dependent recreationists (see Public Use Objective 3.1).

Promote Refuge-friendly Land Use with Neighbors and Local Municipalities. From aerial images of the Refuge, it is readily apparent that the Refuge is an island surrounded by human alterations of the landscape. The Refuge is bounded by agricultural fields, but even this landscape has been rapidly changing. The small cities and communities that dot the landscape around the Refuge have experienced one of the highest growth rates in the country. Because the Refuge represents only a small part of the overall landscape, to successfully manage wildlife the Service must work with other agencies, governments, businesses, and neighboring landowners to protect and preserve Refuge wildlife and wildlife habitat.

The Refuge also plans to conduct outreach to adjacent landowners to educate them about their potential impacts (fragmentation, feral animals, habitat degradation) to wildlife and habitat and to promote awareness of existing incentive programs that promote continued agricultural use and/or low-density development. Cooperation and education of Refuge neighbors could also enhance the law enforcement program by providing a well-educated corps of neighboring landowners and regular Refuge visitors who may observe and report inappropriate or illicit behavior on the Refuge. This could reduce the number of violators through increased surveillance, thus benefitting natural and cultural resources, taxpayers' investment in visitor facilities, and visitor experiences.

2.3.3 Alternative Descriptions

2.3.3.1 Range of Alternatives

The range of alternatives in this Draft CCP/EIS provides different scenarios for the future management of Deer Flat Refuge as a unit of the National Wildlife Refuge System. Measures for protecting wildlife and habitat vary from area closures to more expansive protective measures. Alternative 1, the status quo, is the least protective, and Alternative 4 is the most protective of wildlife. Alternative 4 protects the greatest amount of habitat by restricting horseback riding and dog walking and making the entire lake a no-wake zone. Alternative 2 (the Preferred Alternative) and Alternative 3 allow more of the traditional recreational uses to continue on Lake Lowell while still meeting wildlife compatibility standards. This would be accomplished by designating no-wake zones and creating seasonal and year-round closures to protect the Refuge's most sensitive habitats. Given the current available science, the areas proposed as closed and no-wake zones in the action alternatives provide adequate protection for Refuge wildlife.

Over the next 15 years, monitoring and research would continue to inform Refuge management on the level of successful implementation and achievement of Refuge objectives and strategies. In particular, our monitoring and research of the potential effects and disturbance to wildlife caused by recreational use activities may result in the Refuge proposing new or modified management objectives or strategies. Changes to management objectives may result in a CCP amendment or revision. Major revisions would include public outreach and appropriate NEPA compliance.

2.3.3.2 Definitions

To help the reader in understanding this section, we are providing the following definitions:

Wildlife-dependent Recreation: Sometimes referred to as the "Big Six," these activities consist of hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education. These six wildlife-dependent uses are priority activities for Deer Flat NWR as well as for all national wildlife refuges.

Nonwildlife-dependent Recreation: At Deer Flat Refuge, these uses include swimming, picnicking, biking, jogging, horseback riding, boating, and water sports.

Protect: To keep from being damaged or injured. Protected acreage consists of the total Refuge acreage of each defined habitat.

Maintain: To keep in the current state; preserve; retain. Maintenance includes the continuation of current routine management or maintenance, such as the continuation of recurring weed control or management of current public use regulations.

Enhance: To improve features or quality. Enhancement includes implementing new additions to current management and ongoing future maintenance of these areas, or initiating new management, such as treating new areas and acreages for weeds and maintaining these areas during the life of the plan or implementing new public use regulations.

2.3.3.3 Alternative 1 (Status Quo, No Action Alternative)

Alternative 1 is the no action alternative required by NEPA. Wildlife and habitat and public use management would continue at current levels as described below.

Lake Lowell Unit

Management of Wildlife and Habitat. Management of Refuge wildlife in this unit would continue to involve basic population monitoring activities. Management of Refuge habitats in this unit would continue to involve primarily invasive species control and limited restoration. Invasive plant control would be conducted by one staff member and volunteers using mechanical, chemical, and biological controls.

A no-wake zone would continue to the east of Parking Lot 1, and the entire lake would close for winter migration from October 1 through April 14 each year. No other on-water protection would be provided for wildlife. The emergent vegetation along the shoreline of Lake Lowell would remain unprotected; this vegetation provides erosion control, nesting habitat for grebes and other birds, foraging habitat for waterfowl and wading birds, as well as forage, nesting, and brood-rearing habitat for numerous fisheries.

Management of Public Uses. Existing public uses would continue and include the "Big Six" wildlife-dependent recreational activities as well as nonwildlife-dependent activities such as horseback riding, biking, jogging, motorized boating, using personal watercraft, waterskiing, picnicking, and swimming. Under Alternative 1, there are few actions that would alter when, where, or how public uses are allowed to occur within the Refuge. Nearly the entire Refuge would continue to be available for on-trail public recreation, including wildlife observation, photography, jogging, bicycling, on-leash pet walking, and horseback riding. No additional trail or lake access would be provided. Upland and waterfowl hunting would continue to be allowed between Parking Lots 1 and 8 and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract. A youth waterfowl hunt would continue to be hosted in current waterfowl hunt zones. A controlled deer hunt would continue to be allowed between Parking Lot 8 and the New York Canal. Gotts Point would remain closed to vehicular traffic, and limited bank-fishing opportunities would exist around the lake. Lake users would continue to participate in numerous surface water recreational activities.

The lake would open to boating on April 15 and close on September 30. The current no-wake zone, from Parking Lot 1 east, would remain in place.

EE would continue to be conducted through on- and off-site programs. Public contact with Deer Flat NWR staff would remain limited and intermittent due to the small number of Refuge employees. Opportunities for visitors to obtain additional information while visiting the Refuge would remain largely dependent on kiosks, brochures, and the availability of volunteers.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 1**,** management of Refuge wildlife in this unit would continue to involve basic population monitoring activities. Because of the logistical difficulties and small staff, limited restoration efforts and/or invasive species control would be conducted on the Snake River Islands Unit.

Management of Public Uses. Existing public uses would continue on this unit; these uses consist of wildlife observation and deer, upland and waterfowl hunting. The Snake River Islands are open from June 1 through January 31 for off-trail, free-roam activities, including shoreline fishing.

2.3.3.4 Alternative 2 (Service Preferred): Protect Wildlife Using No-wake Zones and New Seasonal Closures while Providing for a Variety of Recreational Activities

Alternative 2 would emphasize connecting urban families to nature by providing access to new facilities, as well as a wide range of wildlife-dependent and nonwildlife-dependent recreational activities. Activities would be managed differently than in the status quo alternative to protect wildlife, reduce conflicts between users, and increase safety. Under Alternative 2, fishing access would be promoted, and wildlife interpretation would be emphasized and integrated into all visitor activities to increase awareness and appreciation of Refuge resources. Under Alternative 2, the Service would protect and enhance habitat throughout the Refuge. In Lake Lowell specifically, the Refuge would protect shoreline feeding and nesting sites through no-wake zones and seasonal closures.

The Preferred Alternative provides protections and enhancements for wildlife not found in the status quo alternative while still allowing almost all upland and on-water recreational opportunities currently occurring at the Refuge.

Lake Lowell Unit

Management of Wildlife and Habitat. Alternative 2 would provide needed protections for lake-dependent wildlife by establishing a 200-yard no-wake zone along the south side of the lake between Parking Lots 1 and 8. The entire lake would continue to be closed for the benefit of wintering and migrating birds from October 1 through April 14 each year. No-wake zones would also be required in the Narrows, and the existing no-wake zone on the southeast end of the lake would be expanded to start at a line between Gotts Point and Parking Lot 1. In the no-wake zone, boaters would be allowed to travel only at speeds that do not create a wake (generally <5 mph). The Preferred Alternative would also create seasonally closed areas, such as heron rookeries, eagle nests, and grebe nesting colonies, to protect bird species.

Specific wildlife and habitat management objectives under the Preferred Alternative include:

- Maintain 100 acres and enhance 250 acres of emergent wetland plant beds along the lake shoreline.
- Maintain 350 acres and enhance 560 acres of mudflats to benefit migrating shorebirds.
- Maintain and enhance 6,430 acres of open-water habitat to benefit migrating, nesting, and wintering waterfowl and waterbirds.
- Maintain 520 acres and enhance 1,200 acres of riparian forest habitat at Lake Lowell Unit.
- Maintain 70 acres and enhance 85 acres of nonlake wetland basins in three units to diversify wetland habitats and improve water quality.
- Maintain 520 acres and enhance 300 acres of sagebrush-steppe habitat at Lake Lowell Unit to benefit key migrating birds including sage thrashers, loggerhead shrikes, burrowing owls, and other species.
- Maintain and enhance all Refuge islands through seasonal closures and habitat management.
- Maintain grain and forage crops on 250 acres to benefit migratory ducks and geese and other resident wildlife.
- Inventory and map noxious weeds and prioritize treatment with a variety of tools including mechanical, herbicide and prescribed fire consistent with the Integrated Pest Management Plan.

Management of Public Uses. The Preferred Alternative provides access for a wide range of outdoor recreational activities while putting in place measures (e.g., no-wake zones and seasonal closures) to protect wildlife. Management efforts would focus on increasing participation in all six priority wildlife-dependent recreational activities. Fishing and interpretation would be emphasized to serve a growing urban and diverse population. Management of public uses would seek to connect people with nature and build support for wildlife conservation. Deer Flat NWR would be one of the few, if not only, refuges in the NWRS that allows activities such as use of personal watercraft, waterskiing, wakeboarding, kiteboarding, and windsurfing in waters under Service jurisdiction. It is anticipated that participants in these activities would be exposed to interpretive messages that encourage appropriate, conservation-oriented visitor behavior to benefit wildlife.

The Preferred Alternative includes several elements to protect wildlife and enhance recreational experiences at the Refuge. These include:

- **Lower Dam Recreation Area facilities.** A visitor contact station and a fishing and observation dock/platform would be provided at the Lower Dam Recreation Area. Suitability would be assessed for providing a 0.65-mile Americans with Disabilities Act (ADA)–accessible interpretive loop trail in riparian habitat between the Lower Dam Recreation Area and Murphy's Neck.
- **Gotts Point** would be opened to vehicular traffic upon completion of a cooperative agreement with Canyon County for increased law enforcement presence. Other potential solutions (e.g., electronic gates, improved lighting) might also be implemented. Access to the water's edge would be improved for visitors with mobility impairments.
- **Environmental education and interpretive programs** would continue. Emphasis would be placed on developing interpretive programs, with the goal of increasing visitor awareness of Deer Flat NWR purpose and goals and to encourage appropriate, conservation-oriented visitor behavior. On-site interpretation would involve updating visitor center displays, installing additional interpretive signage, and providing more interpretive tours. Public contact with Deer Flat NWR staff and volunteers would significantly increase from

Alternative 1. EE would continue at a reduced level, and the program would emphasize on-site and teacher-led programs.

- **Upland, waterfowl, and deer hunt areas** would be maintained as described in the status quo alternative, except that the youth waterfowl hunt would be provided to the southeast of Parking Lot 1. Each waterfowl hunter would have a limit of 25 shotgun shells per day.
- **Wildlife-dependent activities** such as fishing, wildlife observation, and photography would be allowed on-trail year-round and off-trail all year in the East Side Recreation Area, and off-trail seasonally in the South Side and North Side Recreation Areas. Shoreline access would be developed at Parking Lots 2, 3, 4, and 7.
- **Walking with on-leash dogs, horseback riding, bicycling, and other nonwildlife-dependent activities** would be allowed on designated trails only (see Map 7). Narrower trails and those used by EE groups would be designated for pedestrian use only. As described above (see Section 2.3.2), ice skating, ice fishing, and competitive group activities would not be allowed.
- **Wake-causing activities** (generally >5 mph) would be allowed in the East and West Pools from April 15 through September 30 outside of the no-wake zones and seasonal closures.
- **Boardwalk.** A feasibility assessment would be completed to determine whether trail access between Parking Lots 1 and 3 could be provided at a lesser cost than is estimated for the proposed boardwalk in Alternative 3. Other fishing docks would be provided as shown on Map 5.
- **Swimming.** To increase safety and reduce impacts to anglers, swimming would be allowed only in designated swimming areas at the Upper and Lower Dams.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 2, Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the IPM Plan in Appendix G) and restoration efforts. Islands management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority (see Objective 2.2). Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue and would include wildlife observation and deer, upland, and waterfowl hunting on 1,219 acres. Most of the Snake River Islands Unit would be open for off-trail, free-roam activities, including shoreline fishing, from June 15 through January 31. Heron- and gull-nesting islands (four to six islands) would be open for off-trail, free-roam activities from July 1 through January 31.

2.3.3.5 Alternative 3: Protect Wildlife Using a No-wake Zone in the East Pool and Permanent and Seasonal Wildlife Closures while Providing for a Variety of Recreational Activities

Under Alternative 3, the Refuge would protect habitat in nesting and feeding sites and in open-water habitat by establishing a no-wake zone in the East Pool, morning restrictions on wake-causing activities in the West Pool, and other seasonal and permanent closures. A no-wake zone in the East Pool would make that portion of the lake more suitable for fishing and wildlife observation. Overall,

Alternative 3 attempts to increase the quality of wildlife-dependent recreation by eliminating horseback riding and dog walking and segregating high-speed boating from wildlife-dependent users. However, a drawback of the no-wake zone changes would be an increase in the amount of time it would take wildlife-dependent users to reach high-quality wildlife areas. Under Alternative 3, the Refuge would not be open to some activities including horseback riding and dog walking. Bicycling would only be allowed on the trail adjacent to the entrance road.

Alternative 3 would provide additional protection for wildlife not found in the status quo alternative or Alternative 2 while allowing most surface-water recreational activities currently occurring and some of the current upland uses. Wake-causing uses would be allowed only in the West Pool.

Lake Lowell Unit

Management of Wildlife and Habitat. Emergent plant beds in Murphy's Neck and emergent plant beds from Parking Lots 3 to 8 would be closed to human activity all year. The entire lake would be closed seasonally to protect wintering and migrating birds. All active and historical grebe nesting colonies would be closed to public use by establishing a 500-yard closure during boating season (Berg et al. 2004). There would be a 100-yard seasonal closure (from July 15 through September 30) to protect shorebird habitat along the shoreline from Murphy's Neck to the Narrows (Rodgers and Smith 1997). A 200-yard closed area and a 200-yard no-wake zone would protect emergent beds and wildlife on the south side of the West Pool.

Specific wildlife and habitat management objectives under Alternative 3 include:

- Maintain 100 and enhance 250 acres of emergent wetland plant beds along the lake shoreline.
- Maintain 350 and enhance 560 acres of mudflats to benefit migrating shorebirds.
- Maintain and enhance 6,430 acres of open-water habitat to benefit migrating, nesting, and wintering waterfowl and waterbirds.
- Maintain 520 and enhance 1,200 acres of riparian forest habitat at Lake Lowell Unit.
- Maintain 70 and enhance 85 acres of nonlake wetland basins in three units to diversify wetland habitats and improve water quality.
- Maintain 520 and enhance 300 acres of sagebrush-steppe habitat at Lake Lowell Unit to benefit key migrating birds including sage thrasher, loggerhead shrikes, burrowing owls, and other species.
- Maintain and enhance all Refuge islands through seasonal closures and habitat management.
- Maintain grain and forage crops on 250 acres to benefit migratory ducks and geese and other resident wildlife.
- Inventory and map noxious weeds and prioritize treatment with a variety of tools including mechanical, herbicide and prescribed fire consistent with the Integrated Pest Management Plan.

Management of Public Uses. Under Alternative 3, the lake would be open to use from April 15 through September 20 with only no-wake activities allowed in the East Pool and wake-causing activities allowed from noon to one hour before sunset in the West Pool. Alternative 3 includes several elements to protect wildlife and enhance the Refuge recreational experience. These include:

- **Lower Dam Recreation Area facilities.** A visitor contact station and a fishing and observation dock/platform would be provided at the Lower Dam Recreation Area. Suitability

would be assessed for providing a 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between the Lower Dam Recreation Area and Murphy's Neck.

- **Gotts Point** would be managed the same as under Alternative 2 and be opened to vehicular traffic upon completion of a Cooperative Agreement with Canyon County for increased law enforcement presence. Other potential solutions (e.g., electronic gates and improved lighting) might also be implemented. Access to the water's edge would be improved for visitors with mobility impairments.
- **Environmental education and interpretive programs** would be the same as Alternative 2. Emphasis would be placed on developing the interpretive programs with the goal of increasing visitor awareness of Deer Flat NWR purpose and goals and to encourage appropriate, conservation-oriented visitor behavior. EE would continue at a reduced level, and the EE program would emphasize on-site programs.
- **Boardwalk**. A boardwalk for wildlife-dependent activities would be constructed between Parking Lots 1 and 3. Over-water access would be provided along the boardwalk on two docks. Other fishing docks would also be provided as shown on Map 8.
- **Upland and waterfowl hunt areas.** To improve the quality of both upland and waterfowl hunting, upland game bird hunting would be allowed only on the east end of the Refuge from the west boundary of the Leavitt Tract to the entrance at Greenhurst Road. A controlled waterfowl hunt (e.g., permit system or sign-in/out) would be allowed only on the south side of the lake between Parking Lots 3 and 8 with a daily limit of 25 shotgun shells per hunter. Other wildlife-dependent activities would be allowed concurrent with the upland hunt and on the boardwalk on the south side of the lake. However, because there is a higher demand by waterfowl hunters and less visibility on the South Side Recreation Area, all trails in the waterfowl hunt area would be closed to the nonhunting public from Parking Lots 3 through 8. The boating season would end on September 20 in order to increase the quality of the youth hunt and reduce the possibility of unsafe hunter/boater interactions.
- **Wildlife-dependent activities** such as wildlife observation and photography would be allowed on-trail year-round.
- **Nonwildlife-dependent activities.** Under Alternative 3, the Refuge would not be open to some activities including horseback riding and dog walking. Bicycling would only be allowed on the trail adjacent to the entrance road.
- **Swimming.** To increase safety and reduce impacts to anglers, swimming would only be allowed in a designated swimming area at the Lower Dam Recreation Area.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 3, Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the IPM Plan) and restoration efforts. The islands' management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority (see Wildlife and Habitat Objective 2.2). Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue; these uses consist of wildlife observation and deer, upland bird, and waterfowl hunting on 1,219 acres. Most of the Snake River Islands Unit would be open for off-trail, free-roam activities, including shoreline fishing, from June

15 through January 31. Heron- and gull-nesting islands (four to six islands) would be open for off-trail, free-roam activities from July 1 through January 31.

2.3.3.6 Alternative 4: Protect Wildlife with Entire Lake Designated as No-wake Zone with an Emphasis on Wildlife-dependent Recreation

Alternative 4 is the most protective alternative, providing wildlife restrictions not found in Alternatives 1 through 3. Habitat management would restore, maintain, or mimic natural ecosystem processes as often as possible. To provide adequate sanctuary for Refuge species, increase visitors' opportunities to appreciate wildlife, and provide the best possible wildlife-dependent recreational opportunities, fishing, hunting, wildlife observation, wildlife photography, EE, and interpretation would be the only recreational activities allowed on the Refuge. The entire lake would be a no-wake zone.

To provide a sanctuary for waterfowl, shorebirds, and waterbirds, as well as fish and other wildlife, all the emergent beds would be closed to public access. The shoreline from Murphy's Neck to the Narrows would be protected by a year-round 100-yard closure to provide undisturbed loafing and feeding habitat for shorebirds and waterfowl (Rodgers and Smith 1997). Trees would be removed in this area to enhance mudflats for migrating shorebirds.

Lake Lowell Unit

Management of Wildlife and Habitat. The entire lake would continue to be closed for wintering and migrating birds from October 1 through April 14 each year. Emergent-bed closures and creation of a no-wake zone on all open areas of the lake would provide added protection for nesting, feeding, and resting wildlife in open-water and emergent-bed habitats. Specific wildlife and habitat management objectives under Alternative 4 include:

- Maintain 100 acres and enhance 250 acres of emergent wetland plant beds along the lake shoreline.
- Maintain 350 acres and enhance 560 acres of mudflats to benefit migrating shorebirds.
- Maintain and enhance 6,430 acres of open-water habitat to benefit migrating, nesting, and wintering waterfowl and waterbirds.
- Maintain 520 acres and enhance 1,200 acres of riparian forest habitat at Lake Lowell Unit.
- Maintain 70 acres and enhance 85 acres of nonlake wetland basins in three units to diversify wetland habitats and improve water quality.
- Maintain 520 acres and enhance 300 acres of sagebrush-steppe habitat at Lake Lowell Unit to benefit key migrating birds including sage thrashers, loggerhead shrikes, burrowing owls, and other species.
- Maintain and enhance all Refuge islands through seasonal closures and habitat management.
- Maintain grain and forage crops on 250 acres to benefit migratory ducks and geese and other resident wildlife.
- Inventory and map noxious weeds and prioritize treatment with a variety of tools including mechanical, herbicide and prescribed fire consistent with the Integrated Pest Management Plan.

Management of Public Uses. Under Alternative 4, there are numerous actions that would alter when, where, and how public uses would be allowed. Boating would be allowed at no-wake speeds

on all areas of the lake open to the public from April 15 through September 30. Several portions of the Refuge would be closed to all public activity (see Map 9). The Refuge would not be open to nonwildlife-dependent activities including horseback riding, dog walking, bicycling, and ice skating.

Alternative 4 includes several elements to protect wildlife and enhance recreational experiences at the Refuge. These include:

- **Lower Dam Recreation Area facilities.** A visitor contact station and a fishing and observation dock/platform would be provided at the Lower Dam Recreation Area. Suitability would be assessed for providing a 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between the Lower Dam Recreation Area and Murphy's Neck.
- **Gotts Point** would remain closed to vehicular traffic. To improve fishing and wildlife observation/photography opportunities at Gotts Point, an ADA-accessible trail would provide access to the water's edge.
- **EE and interpretive programs** would continue. Emphasis would be placed on developing the EE program to better meet the needs of teachers and students in neighboring districts. On-site interpretation would involve updating visitor center displays, interpretive panels, and outreach. On-site outreach would predominantly be conducted by volunteers. Public contact with Deer Flat NWR staff would increase from Alternative 1 but would remain limited and intermittent due to the small number of Refuge employees and the emphasis on the EE program. Opportunities for visitors to obtain additional information while visiting the Refuge would remain largely dependent on kiosks, brochures, and the availability of volunteers.
- **Hunting.** To minimize conflicts with and improve the quality of the waterfowl hunt program, upland game hunting under Alternative 4 would no longer be allowed at the Lake Lowell Unit. Waterfowl hunting would be allowed on the south side of the Lake Lowell Unit from Parking Lots 1 through 8 with a daily limit of 25 shotgun shells per hunter.
- A **youth waterfowl hunt** following IDFG regulations would be provided from Parking Lot 1 to the New York Canal by human- or electric-powered boat, within 200 yards of shore, and in upland areas within 200 yards of the water's edge.
- **Wildlife-dependent activities** such as fishing, wildlife observation, and photography would be allowed on-trail year-round. Shoreline access would be developed at Parking Lots 2, 3, 4, and 7.
- **Uses not allowed.** Under Alternative 4, the Refuge would not be open to nonwildlife-dependent activities, including horseback riding, swimming, walking with dogs, and bicycling.

Snake River Islands Unit

Management of Wildlife and Habitat. Under Alternative 4, Refuge staff would emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the IPM Plan in Appendix G) and restoration efforts. The islands' management would be prioritized using several factors and managed accordingly. The most biologically intact islands would receive higher management priority (see Wildlife and Habitat Objective 2.2). Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses. Existing public uses would continue and would include wildlife observation and deer, upland bird, and waterfowl hunting on 1,219 acres. The Snake River Islands Unit would be open for off-trail, free-roam activities from June 15 to January 31. Under Alternative 4, shoreline fishing would also be available from June 15 to January 31 each year on all islands.

Table 2-1. Summary of Alternatives by Issue

Issue	Alternative 1 (Current Management)	Alternative 2 (Preferred Alternative)	Alternative 3	Alternative 4
How would the Refuge protect its valuable resources on the Lake Lowell Unit?				
Recreational boating	Maintain no-wake zone at the east end of the lake.	Expand the no-wake zone to the east of a line between Parking Lot 1 and Gotts Point and at the Narrows. Add no-wake zone 200 yards from the edge of the vegetation between Parking Lots 1 and 8.	Keep wake-allowed zone on the West Pool from noon through sunset, except for a 200-yard no-wake zone on the south side of the West Pool. Establish East Pool as no-wake zone. Make all uses subject to mudflat and emergent-bed protections.	Establish entire lake as no-wake. Close the southeast end and the emergent beds to all use.
Boating season	Open lake April 15 through September 30.		Open lake April 15 through September 20.	Open lake April 15 through September 30.
Protection of emergent beds	Keep all emergent beds open to public use.	Keep all emergent beds open to public use, except a 500-yard closure around active and historical grebe nesting colonies during the boating season. Keep closure in place until July 15 of the following year.	Close these areas to public use during boating season: Murphy's Neck, emergent beds from Parking Lots 3 through 8, and 500 yards around all active and historical grebe nesting colonies.	Close these areas to public use during boating season: Murphy's Neck, all emergent beds, and 500 yards around all active and historical grebe nesting colonies.
Protection of mudflats	Keep all mudflats open to public use.	Seasonally close mudflats when water levels below 2,522 feet around shorebird areas in the East and West Pools.	Establish 100-yard buffer from West Pool mudflats open from April 15 through July 14.	Close 100-yard buffer from West Pool mudflats year-round.
Creation of mudflats	No shoreline tree removal.	Remove 5 to 25 acres of shoreline vegetation adjacent to West Pool mudflats.		
Noise	No decibel limit enforced.	Enforce State/County decibel limits.		
Swimming	Allow swimming at East Upper Dam swim beach and elsewhere.	Allow swimming only at designated areas at Lower Dam Recreation Area and Upper Dam.	Allow swimming only in designated area at the Lower Dam Recreation Area.	Swimming not allowed.
Upland access	Allow access on maintained roads and trails only (except for hunting).	Allow wildlife-dependent activities off-trail in East Side Recreation Area year-round, at Gotts Point February 1 through September 30, and in all other open areas August 1 through January 31. Allow nonwildlife-dependent activities allowed on	Allow only wildlife-dependent activities, except for limited bicycling. Allow access only on maintained roads and trails (except for hunting).	Allow only wildlife-dependent activities. Allow access only on maintained roads and trails (except for hunting).

Issue	Alternative 1 (Current Management)	Alternative 2 (Preferred Alternative)	Alternative 3	Alternative 4
		designated trails only.		
Upland activities	Allow walking, jogging, bicycling, and horseback riding and dogs on-leash.		Allow only wildlife-dependent activities allowed, except for limited bicycling.	Allow only wildlife-dependent activities allowed.
How would the Refuge protect its valuable resources on the Snake River Islands Unit?				
Nesting protection	Open islands to public use June 1 through January 31.	Most Refuge islands would be open to public use outside of goose nesting season, from June 15 through January 31. Some Refuge islands (currently four to six islands) would be open to public use July 1 through January 31 to reduce disturbance to nesting herons, gulls, and terns.		
How would the Refuge provide safe, accessible, high quality compatible wildlife-dependent recreation opportunities in the future?				
Wildlife observation and photography	Maintain existing observation and trail facilities.	Maintain existing and add additional trails and observation facilities (see pink icons on Maps 5, 8, and 9).		
Environmental education (EE) and interpretation	Maintain current EE program.	Increase interpretive opportunities and programs. Reduce the size of current EE program by emphasizing on-site programs.		Tailor EE to meet local teachers' needs and Refuge EE themes.
	Maintain existing facilities at Lower Dam Recreation Area (LDRA).	Redesign LDRA to include new facilities and trails.		
Upland game hunting	Allow upland game hunting at Snake River Islands Unit. Allow upland game bird hunting at Lake Lowell Unit between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.	Allow upland game hunting at Snake River Islands Unit. Allow upland game bird hunting at Lake Lowell Unit between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.	Allow upland game hunting at Snake River Islands Unit. Allow upland game bird hunting at Lake Lowell Unit during entire upland season from west boundary of Leavitt Tract to entrance at Greenhurst Road. No upland hunting allowed in emergent beds.	Allow upland game hunting at Snake River Islands Unit. No upland hunting opportunities at Lake Lowell Unit.
Locations				
Waterfowl hunting	Allow on Snake River Islands Unit. Allow on Lake Lowell Unit between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.	Allow on Snake River Islands. Allow at Lake Lowell Unit between Parking Lots 1 and 8 and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.	Allow at Snake River Islands Unit. Allow at Lake Lowell Unit \ between Parking Lots 3 and 8.	Allow at Snake River Islands Unit. Allow at Lake Lowell Unit between Parking Lots 1 and 8.
Locations				
Shell limit	No shotgun shell limit.	Daily limit of 25 shotgun shells per hunter on Lake Lowell Unit.		
Type of hunt	Offer general season hunt.		Establish a controlled hunt (e.g., sign-in/out at parking areas or	Offer general season hunt

Issue	Alternative 1 (Current Management)	Alternative 2 (Preferred Alternative)	Alternative 3	Alternative 4
			application/lottery system).	
Youth hunt	Allow youth hunt in all designated waterfowl hunting zones.	Allow youth hunt east of Parking Lot 1.	Allow youth hunt in all designated waterfowl hunting zones.	Allow youth hunt east of Parking Lot 1.
Deer hunting	Allow on Snake River Islands Unit, and allow controlled hunt on Lake Lowell Unit from Parking Lot 8 to the New York Canal.			
Fishing	Allow from shoreline in all open Refuge areas. During waterfowl hunting season, restrict to Fishing Areas A and B.	Provide additional shoreline fishing access from designated trails and docks (see Maps 5 and 7). Allow access in all open areas of lake. Allow anglers off-trail in East Side Recreation Area year-round, at Gotts Point February 1 through September 30, at Murphy's Neck March 15 to September 30, and in all other open areas August 1 through January 31. From October 1 to April 14 fishing is allowed from non-motorized boats in Fishing Areas A and B.	Provide additional shoreline fishing access from designated trails and docks. Allow access in all open areas of lake. Allow shoreline access at Murphy's Neck March 15 to September 30. During waterfowl hunting season, restrict fishing to Fishing Areas A and B and to new fishing facilities outside of the hunt areas.	Provide additional shoreline fishing access from designated trails and docks. Allow access in all open areas of lake. During waterfowl hunting season, restrict fishing to Fishing Areas A and B and to new fishing facilities outside of the hunt areas.
Fees and Permits	No fees or permits required.	Evaluate whether to charge an entrance and/or boat launch fee.		
Bass Tournaments	Allow every other weekend from LDRA, April 15 through May 13 and July 10 through September 30.		Allow every other weekend from the Upper Dam West, July 1 through end of boating season.	
Gotts Point Access	Allow walk-in access only.	Allow vehicle access (contingent on signed agreement with County Sheriff to reduce illegal activities).		Allow walk-in access only on accessible trail from parking to shoreline trails.

2.4 Wildlife and Habitat Goals, Objectives, and Strategies

Goals and objectives are the unifying elements of successful refuge management. They identify and focus management priorities, resolve issues, and link to refuge purposes, Service policy, and the Refuge System mission.

A CCP describes management actions that help bring a refuge closer to its vision. A vision broadly reflects the Refuge's purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Goals then define general targets in support of the vision, followed by objectives that direct effort into incremental and measurable steps toward achieving those goals. Strategies identify specific tools and actions to accomplish objectives (USFWS 2002).

The draft goals for Deer Flat NWR for the 15 years following completion of the CCP are presented on the following pages in tables. Each goal is followed by the objectives that pertain to that goal. Some objectives pertain to multiple goals and have simply been placed in the most reasonable spot. Similarly, some strategies pertain to multiple objectives.

The order of goals does **not** imply any priority in this CCP. Priority actions are identified in the staffing and funding analysis (see Appendix C).

- The objective statement sometimes indicates specific items (e.g., acreages) from the Preferred Alternative that vary in the other alternatives. Values of those items for other alternatives are displayed in the short table under each objective statement. As applicable, each other alternative shows substitute text for the item or items in italics.
- If an objective is not in a particular alternative, a blank is used to indicate that this objective is not addressed in that alternative.

Below each objective statement are the strategies that could be employed to accomplish the objectives. Note the following:

- Check marks (✓) alongside each strategy show which alternatives include that strategy. If a column for a particular alternative does not include a check mark for a listed strategy, it means that strategy would not be used in that alternative.

Other symbols are used in the tables with the following meanings:

%	percent
>	greater than
<	less than
≥	greater than or equal to
≤	less than or equal to

2.4.1 Goal 1 (Lake): Protect, maintain, and enhance mudflat, emergent-bed and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife.

Objective 1.1. Protect, maintain, and enhance emergent beds – Lake Lowell shoreline

Protect 845, maintain 100, and enhance *250* acres of emergent plant beds on Lake Lowell, benefiting aquatic migratory birds (e.g., western and Clark's grebes, great egrets, and mallards) and other fish and wildlife. These emergent plant beds are characterized by the following attributes:

- 50%-70% cover of desirable moist-soil plants (e.g., smartweeds, spikerushes, salt grass) interspersed with taller (<3 feet) emergent plants (e.g., bulrush, simplestem bur-reed, and cattail)
- Presence of native/desirable submergent plants (e.g., pondweeds)
- No hydrilla, Eurasian watermilfoil, or purple loosestrife present
- Areas with high concentrations of breeding and foraging birds and other wildlife protected from human-caused disturbance
- Minimum water elevation of 2,520 feet to benefit grebe nesting colonies from April through July (if suitable for Board of Control; see Section 2.3.1 for more detail)

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total emergent acreage	845	845	845	845
Acreage maintained	100	100	100	100
Acreage enhanced	0	250	250	250
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
*Implement boating closures to protect emergent beds for grebe nesting and other wildlife. See Public Use Objective 1.4.		✓	✓	✓
Work with IDFG and other partners to develop and implement methods to reduce carp biomass in Lake Lowell. Potential methods include mechanical removal, chemical treatments, biological treatments, and carp exclusion devices.	✓	✓	✓	✓
Use soil disturbance (e.g., discing) techniques to create openings in emergent beds.		✓	✓	✓
Seed/plant desirable moist-soil plants, as needed.		✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓

*****In the Preferred Alternative (Alternative 2), areas critical to nesting birds (e.g., grebe colonies, heron rookeries, and bald eagle nests) would be closed to public entry on a seasonal basis. These areas would be sized appropriately according to best available science. The area would remain closed until no nesting is observed within the same area the following year.

Rationale: Deer Flat NWR was established to provide a refuge and breeding grounds for migratory birds and other wildlife. The Refuge has been identified as a notable waterbird site (Ivey and Herziger 2006), an "important site for aquatic birds in Idaho" (Manning and Hartley 2006), and as a State Important Bird Area (see Chapter 1). Nineteen species of birds that use the Refuge's emergent beds, open waters, and mudflats are listed by the Idaho Comprehensive Wildlife Conservation Need Strategy (IDFG 2005) as species of greatest conservation need. These species include western and Clark's grebes, northern pintail, great egret, and hooded merganser.

Emergent beds (i.e., plants that grow in the water but pierce the water surface) typically occur along the entire south and east shorelines of Lake Lowell as well as pockets along the northern shoreline. Lake Lowell's approximately 845 acres of emergent plant beds are composed predominantly of water

smartweed (*Polygonum amphibium*), coyote and peachleaf willow (*Salix exigua* and *S. amygdaloides*), and bulrush (*Scirpus paludosus* and *S. tuberosus*). Plants from the *Polygonum* and *Scirpus* genera provide food for the thousands of ducks that use the lake in the winter and early spring (Stollberg 1950). Approximately 77 bird species in Idaho use marshes and lakes, and 55 species depend on lakes and emergent beds as their primary habitat (Idaho Partners in Flight 2000). Many of the bird species that are seen in the smartweed bed are near the edge of the open water. Nesting grebes have also selected sites near open water to facilitate easy feeding and back brooding. In order to create more edge area and open up areas for foraging and nesting waterbirds, we would explore appropriate measures to create openings (e.g., discing) and channels in the larger expanses of smartweed to facilitate grebe foraging and movement.

Smartweed was planted in the lake in 1938 by Refuge staff and typically emerges as the ambient and water temperatures increase in April and May. The plant continues to grow throughout the summer season, blooms in July, and dies back as water temperatures drop. The combination of willows, smartweed, and open water provides excellent feeding, cover, and nesting habitat for numerous species of migratory birds (including waterbirds), as well as spawning, nursery, and escape habitat for fish. For example, marsh wrens and yellow-headed blackbirds nest in the willows, and Clark's, western, and pied-billed grebes; American coots; American bittern; and redheads, nest in the smartweed beds and also in the willows. In addition, many species use the emergent beds for foraging. Lake Lowell is known for large concentrations of wintering ducks and geese that rely on smartweed habitat. Canada geese primarily use the shallow water, smartweed beds, and other emergent cover of the lake for sanctuary and loafing during the spring. Ducks including redhead, mallard, northern shoveler, and cinnamon teal use the emergent beds as brood rearing and/or foraging habitat. Duck broods were much more common around the lake in the late 1960s than they are today.

These plants are also important to anchor soil and help reduce lakeshore erosion and sedimentation of the lake, thereby improving water quality by reducing sedimentation. Asplund (2000) concludes that naturally vegetated shoreline helps reduce the impacts of waves on shoreline erosion. The removal of some of the shoreline vegetation would be beneficial to marshland birds but may also increase or add to the erosion and sedimentation in the immediate area. The overall effects of this strategy are anticipated to be minimal as the amount of emergent vegetation removal would be small in comparison to overall size of the lake and adherence to BMPs.

According to Bouffard (1982), boat propellers can remove aquatic vegetation and change the species composition of the vegetation. Also, in Bouffard's study, vegetation loss caused as a result of bank erosion and siltation was most common in areas where waterskiing was practiced. During summer months at Lake Lowell, migratory birds such as pelicans, cormorants, and grebes loaf and forage in and adjacent to shallow water with smartweed and emergent vegetation. The presence and noise from boats and personal watercraft in and adjacent to smartweed beds and emergent vegetation (used for nesting and foraging) causes disturbance (e.g., flushing) to aquatic birds (Rodgers and Schwikert 2002).

Clark's and western grebes are migratory waterbirds that have historically used Lake Lowell for nesting, foraging and staging for migration. The breeding populations of Clark's and western grebes are listed as imperiled by the State of Idaho (IDFG 2005). Species are designated imperiled in Idaho if few populations exist, there is a rapid decline in numbers, or there are other factors that make the species vulnerable to rangewide extinction or extirpation (IDFG 2005).

Grebes at Lake Lowell nest in the emergent beds, and large nesting colonies have been noted along the south shore of Lake Lowell. Although regular grebe nesting surveys have not been conducted, references to nesting grebes have been made regularly in Refuge files and historical Refuge pamphlets. The shoreline and its emergent vegetation are an important habitat for a wide variety of wildlife, but these

areas are especially important for nesting and breeding grebes in Idaho. In order to protect this habitat, the Refuge has proposed various measures, including implementing no-wake zones and seasonal boating closures to protect emergent beds to provide grebes and other waterbirds opportunities to nest, forage, and rest with minimal disturbance. The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

The emergent beds also provide an important buffer. Allen et al. (2008) found that such buffers are important means of protecting grebe nests from wind- and/or boat-caused wakes. In addition, boats with frequent starts, stops, and "nearplane" speeds increased the potential for habitat impacts. Increased sedimentation and/or resuspension of sediments in the lake, by either boating activity or natural wind events, increases turbidity and resuspends phosphorus and other pollutants that adhere to soil particles (IDEQ 2010).

The lake carp population is estimated at 1.2 million carp (Kozfkay et al. 2011). Carp are thought to represent a high threat to the submerged vegetation's ecological functions. Carp uproot and eliminate submerged vegetation, increase turbidity, and decrease the overall abundance and diversity of the invertebrate community (Miller and Crowl 2006). Treatments using the natural plant chemical rotenone are expensive, are not target-specific, and may not be practical for a lake the size of Lake Lowell at full pool. Recently, IDFG completed a project to estimate and provide recommendations to reduce the carp population in Lake Lowell. IDFG (Kozfkay et al. 2011) recommended three options for significant carp reduction: physical control such as seining, a yet-to-be-studied biological control using a koi-herpes virus, or chemical control using a rotenone treatment applied to the lake in an extreme low-water year.

Carp removal has occurred intermittently for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell. Through an SUP from the Refuge, a commercial fisherman uses a beach seine to harvest carp and suckers. Seining is usually conducted during the fall and winter because the fish slow down and congregate in the cooler water, making them easier to catch. Current seining operations, which remove an estimated 50 to 125 tons of biomass annually (Cunningham 2012), likely do not remove enough of the carp population (estimated at 4,800 tons of biomass) to result in significant water quality improvements or promote submergent plant growth. However, there have been no studies that have determined the appropriate threshold of biomass removal to achieve habitat improvements.

Objective 1.2. Protect, maintain, and enhance mudflats – Lake Lowell shoreline

Protect between 100 and 800 (560 based on a water level elevation of 2,515 feet), maintain 350, and enhance *560* acres of mudflats on Lake Lowell, benefitting aquatic migratory birds (e.g., shorebirds, waterfowl) and other wildlife. These mudflats are characterized by the following attributes:

- Saturated soils during mid-July to end of September
- Sparse (1%-10%) to no vegetation (e.g., moist-soil plants)
- Macroinvertebrates (e.g., chironomids) that provide forage for migratory shorebirds present
- Areas with high concentrations of foraging shorebirds, waterfowl, and other wildlife protected from human-caused disturbance, especially during the late summer and fall

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total mudflat acreage	100-800	100-800	100-800	100-800
Acreage maintained	350	350	350	350
Acreage enhanced	0	560	560	560

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Work with the Board of Control to explore the possibility of dropping water level elevation to 2,515 feet by September 1.		✓	✓	✓
Implement seasonal or permanent closures to prevent disturbance to migrating shorebirds. See Public Use Objective 1.4.		✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓

Rationale: Late in the summer, as Lake Lowell is drawn down for irrigation, many species of shorebirds use the exposed mudflats for feeding. Shorebirds depend upon wetland stopover sites to replenish the depleted fat reserves used in their migratory flight (Dugan et al. 1981). Many wetland areas in Idaho and throughout the United States have been drained, developed, or otherwise altered, forcing shorebirds to use other remaining wetlands. Construction of reservoirs for power and irrigation throughout the United States has created about two million acres of such habitat since the mid-1950s (Howe 1987). Taylor and Trost (1992) showed that reservoirs in the western interior can be important migratory stopover sites for shorebirds. Lake Lowell, a reservoir created in 1909, has been shown to be important for shorebirds.

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) identified Lake Lowell as one of only two sites in Idaho with greater than 5,000 shorebirds in more than half the years surveyed. The peak was just under 12,000 shorebirds in 1990 (Taylor et al. 1992). Shorebirds present in late summer and fall include lesser and greater yellowlegs, sandpipers (western, pectoral, least, Baird's, solitary, spotted, and stilt), marbled godwits, long-billed dowitchers, plovers (black-bellied, semi-palmated, killdeer, and American golden), as well as the black-necked stilt and American avocet. If mudflats are exposed, peak shorebird abundances occur at Lake Lowell between mid-July and mid-August (Taylor and Trost 1992).

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) lists Lake Lowell as critically important for the Wilson's phalarope, long-billed curlew, long-billed dowitcher, and black-necked stilt. Lake Lowell is also listed as very important for the western sandpiper, willet, red-necked phalarope, least sandpiper, and marbled godwit and important for the semi-palmated plover, spotted sandpiper, and greater yellowlegs. The long-billed curlew is a Federal species of special concern.

The Idaho Comprehensive Wildlife Conservation Strategy (CWCS; IDFG 2005) lists species of greatest conservation need by different levels. Three species of shorebirds that occur at Lake Lowell are included on the list; two are listed as vulnerable (black-necked stilt and American avocet), and one is listed as imperiled (marbled godwit). *Vulnerable* means the species is at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to rangewide extinction or extirpation. *Imperiled* means the species is at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to rangewide extinction or extirpation.

Studies have shown that both the date and amount of shoreline exposed affect shorebird abundance, with increasing numbers of shorebirds correlating to increasing mudflat (Taylor et al. 1992; Turley and Holthuijzen 2003). When exposed, mudflats are the most extensive on the southeast end of the lake and near Parking Lots 1 through 3. Additional areas include areas along the north and east sides of the West Pool. At Lake Lowell, approximately 100 acres of mudflats are exposed at a surface water elevation of 2,522 feet and increase in extent to 560 acres as the water drops to typical annual lows reaching elevations of 2,515 feet. Even more mudflats are exposed if surface water elevations fall below the annual averages. If consistent mudflats are made available to shorebirds, the Refuge may experience increased numbers and prolonged stopover times, which would benefit shorebird populations and provide

increasing viewing opportunity for Deer Flat Refuge visitors.

Deer Flat NWR does not have any jurisdiction to manage the water levels of Lake Lowell and water levels fluctuate with irrigation demands (see Chapter 3). The Refuge would work with the Board of Control to explore the possibility of maintaining a minimum water level from July 15 through September 30 at or near forebay elevations ranging from 2,515 to 2,512 feet to provide mudflats for foraging shorebirds while still meeting the Board of Control's primary mission of providing water to irrigators.

The mudflats used most by shorebirds are those near the New York Canal at the east end of the lake. The New York Canal is the southern boundary of the east end of the East Side Recreation Area. This area is currently open to the public for recreational activities including hunting, fishing, and wildlife observation (see Chapter 5). Recreational activities in this area have the potential to disturb migrating shorebirds. The consequences of human disturbance, in terms of physical condition or survival, are currently unknown (Fernández et al. 2010). Some studies have shown that shorebirds avoid areas of higher disturbance. For example, when comparing bird response on paired lower and higher use days at the trail sites, a study in California found the number of shorebirds decreased with increasing trail use, with higher trail-use days averaging 25 percent fewer birds than on lower use days (Trulio and Sokale 2008). To minimize disturbances to migrating shorebirds, in the Preferred Alternative, the shorebird area at the northern shoreline of the East Pool east of Tio Lane access would be closed seasonally to boating when the water level elevation falls below 2,522 feet (see Public Use Objective 1.4). A shorebird observation blind would be installed to provide the public an opportunity to observe the shorebirds while minimizing disturbance (see Public Use Objective 1.3). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

Objective 1.3 Create mudflats – Lake Lowell shoreline

Within five years, restore approximately *5-25* acres of mudflats at Lake Lowell adjacent to Farm Field 5 at or above approximately 2,518 feet elevation. These mudflats would provide habitat for migrating shorebirds and other wildlife when lake water levels are above 2,518 feet. These mudflats are characterized by the following attributes:

- Saturated soils during mid-July to end of September
- Sparse (1%-10%) to no vegetation (e.g., moist-soil plants)
- Saturated soils to dry soils during mid-July to mid-September
- Macroinvertebrates (e.g., chironomids) that provide forage for migratory shorebirds present
- Adjacent or connected to existing mudflats with a history of high shorebird use

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Total acreage created	0	5-25	5-25	5-25
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Remove 5-25 acres of shoreline vegetation adjacent to current mudflats through mechanical control (including possible issuance of firewood collection permits) or controlled burn to create larger contiguous mudflats.		✓	✓	✓
Create shallow scours to hold water.		✓	✓	✓
Disc vegetation in late fall to incorporate organic matter into the soil and encourage invertebrate growth.		✓	✓	✓

Rationale: During high-water years, Lake Lowell does not have suitable exposed mudflats to provide reliable shorebird habitat. Historically, the Refuge maintained open shorelines by removing willows and cottonwoods. For example, according to the 1975 Refuge Annual Narrative, short willows and forbs were

clipped with a tractor and rotary beater to retard succession on shoreline in the area adjacent to Farm Field 5. In addition, firewood permits were regularly issued in the 1960s through late 1970s, which likely provided additional areas of mudflat above and/or at elevations that are now covered by riparian habitat. Over time, these activities ceased, and a riparian habitat developed along the lakeshore as it appears management began to shift to provide habitat for raptors.

Small openings in the riparian habitat have been maintained near Farm Field 5 and are primarily used as duck trapping sites. These areas are used by shorebirds when lake water levels are higher. The Refuge proposes to reimplement some of the historical management practices, such as willow and cottonwood removal, to provide mudflat habitat for shorebirds in high-water years. In addition, discing some of the smartweed at low water levels would incorporate organic matter into the soil and encourage invertebrate growth, therefore increasing the forage base for shorebirds even when water levels are maintained at levels conducive to providing suitable mudflats in July through September. Initially, small acreages (<5 acres) of willow and cottonwood would be removed and monitored to see if shorebirds use the area. If these first plots are used by shorebirds, then additional acreages would be treated.

Objective 1.4. Protect, maintain and enhance open-water habitat – Lake Lowell

Protect, maintain, and enhance *6,430* acres of open-water habitat (depths from 2 to 45 feet) at Lake Lowell to benefit waterfowl (e.g., mallards, geese), waterbirds (e.g., grebes, pelicans), and fish. These open-water habitats are characterized by the following attributes:

- No emergent vegetation
- Submergent plant beds in shallow areas with light penetration
- Carp no more than 20% of total fish biomass
- Areas with high concentrations of foraging and loafing birds and other wildlife protected from human-caused disturbance year-round

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total open-water acreage (estimated at full pool on July 21, 2009)	6,430	6,430	6,430	6,430
Maintained acreage (estimated at full pool on July 21, 2009)	6,430	6,430	6,430	6,430
Enhanced acreage (estimated at full pool on July 21, 2009)	0	6,430	6,430	6,430
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Implement carp reduction in *x* acres of open water. See Wildlife and Habitat Objective 1.1.	100	6,430	6,430	6,430
Continue winter waterfowl boating closure and current no-wake zones on 6,430 acres of open water. See Public Use Objective 1.4.	✓	✓	✓	✓
Implement new no-wake zones and/or closures to minimize disturbance to wildlife species that are dependent on open-water habitat. See Public Use Objective 1.4.		✓	✓	✓
Work with partners to improve water quality in Lake Lowell.		✓	✓	✓

Rationale: The importance of the Lake Lowell Unit to migratory birds is discussed in Wildlife and Habitat Objective 1.1. The open-water habitat provided by Lake Lowell is important to many species of birds for feeding and roosting at different times of the year. Open-water sites such as Lake Lowell support large waterfowl concentrations during spring and fall staging, as well as migration and wintering (Idaho

Partners in Flight 2000).

The lake carp population is estimated at 1.2 million carp (Kozfkay et al. 2011). Carp are thought to represent a high threat to the submerged vegetation's ecological functions. Carp impacts and potential treatments are discussed in Obj. 1.1.

Grebes nest in the emergent beds of Lake Lowell (see Wildlife and Habitat Objective 1.1) and rear their young in the open water, typically from June through October. The water level drops at this time (see Wildlife and Habitat Objective 1.2), leaving the emergent beds dry. Lowered water levels are problematic for grebes for several reasons. Grebes eat fish and pursue them underwater (Lawrence 1950; Storer and Nuechterlein 1992) and grebe chicks are altricial (dependent on adults for protection), riding between the wings on their parent's back in open water until they are 2 to 4 weeks old. Back-brooding is essential for survival of young chicks because their plumage is not yet developed to withstand long periods of swimming and they are not adapted to loaf on shore (Storer and Nuechterlein 1992). The fluctuating water levels on Lake Lowell have a direct effect on the amount of open water acreage available for grebes. As water levels decrease in the summer months, usable open water habitat is diminished accordingly. During the 2010 and 2011 nesting season, as water levels dropped grebes moved into deeper water. Grebes nesting in the southeast portion of the lake needed to move especially far as water levels dropped, because the gradual slope of the lake bottom meant that feeding habitat was unavailable. In open water, grebes are more prone to disturbance from open-water recreational activities. High-speed boating leads to disruption of nesting and can separate chicks from adults, which may lead to a loss of production and displacement of grebes from preferred habitats (Burger 1997). Adults and chicks are often killed by boats (D. Anderson, as cited in Ivey 2004), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Shaw 1998; Storer and Nuechterlein 1992). Creating no-wake zones would provide a sanctuary for grebes to forage and raise their young with fewer disturbances.

The open water of Lake Lowell is also important for waterfowl, primarily as wintering habitat, but some nesting also occurs on the Refuge. Proposed closed areas and no-wake zones would provide undisturbed forage and brood-rearing habitat for waterfowl. Eleven species of waterfowl, including mallard, cinnamon teal, wood duck and gadwall, nest around the lake edges and rear their young in the open water, typically in early summer. Refuge annual narratives throughout the 1960s and early 1970s document nesting waterfowl and a fairly significant number of spring waterfowl migrants using the lake. It appears that nesting and spring migration have declined over time. Reasons for the decline likely include habitat alteration (see Wildlife and Habitat Objective 2.1), fluctuating water levels (see Chapter 3), and/or disturbance. Disturbance can reduce courtship behavior and decrease egg and duckling survival. Disturbed adults may leave their eggs, nestlings, or ducklings, reducing survival rates (Korschgen and Dahlgren 1992). Impacts on waterfowl depend on the noise, speed, and proximity of watercraft (Cywinski 2004). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

It is essential that grebes, waterfowl, and other wildlife have locations on the lake where they can feed, roost, and raise young undisturbed. To provide places to feed, raise their young, and roost with little or no disturbance to waterfowl and waterbirds (e.g., grebes and pelicans), the Preferred Alternative includes strategies that seasonally close portions of the lake to public use and implement no-wake zones. For more information on the general and Refuge-specific effects of human-caused disturbance to wildlife see Chapter 6.

The lake itself is closed to public use from October 1 through April 14 to provide resting habitat for migrating and wintering Canada geese and other waterfowl. Energy reserves are extremely important for wintering waterfowl to maintain body temperature in cold weather and provide energy for migration.

Therefore, disturbance and flushing events during this critical time are more disruptive than during warmer months outside of the migration period.

2.4.2 Goal 2 (Riparian): Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Objective 2.1. Protect, maintain, and enhance riparian forests – Lake Lowell

Protect *1,900*, maintain *520*, and enhance *1,200* acres of riparian forest communities surrounding Lake Lowell to benefit migratory birds (e.g., yellow warbler, song sparrow, herons) and a diverse assemblage of other riparian-dependent species. These riparian habitats are characterized by the following attributes:

- Structurally diverse forest community
- 20%-70% canopy cover of over-story woody species (e.g., cottonwood, peachleaf willow)
- 30%-80% cover of native shrub in understory (e.g., willows, golden currant, wild rose, elderberry)
- 25% cover of desirable/native grasses and forbs (e.g., *Deschampsia* sp., mannagrass)
- 20%-40% ground cover from dead and downed wood
- >2 standing dead trees/acre
- 5%-25% coverage of invasive woody trees and shrubs (e.g., Russian olive)
- No salt cedar
- <5% cover of invasive plants (e.g., Canada thistle, perennial pepperweed, poison hemlock, reed canarygrass)
- Areas with noted concentrations of nesting, wintering, and migrating birds and other wildlife protected from human-caused disturbance

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total riparian acreage	1,900	1,900	1,900	1,900
Maintained acreage	520	520	520	520
Enhanced acreage	0	1,200	1,200	1,200
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Annually, remove undesirable trees, shrubs, and grass; plant desirable trees, shrubs, and grass species on *10-15* acres, as necessary.		✓	✓	✓
Maintain appropriate level of downed and standing dead trees (including invasive tree and shrub species that are treated and left in place with the exception of the area designated for mudflat creation adjacent to Farm Field 5		✓	✓	✓
Use mechanical and prescribed fire to reduce hazardous fuels loading, create openings, and reduce invasive species.		✓	✓	✓
Maintain nesting habitat by reducing ladder fuels and/or fuel loading, or girdling trees in rookery areas and around eagle nests.		✓	✓	✓
Maintain appropriate fire breaks while maintaining a continuous canopy cover.	✓	✓	✓	✓
Where feasible, relocate fire breaks to coincide with Board of Control drainage canals.		✓	✓	✓
Require visitors to stay on trail seasonally to prevent disturbance to neotropical migrants, nesting wading		✓		

birds, and other wildlife. See Public Use Objective 1.3.				
Require visitors to stay on trail to prevent disturbance to neotropical migrants, nesting wading birds, and other wildlife. See Public Use Objective 1.3.			✓	✓
Implement land-based seasonal closures to protect nesting and wintering areas. See Public Use Objective 1.3.		✓	✓	✓
Issue SUPs for firewood collection as appropriate to maintain appropriate level of dead and downed material.		✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓
Apply mechanical, chemical, and biological methods to treat invasive species.	✓	✓	✓	✓

Rationale: Before the construction of the reservoir, Deer Flat NWR consisted of typical sagebrush-steppe habitat that included springs and small riparian oases associated with these springs. The flooding of the reservoir eliminated the existing habitats but over the years provided an important riparian habitat. Currently, the majority of shoreline around Lake Lowell is a riparian zone dominated by cottonwood, Russian olive, coyote and peachleaf willows, and false indigo bush. The Lake Lowell Unit contains approximately 2,116 acres of riparian and/or floodplain forest habitat in various seral stages. Most of this habitat on the Refuge is in a degraded condition due to invasive plants, past grazing practices, alteration of hydrologic regimes, and potentially poor native plant recruitment/recovery.

Historically, the Refuge maintained open shorelines by removing willows and cottonwoods with a tractor and rotary beater to retard succession on shoreline in the area adjacent to Farm Field 5 (Refuge Annual Narrative 1975). In addition, firewood permits were regularly issued in the 1960s through late 1970s. Over time, these activities ceased, and a riparian habitat developed along the lakeshore. The Refuge can provide habitat for species dependent on riparian and floodplain forests by enhancing a mix of early, mid-, and late-successional riparian forests.

Human land uses (e.g., urban sprawl, agriculture) can have substantial effects on plant and animal communities, including riparian forests (Patterson and Best 1996; Wilson and Ryan 1988). Over 60 percent of western neotropical birds use riparian areas during the breeding season or as a stopover for migration (Krueper 1993). One study has shown that some riparian areas harbor up to 10 times the neotropical migrants that are harbored by neighboring nonriparian habitats (Stevens et al. 1977). Of the 243 bird species breeding in Idaho, 113 (46%) use riparian habitat as nesting habitat. Many of the other 130 species also use riparian habitat as a source of water, as migratory corridors, or for other purposes. Of the 119 neotropical migratory landbirds, 68 species (57%) use riparian habitat. Many of Idaho's mammals, amphibians, reptiles, fish, and mollusks also depend on riparian habitat for survival (Idaho Partners in Flight [Bird Conservation Plan] 2000).

Wading birds like great blue herons typically build large stick nests in both live and dead trees in close proximity to water. Herons occasionally nest singly, but more typically they nest in large colonies that average around 35 nests and are found in wet or dry forest, sparsely treed islands, beaver ponds, and marshes (Peck and James 1983). In order to provide this type of structure in the riparian habitat surrounding Lake Lowell, the Refuge would identify potential suitable habitats and take measures to protect and monitor them to encourage future wading bird use. Currently all recreation in the riparian habitat is required to be conducted on designated trails during the breeding season. In the Preferred Alternative, seasonal closures would be placed around any colonies to mitigate potential impacts from

human disturbance that could result in increased mortality of chicks due to exposure or predation, nest desertion, or complete abandonment of a colony (Vos et al. 1985). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

The Refuge has an opportunity to enhance riparian areas on the Lake Lowell Unit. Planting desirable species would accelerate riparian regeneration, enhance habitat quality, and provide habitat for neotropical species. Highest-priority areas for enhancement would be based on their size and location on the Refuge. Though riparian acreages are relatively small, enhancement efforts may provide valuable habitat or habitat connectivity for some species that are dependent on riparian forests. New plantings would focus on connecting or expanding existing riparian stands in areas that are likely to be used by focal species.

In areas open to public use, social trails fragment viable wildlife habitat and increase user impact on the natural system. Wildlife responds to recreationists using trails by flushing away from the perceived danger, which effectively reduces the amount of suitable habitat available to them (Taylor and Knight 2003). Frequent flushing of an animal increases the amount of expended energy, which reduces their overall growth and reproductive potential, and causes animals to avoid otherwise suitable habitat (Geist 1978). In the Preferred Alternative, there would therefore be seasonal restrictions on off-trail travel in some areas.

Most riparian habitat on the Refuge is in a degraded condition due to invasive plants, alteration of hydrologic regimes and poor native plant recruitment/recovery. In all alternatives, management would focus on improving habitat conditions in the existing riparian habitat. Strategies to enhance this habitat could involve thinning and planting of young native woody species to create multiaged stands, controlling invasive species, and establishing native understory in existing riparian forests. Selected snags, logs, and piles of woody debris would be left in place to provide important habitat for a variety of bird species and other wildlife. Passerine birds like dark-eyed juncos and white-crowned sparrows as well as upland game species like California quail use dense vegetation and brush piles for cover. Snags are used by many raptors for perching, by woodpeckers for foraging, and by wood ducks and owls for nesting. Bunnell et al. (2002) estimate that 57 percent of the listed vertebrate species in their study were reliant or associated with dead and dying woody debris. Firewood collecting is an effective way of reducing the amount of woody debris to reduce fuel loads. In one study, an unmanaged stand consisted of 30 to 40 percent woody debris cover, which declined rapidly with successive fiber harvesting (Angelstam 1997). Care should be taken to ensure excessive harvest does not happen. A balanced approach that supports a mosaic of woody debris and open riparian forest floor would provide suitable habitat for a wide variety of wildlife.

Mechanical and prescribed fire treatments can be used to reduce the amount of fuel loading and invasive species and to restore selected sites. Removal of selected dead and downed logs can reduce the amount of fuel loading in existing riparian forests, which can reduce the likelihood of an out-of-control fire destroying riparian sanctuaries important for local and migrating wildlife. Refuge neighbors and users have expressed interest in collecting firewood from the Refuge due to its close proximity to residences and an abundance of trees and downed debris. Firewood collection could be allowed by SUP and would provide interested parties with a usable resource while benefitting the Refuge's wildlife. Fire breaks would be strategically placed in vulnerable areas to reduce the probability of an out-of-control wildfire destroying large swaths of riparian habitat in consultation and cooperation with the Refuge Fire Management Officer.

Objective 2.2. Protect, maintain, and enhance riparian forests – Snake River Islands

Protect *105,* maintain *105,* and enhance *105* islands' riparian forest communities to benefit migratory birds (e.g., yellow warbler, song sparrow, great blue heron) and a diverse assemblage of other riparian-dependent species. Riparian habitat would be managed to meet the following attributes as appropriate:

- Structurally diverse forest community
- >20% canopy cover of over-story woody species (e.g., cottonwood, peachleaf willow)
- 30%-80% cover of native shrub in understory (e.g., golden currant, wild rose, coyote willow, elderberry)
- 25% cover of native grasses and forbs (e.g., Sandberg bluegrass, bluebunch wheatgrass)
- 20%-40% ground cover from downed trees
- >2 standing dead trees per acre
- Minimal invasive woody trees and shrubs (e.g., Russian olive, salt cedar)
- <25% cover of invasive plants (e.g., Scotch thistle)
- Areas with high concentrations of nesting and migrating birds and other wildlife protected from human-caused disturbance

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect all islands	104	104	104	104
Maintained islands	104	104	104	104
Enhanced islands	0	104	104	104
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Plant desirable tree and shrub species following invasive species treatment and/or removal on two to 10 islands.		✓	✓	✓
Maintain downed and standing dead trees (including invasive tree and shrub species that are treated and left in place) as appropriate.		✓	✓	✓
Use mechanical and prescribed fire to reduce hazardous fuel loading.		✓	✓	✓
Implement seasonal closures to prevent disturbance to waterfowl and colonial-nesting birds. See Public Use Objectives 1.3 and 3.1.		✓	✓	✓
• All Refuge islands closed February 1 through May 31.	✓	✓	✓	
• All Refuge islands closed from February 1 to June 14 during goose nesting season.		✓	✓	✓
• Some Refuge islands (currently four to six islands) closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns).		4-6	4-6	4-6
Partner with adjacent landowners to address cattle trespass problems in targeted locations (i.e., fencing on landowner property, fencing on islands, and other exclusion methods).		✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓

Rationale: The importance of riparian habitat in the arid west is discussed in the rationale for Wildlife and Habitat Objective 2.1. Meador and Goldstien (2003) also suggest the universal importance of riparian zones to the maintenance and restoration of diverse fish communities in streams.

Vegetative structure varies from island to island, but most include both upland and riparian habitat. The

Refuge can provide habitat for species dependent on riparian forests by enhancing or restoring a mix of early, mid-, and late-successional forests on the Snake River Islands Unit. Highest-priority areas for restoration would be based on GIS modeling that includes a ranking system identifying the most biologically intact islands that are likely to provide good habitat. Factors to be modeled include size, current condition (e.g., existing habitat, noxious weeds), neighboring land use, and isolation (measure of flow and channel depth, Zoellick et al. 2004a). See Wildlife and Habitat Objective 6.4. By starting with small projects, the Refuge can monitor effectiveness, predict future funding needs, and develop a long-term strategy for enhancing riparian habitat on all of the Refuge islands.

To effectively protect riparian zones on the islands, functional partnerships with adjacent landowners would be important. Unauthorized grazing occurs on the islands periodically, especially when low water flow allows easy access. Maintaining collaborative efforts with landowners would help the Refuge identify problem areas, seek assistance for prevention of trespass, and provide a shared outlook on the importance of riparian areas on the Snake River Islands. In addition, the Refuge periodically receives requests from Snake River Islands Unit neighbors to better control invasive species to prevent spread from the islands to private property. Invasive species are an enormous problem in the Treasure Valley, especially on the Snake River Islands, and effectively reducing invasive populations can be accomplished only with a combined effort.

Fire has been used to control undesirable plant communities in the past with mixed results. The vegetative structure on some of the islands is such that mechanically thinning and then burning the entire island may be the most cost-effective method of restoration. In cooperation with Service fire personnel, Refuge staff would evaluate past, current, and future practices to effectively use fire as a valuable tool in vegetative removal and restoration of riparian zones on the Snake River Islands.

Current protection practices include the closure of Refuge islands during sensitive times, most notably nesting periods for waterfowl and wading birds. The current island closure dates are February 1 to May 31, but additional protection is warranted. Canada geese in this area generally start hatching at the end of April or beginning of May, but hatching has been noted well into June (Steele et al. 1957). Molting of flight feathers happens around the same time, and geese are more vulnerable to disturbance when they are land-bound with young. To provide protections through this vulnerable time, the island closures would be extended to June 15. The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

2.4.3 Goal 3 (Wetlands): Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Objective 3.1. Protect, maintain, and enhance emergent wetlands

Protect *85*, maintain *70,* and enhance *85* acres of wetland on three tracts (Upper Dam Marsh, Rambo Pond, and Leavitt Tract) to benefit wetland-dependent species (e.g., wetland birds, amphibians, hydrophytic plants, aquatic invertebrates). These wetlands should be characterized by the following attributes:

- Variably flooded, from seasonal inundation (October through April) to semipermanent (October through August) to permanent
- Variable-bottom topography resulting in water depths 0 to >36 inches
- Mosaic of tall (4-6 feet) emergent vegetation and open water
- 30%-70% cover of native emergent vegetation (cattail, bulrushes, sedges, rushes, smartweeds, wild millet)
- Submergent plants (e.g., pondweeds) in open water

- <5% cover of invasive plants (e.g., purple loosestrife)
- Wetland areas of importance to nesting and migrating birds and other wildlife protected from human-caused disturbance

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total wetland acreage	85	85	85	85
Maintained acreage	70	70	70	70
Enhanced acreage	0	85	85	85
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Use prescribed fire, discing, mowing, and herbicides to remove extensive emergent stands (e.g., cattails).		✓	✓	✓
Implement water-level management (flood-up and drawdown) using water control structures.	✓	✓	✓	✓
Develop/secure reliable water sources (including water rights) and lift-pump systems, as needed.		✓	✓	✓
Use scraping and contouring to produce a variable-bottom topography.		✓	✓	✓
Modify the time and purpose of use (from irrigation use to wildlife use) for existing water rights on the Leavitt Tract.		✓	✓	✓
Reseed and/or revegetate with a mix of emergent vegetation.		✓	✓	✓
Exclude cattle from Leavitt Tract wetland.		✓	✓	✓
Finalize transfer of Upper Dam Marsh (and adjacent uplands) from Reclamation to FWS.		✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓

Rationale: The Refuge was established to provide a refuge and breeding grounds for migratory birds and other wildlife. Providing a diversity of wetlands is vital to the Refuge's purposes. Wetlands provide habitat for fish and wildlife; improve water quality by filtering sediments and chemicals; reduce flooding; recharge groundwater; protect biological diversity; and provide opportunities for educational, scientific, and limited recreational activities. Outside of wetlands' use by waterfowl and other migratory birds, little is known about the vegetative composition of or aquatic species inhabiting the wetlands on the Lake Lowell Unit.

Wetland basins should be at least 1 acre if the primary concern is waterfowl production (Hudson 1983). However, Williams (1985) reported that bird species diversity increases with a wetland area up to 10 acres, and species richness is more stabilized in larger wetlands. Water depths should be varied throughout a wetland basin to attract a wide variety of flora and fauna but should not exceed 8 feet for optimum wetland plant development. Shorelines should consist primarily of gently sloping gradients (1:10) if the primary objective is to maximize wetland vegetation production and waterfowl use (Cole et al. 1996).

Refuge wetlands at the Lake Lowell Unit (three wetlands totaling approximately 85 acres, including the Upper Dam Marsh, Rambo Pond, and the Leavitt Tract) should be managed to mimic natural disturbance mechanisms, thus providing and maintaining the cyclical aging and renewal processes of wetlands over time. By maintaining a number of acres of open shallow marsh through active management such as mechanical soil disturbance and water-control infrastructure, the Refuge can provide a diversity of early successional vegetation stages that increase overall biodiversity.

Invasive plants (e.g., cattails and purple loosestrife) are widespread in Refuge wetlands. Invasive plants limit native plant production and cause impacts to food, nesting habitat, and cover for wildlife. Invasive plants in wetlands reduce waterfowl food availability during the migration and wintering periods.

Cattails generally occur as scattered sterile plants in high-quality natural areas. Disruptions of hydrology, wildfire suppression, or system enrichment may favor cattail growth. System disruption is often followed by the growth of dense monocultures of cattails that may reduce habitat heterogeneity and eliminate other plants. Mechanical and chemical methods, prescribed burning, and several other methods of cattail control are available. Reliable control is achieved when any method reduces and maintains the stature of live and dead cattail stems below water levels for a period of one to three years (Apfelbaum 1985). A step-down plan for invasive species abatement would be developed following completion of the CCP.

The Refuge has minimal water-management capabilities on these wetlands. Refuge staff would work toward ensuring the dependability of water to these wetland areas. With the exception of Rambo Pond, the wetlands retain water throughout the summer, though significant reduction in surface area and depth may occur. Water levels in the Rambo Pond appear to vary due to seepage from groundwater and timing of when the water is pumped in. These wetlands support primarily submergent plant species.

The Leavitt Tract simulates a wet meadow and is used as foraging habitat by Canada geese, ducks, sandhill cranes, and shorebirds and as nesting habitat for northern harriers and ducks. Wet-meadow vegetation may have included native species historically, but this site has been largely taken over by cattails. Currently, the Leavitt Tract attracts ducks and geese during the fall and winter.

Scraping and contouring of these wetlands may be beneficial in a few ways. The Leavitt Tract and the Upper Dam Marsh consist of a monoculture of cattails that could be removed most easily by heavy equipment initially, after which a regime of mowing and discing could maintain the wetlands. Modifying the wetlands to provide more edge, shoreline, and island structure for waterfowl and shorebirds could also be beneficial. Removing sediment buildup in the shallow ponds would deepen them, making the wetland more of a permanent structure.

The degradation of sensitive riparian habitats by livestock has been well studied, and some of the negative impacts from livestock include compaction of soil, which increases runoff and decreases water availability to plants; significant removal of vegetation, which allows soil temperatures to rise, increases evaporation on the soil surface and reduces resources available to native wildlife; and physical damage to vegetation from rubbing, trampling, and browsing (Severson and Boldt 1978). If the Refuge is to maintain wetland habitat as a priority resource for waterfowl and other wildlife, cattle need to be excluded from wetland areas and managed in the nearby uplands at appropriate stocking rates and times of the year (see Wildlife and Habitat Objective 5.2).

2.4.4 Goal 4 (Shrub-steppe): Protect, maintain, and enhance shrub-steppe habitats characteristic of the historic Columbia Basin.

Objective 4.1. Protect, maintain, and enhance shrub-steppe habitat– Lake Lowell

Protect *830,* maintain *520,* and enhance *300* acres of shrub-steppe communities surrounding Lake Lowell, benefiting migratory birds (e.g., sage thrasher, loggerhead shrike, burrowing owls) and a diverse assemblage of other shrub-steppe-dependent species. These habitats should be characterized by the following attributes:

- Unfragmented stands of 20 to >50 acres
- 25% canopy cover of native shrubs, including sagebrush, bitterbrush, saltbush, and rabbitbrush

- 25% cover of native perennial forbs/bunchgrasses (bluebunch wheatgrass, Great Basin wildrye, Idaho fescue)
- <25% cover of invasive plants (e.g., cheatgrass, puncturevine, tumbleweed)
- No rush skeletonweed present
- 15% cover of bare ground
- Refuge areas for wildlife protected from human-caused disturbance

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total shrub-steppe acreage	830	830	830	830
Maintained acreage	520	520	520	520
Enhanced acreage	0	300	300	300
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Seed and plant native shrubs, forbs, and bunchgrasses with primary emphasis on areas adjacent to previously restored areas (i.e., CC Lightning Fire and Sage Fire areas) and areas beneficial for research and/or EE.	✓	✓	✓	✓
Rehabilitate shrub-steppe that has been damaged in unplanned fire events with native shrubs, forbs, and bunchgrasses.		✓	✓	✓
Use *x* acres of restored steppe habitat to research cheatgrass control methods. Priority would be given to the North Side Recreation Area and adjacent areas, as well as the CC Lightning Fire area and adjacent areas.	0	163	163	163
Remove and rehabilitate unnecessary internal fire breaks through green-stripping.		✓	✓	✓
Use prescribed fire and mechanical treatments for hazardous fuels reduction.		✓	✓	✓
Implement land-based seasonal closures to protect nesting and wintering areas. See Public Use Objective 1.3.		✓	✓	✓
Seasonally restrict travel to designated roads and trails to reduce and/or prevent habitat impacts and disturbance to wildlife. See Public Use Objective 1.3.		✓		
Restrict travel to designated roads and trails to reduce and/or prevent habitat impacts and disturbance to wildlife. See Public Use Objective 1.3.			✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓
Apply mechanical, chemical, and biological to invasive species.	✓			

Rationale: Uplands on the Refuge typically consist of patches of big sagebrush with a cheatgrass understory between Lake Lowell, agricultural fields, fences, roads, and irrigation dikes. Even though most of the vegetation is nonnative, these areas provide nesting and foraging habitat for ground-nesting birds, resting and feeding areas for flocks of geese, foraging space for raptors, and habitat for small mammals and other wildlife. Currently the Lake Lowell Unit has approximately 830 acres of this upland or shrub-steppe habitat. The area near the Visitor Center has the largest contiguous piece of sagebrush habitat on the Refuge at approximately 550 acres.

Sagebrush ecosystems and the wildlife that depend on them are thought to be among the most imperiled in North America (Dobkin and Sauder 2004; Knick and Rotenberry 2002; Knick et al. 2003; Mac et al.

1998). Populations of shrubland and grassland birds, which represent an important component of the biodiversity in the western United States, are declining more rapidly than other groups of bird species in North America (Dobkin 1994; Knopf 1994; Saab and Rich 1997; Vickery and Herkert 1999). Declines in sagebrush-dependent species can be attributed to the once greater than 60 million hectares of the Intermountain West shrub-steppe habitat being degraded, fragmented, converted to agriculture, or changed to vegetative states dominated by exotic annual grasses (Miller and Eddleman 2001; West 1996). These disturbance regimes have accelerated soil erosion and the loss of sagebrush ecosystems (Bunting et al. 2003; West and Young 2000) to a point where the ecological integrity may be pushed beyond a threshold from which they can recover (Allen 1988; Belnap and Eldridge 2001). Conservation and restoration of sagebrush lands are becoming high priorities for natural resource agencies because of changing attitudes about the intrinsic value of sagebrush ecosystems and the threat of petitions to list species under the Endangered Species Act (Bureau of Land Management [BLM] 2002). Less than 3 percent of the area dominated by sagebrush in the United States lies within areas that receive permanent legal protection (Scott et al. 2001; Wright et al. 2001). An estimated 99 percent of historical sagebrush habitats in the Snake River Plain had been converted to cropland by the early 1980s (Hironaka et al. 1983).

Deer Flat NWR is particularly vulnerable to invasive plant infestations due to a combination of surrounding land management practices and high levels of human use. Seeds and propagules can transfer across boundaries along trails (human and wildlife), rivers, utility corridors, and roads. Recreational use by bird watchers, hikers, hunters, cyclists, joggers, photographers, equestrians, and dog walkers can create a high probability for propagules to enter and be distributed into even remote areas. Currently there is minimal management of natural vegetation due to large areas, low budgets, and staff shortages.

The constant flood of new propagules into desert regions, especially near urbanized areas, increases the probability that new populations (of invasive species) will become established. One of the biggest challenges for land managers is to identify these problematic species and control them before they establish and spread in wildland areas (Brooks and Pyke 2001). Mowing, grazing, burning, tilling, and reseeding of existing shrub-steppe habitat would be used to attempt to restore small tracts of Refuge uplands to provide presettlement conditions for obligate bird species and other terrestrial vertebrates as well as provide a working example and educational opportunity for future studies. In one study, repeated mowing (every three weeks) during the spring and summer was found to be as effective at controlling cheatgrass seed production as an application of glyphosate, when initiated in the year following a prescribed fire treatment (Ponzetti 1997). This method was very labor-intensive, and a cost/benefit analysis should be conducted before any choice is made. Refuge staff would attempt to continue, augment, and improve past restoration efforts. The strategic placement of fire breaks would be re-evaluated, and those identified as superfluous would be exploited for green-stripping and restoration efforts.

There is substantial evidence that human presence can cause significant impacts to bird behavior and fecundity. For birds, human disturbance can impact foraging habits (Skagen et al. 1991), reduce song occurrence and consistency (Gutzwiller and Marcum 1993), and reduce reproductive success (Safina and Burger 1983). Knight and Cole (1995b) pointed to multiple studies that showed human disturbance can also alter nesting behavior. The effects of human intrusion increase when it is accompanied by dogs. One study showed that dog walking in woodland leads to a 35 percent reduction in bird diversity and 41 percent reduction in abundance, both in areas where dog walking is common and where dogs are prohibited (Banks and Bryant 2007). To minimize disturbance to wildlife, people engaged in recreational activities would be required to stay on trails from February 1 to July 31. In addition, dogs would be required to be on leash and be allowed only on designated trails (see Public Use Objective 1.4). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6

and Appendix B.

Objective 4.2. Protect, maintain, and enhance shrub-steppe habitat – Snake River Islands

Protect, maintain, and enhance *104* Refuge islands with shrub-steppe habitat on the Snake River, benefiting nesting and migrating birds (e.g., geese and mallards) and a diverse assemblage of other shrub-steppe-dependent species. These habitats should be characterized by the following attributes:

- 0%-50% cover of <8 feet native shrub species (e.g., sagebrush species, fourwing saltbush, rabbitbrush, greasewood, golden currant, wild rose)
- >50% cover of native grasses and forbs (e.g., Great Basin wildrye, bluebunch wheatgrass, Indian ricegrass, western wheatgrass, Idaho fescue, smooth brome, salt grass)
- No invasive woody trees (e.g., Russian olive, salt cedar)
- <25% cover of invasive plants (e.g., Scotch thistle, cheatgrass, whitetop)
- No rush skeletonweed, leafy spurge, or yellow starthistle present

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect all islands	0	104	104	104
Maintained number of islands	104	104	104	104
Enhanced number of islands	0	104	104	104
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Seed and plant native shrubs, forbs, and bunchgrasses, particularly following invasive species treatments on *x* islands.	0	2-10	2-10	2-10
Use prescribed fire and mechanical treatment to reduce hazardous fuels on *x* islands.	0	2-10	2-10	2-10
Eliminate trespass livestock grazing through appropriate methods to include law enforcement or fencing on Refuge islands or landowner land.			✓	✓
Aerially apply the herbicide metsulfuron to control extensive infestations of whitetop on *x* islands.	0	2-10	2-10	2-10
Graze goats on select islands to prevent woody invasion and set back succession as appropriate for nesting Canada geese.		✓	✓	✓
Implement seasonal closures to prevent disturbance to waterfowl and colonial-nesting birds. See Public Use Objectives 1.3 and 3.1.				
• All Refuge islands closed February 1 through May 31.	✓			
• All Refuge islands closed February 1 to June 14 during goose nesting season.		✓	✓	✓
• Some Refuge islands (currently four to six islands) closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns).	0	4-6	4-6	4-6
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).	✓	✓	✓	✓

Rationale: The importance of shrub-steppe habitat and the responsibility of Federal land managers to enhance and protect this landscape are discussed in Wildlife and Habitat Objective 4.1 above.

Monitoring of Canada geese nesting on the Snake River Islands Unit has been done by Refuge staff since the 1960s because the area is an important nesting area for resident flocks. Goose nesting platforms and wood duck boxes are in place and are maintained by Refuge staff, volunteers, and partners. The islands also provide nesting habitat for other species of birds, including raptors, owls, cormorants, herons, gulls,

and a wide variety of songbirds.

Vegetative structure varies from island to island, but most include both upland and riparian habitat. Highest priority areas for restoration would be based on GIS modeling that includes a ranking system that would identify the most biologically intact islands which are likely to provide good habitat. Factors that would be modeled would include size, current condition (existing habitat, noxious weeds, nesting activity), neighboring land use, and isolation (measure of flow and channel depth) (see Wildlife and Habitat Objective 6.4). By starting with small projects, the Refuge can monitor effectiveness, predict future funding needs, and develop a long-term strategy for enhancing riparian habitat on all of the Refuge islands.

Protection and management of shrub-steppe habitat on the islands presents a different set of challenges than at the Lake Lowell Unit. Fluctuating water levels cause some of the islands to be more accessible to livestock from neighboring shores during lower flow regimes. Refuge staff may use fencing, law enforcement, and partnering with adjacent landowners to ensure control of any livestock trespassing on the Snake River Islands Unit.

The control of invasive species on the Snake River Islands Unit presents some unique challenges due to the logistics of getting people and equipment onto the islands for effective control measures. Some of the islands are so choked with invasive woody species (e.g., tamarisk), large monocultures of noxious weeds (e.g., whitetop), and cheatgrass that conventional land-based mechanical control is restricted. Using aerial spraying may be more cost effective than attempting to get personnel and materials over the water and onto the islands to implement physical control measures. Successful control usually requires repeated applications with foliar herbicides as well as reseeding and planting of desirable species within treatment areas. Islands would be prioritized and treated accordingly.

Alternative methods for invasive species control on the islands would also be researched and implemented as needed. Methods like using goats to graze on select islands to prevent woody invasion and set back succession as appropriate for nesting Canada geese may be a viable alternative. The use of mechanical treatments and prescribed fire to remove large areas of invasive species may be the most cost-effective way of encouraging a more desirable shrub-steppe landscape.

The current closure dates for the Snake River Islands Unit do not correspond with the dates of needed protection. Canada geese in this area generally start hatching at the end of April or beginning of May, but hatching has been noted well into June (Steele et al. 1957). Molting of flight feathers happens around the same time, and geese are more vulnerable to disturbance when they are land-bound with young. To provide protections through this vulnerable time, for island closures should be extended to June 14. There are a few (four to six) Refuge islands that have historically held nesting colonies of herons, egrets, cormorants, and gulls. The existing closures do not adequately cover the sensitive nesting time for these birds and need to be lengthened to provide needed protection. Islands that have nesting colonies or rookeries (present and future) would be closed from February 1 through June 30. The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Chapter 6 and Appendix B.

2.4.5 Goal 5 (Agriculture): Protect, maintain, and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife.

Objective 5.1. Maintain grain and forage crops
Maintain a diversity of grain and green forage crops on *250* acres, benefitting migratory birds (e.g.,

Canada geese, dabbling ducks) and other resident wildlife. Croplands would be characterized by the following attributes:

- As of October 1, ≥25% of total crop acreage is left standing and is a wildlife forage crop
- As of October 1, alfalfa must be 6 inches tall and winter wheat must be 3 to 6 inches tall.
- No cutting between April 15 and June 15 to avoid destroying ground-nesting birds.
- Minimize winter till on Refuge farmlands
- <10% presence of invasive plants (e.g., *Kochia*, field bindweed, Russian thistle)

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Maintained acreage	250	250	250	280
Enhanced acreage	0	varies*	varies*	varies*
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Use crop rotation as a mechanism to improve soil tilth and as a strategy to control invasive/undesirable plant species in agricultural lands.	✓	✓	✓	✓
Use cooperative farmers.	✓	✓	✓	✓
Knock down corn after hunting season.	✓	✓	✓	✓
Use the following BMPs: leaving residues, filter strips, and buffers along field edges.	✓	✓	✓	✓
Install one new well near Farm Field 5 to better farm current acres.		✓	✓	✓
No cutting allowed between April 15 and June 15.	✓	✓	✓	✓
Ensure wildlife crop share is at least 25%.	25%	≥25%	≥25%	≥25%
Implement lake shoreline plantings (millet, buckwheat, and/or winter wheat) in areas adjacent to Farm Field 5.		✓	✓	✓
Develop cooperative land management plan.	✓	✓	✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).	✓	✓	✓	✓

*Enhanced acreage (i.e., shoreline plantings) would vary depending on water levels and the ability to agree on appropriate in-water acreages with the Board of Control.

Rationale: The Refuge farm fields are an important food source for waterfowl and other wildlife when natural foods are limited. The lake contains minimal submerged aquatic food for feeding waterfowl because of poor water quality, unreliable water levels, and large numbers of carp. The smartweed beds provide natural food only when they are sufficiently flooded in the summer for the production of seed and flooded in the fall to allow for waterfowl access. Much of the surrounding landscape has been converted from agriculture to low-density development, resulting in food loss for wintering waterfowl. In addition, crops grown in many of the remaining fields include higher-value specialty crops such as seed alfalfa, onions, and mint that are not as valuable to wildlife. Also, more efficient harvesting equipment leaves little waste grain in the field for waterfowl. "Clean farming," which involves plowing and tilling in the fall to reduce the spread of noxious weeds, also reduces the amount of waste grain left in the fields prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue into the future, cooperative farming would be essential for waterfowl management. Although wintering waterfowl numbers have declined over time, numerous waterfowl still winter at Deer Flat NWR (see Chapter 4). The crops on the Refuge provide a consistent food source for the wintering waterfowl and therefore are important to continue.

One significant change may be implemented as part of the cooperative farming program. The basic objective for cropland management has been to produce green browse and high-nutrition foods for

waterfowl. Historically, one of the biggest changes in the farming program included the elimination of shoreline plantings, likely due to budget constraints at the time. At one time, approximately 400 acres were farmed on the Refuge, which included planting millet along some of the lake shorelines. Because lakeshore plantings can be less labor intensive and do not require irrigation, they can be a less costly option than expanding cooperative farming. As development continues around the lake, use of this strategy may be implemented to achieve Refuge goals and objectives.

Studies have shown that BMPs like crop rotation can have a dramatic effect on reductions in the amount of weed species present in agricultural fields (Liebman and Dyck 1993) and on the improvement of soil tilth and carbon sequestering capabilities (West and Post 2001), thereby reducing the amount of pesticides and fertilizers needed for profitable farming. Other Refuge practices like knocking down share-crop corn after the hunting season so that waterfowl have easier access to it would also continue on cooperatively farmed land. The proposed strategies are either existing management practices or work toward improving the existing farming program. In addition to BMPs, special conditions currently in place would continue, including restrictions on pesticide uses, limits to the types of crops grown, no grass-crop harvesting from May 1 through June 15 (to reduce the risk of destroying nests of ground-nesting birds), and a requirement to have 6 inches of green browse by October 1. Conditions under which cooperative farming would be managed would be spelled out in a cooperative land management plan.

Objective 5.2 Protect, maintain, and enhance managed grasslands to benefit migratory and wintering waterfowl

Protect and maintain 80 acres, and within two years enhance 80 acres (Leavitt Tract) of improved pasture for wintering waterfowl with the following attributes:

- Mix of desirable, palatable grasses (e.g., perennial ryegrass, orchard grass, fescues) and forbs (e.g., clover) with a height of <4 inches by October 15 in fields and along field/wetland interfaces.
- <20% cover of invasive species
- No encroaching woody vegetation

Alternatives	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Protect total managed grassland acreage	80	80	80	80
Maintained acreage	80	80	80	80
Enhanced acreage	80	80	80	80
Strategies Applied to Achieve Objective *Strategy applies to alternatives (✓) or is modified by replacing text in italics with the text in this row.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Use herd rotation as a mechanism to reduce soil compaction and control invasive/undesirable plant species in grazing lands.		✓	✓	✓
At Leavitt Tract, clean ditches and update irrigation infrastructure (i.e., redo corrugations and replace irrigation checks) to provide better water control.		✓	✓	✓
Re-establish permanent goose pasture by interseeding cool-season perennial grasses at the Leavitt Tract.		✓	✓	✓
In addition to grazing, manage short grasses by haying, mowing, burning, and other means.		✓	✓	✓
Graze Leavitt Tract from *April 1 through August 15.* Determine if grazing during this time period is impacting ground-nesting birds.	April-Sept.	✓	✓	✓

Develop cooperative land management plan and grazing management plan.	✓	✓	✓	✓
Conduct grazing fee market analysis to evaluate current grazing fees.	✓	✓	✓	✓
Implement closure of Leavitt Tract during hunting seasons. See Public Use Objectives 2.1 and 2.2.			✓	✓
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).		✓	✓	✓

Rationale: Grazing is allowed on national wildlife refuges if it achieves a management goal that would benefit wildlife. The only area on the Refuge that currently has grazing is the Leavitt Tract. The purpose of the grazing is to maintain short grasses to benefit wintering Canada geese. To provide high-quality forage for wintering and migrating geese, the Refuge has used grazing to ensure that young shoots less than 6 inches tall are available by early October each year and to reduce the accumulation of thatch, which can reduce the number of shoots. Other tools to manage grasslands for the benefit of geese include mowing and prescribed fire. Both of these tools, if used properly, can achieve similar benefits as grazing and may be implemented as necessary.

Grazing can be used to set back succession and help maintain diversity (Hayes and Holl 2003). Grazing has also been shown to increase native annual forb species and cover, as well as decrease vegetation height and litter depth (Hayes and Holl 2003), all of which are beneficial to foraging Canada geese. However, studies have also shown negative impacts of grazing, including altering species composition, decreasing density and biomass of individual species, reducing species richness, and changing community organization (Fleischner 1994). Vavra (2005) also showed that grazing can alter species composition and that it can increase the productivity of selected species, increase nutritive quality of the forage, and increase diversity of the habitat by altering its structure. Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese (Greenwalt 1978). Therefore, grazing would continue to be allowed at the Leavitt Tract to benefit wintering Canada geese, but Refuge staff would monitor potential impacts to wildlife and habitat.

The impacts of grazing depend on many factors including timing, habitat type, and stocking rate. An evaluation of the current Refuge grazing program, including infrastructure maintenance (irrigation ditches, fences), stocking rate, habitat impacts, wildlife use, and grazing fees has not been conducted in many years. Development of a cooperative land management plan and a grazing management plan would address these concerns. The cooperative land management plan would be written after the CCP is complete and would include a description of the agreement between the Refuge and the private farmer to manage the land for both parties. Typically the cooperator is responsible for pasture management, weed control, and installation and maintenance of fencing, whereas the Refuge maintains pumps, supplies fencing materials, and constructs access roads. The grazing management plan would better define the objectives of grazing, as well as the amount of stock to be grazed and any time restrictions necessary to meet biological management goals. The management plan would also identify what habitat and/or wildlife would be monitored to determine the benefits and/or impacts of the grazing program.

2.4.6 Goal 6 (Research): Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources.

Objective 6.1. Monitoring activities				
The following is a prioritized list of monitoring activities to support resource management decisions on the Refuge.				
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Develop an inventory and monitoring plan.		✓	✓	✓
Monitor public-use activities on Lake Lowell to evaluate wildlife disturbance effects.	✓	✓	✓	✓
Implement shorebird surveys to determine importance of Lake Lowell unit to migrating shorebirds.		✓	✓	✓
Implement point counts to characterize importance of riparian habitat to migrating and nesting passerines.	✓	✓	✓	✓
Early detection and rapid response monitoring to identify new or spreading invasive plant and/or animal (e.g., zebra and quagga mussels [*Dreissena polymorpha* and *D. rostriformis bugensis*) problems on the Refuge.	✓	✓	✓	✓
Monitor the effectiveness of IPM activities to control/eradicate invasive plants on the Refuge.		✓	✓	✓
Monitor habitats (e.g., wetlands, shrub-steppe, riparian) to establish baseline and evaluate achievement of objectives for adaptive management.	✓	✓	✓	✓
Evaluate and analyze historical biological data (e.g., waterfowl counts and goose nesting data) to determine long-term population trends and reliability of the data.	✓	✓	✓	✓
Monitor nesting density and success of waterfowl on Snake River Islands Unit.	✓	✓	✓	✓
Monitor waterfowl populations during fall and winter on Lake Lowell Unit to develop long-term population trends.	✓	✓	✓	✓
Install and monitor water-level gauges in Refuge wetlands.		✓	✓	✓
Conduct annual grebe nesting and brood count surveys.	✓	✓	✓	✓
Monitor dog walking leash compliance and associated wildlife impacts.	✓	✓	✓	✓
Monitor effectiveness and impacts of integrated pest management.		✓	✓	✓

Rationale: Monitoring the wildlife and vegetation response to habitat management practices is necessary to implement adaptive management techniques on the Refuge. The NWRS Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants on each refuge. An inventory and monitoring plan needs to be developed that would include monitoring of vegetation and wildlife in order to measure responses to habitat management activities, and the response of vegetation and wildlife to habitat restoration projects.

Existing staff and funds are prioritized to perform the most pressing habitat management projects on the Refuge, leaving few resources available to conduct studies of the effectiveness of habitat management or restoration treatments. This lack of data hinders the Refuge's ability to use adaptive management to evaluate the effectiveness of its management practices and make necessary course corrections. At Deer Flat NWR, there is a lack of data for both managed sites as well as appropriate reference sites that are necessary to account for variability.

A substantial body of scientific literature has documented the disturbance effects of human activities, including recreational activities on wildlife (Bartelt 1987; Boyle and Sampson 1985; Cole and Knight 1990; Havera et al. 1992; Klein 1993; Knight and Cole 1995b; Madsen 1995; Pease et al. 2005). The Refuge is mandated by law to provide wildlife-dependent recreational opportunities that do not materially interfere with the Refuge's ability to manage according to its purposes. Nesting waterfowl and waterbirds, such as great blue herons, western grebes, and Clark's grebes, are a few species of particular concern at the Refuge because they are especially sensitive to disturbance. The Refuge must design and evaluate public use programs and facilities based on the best available science while considering disturbance effects. By monitoring changes in wildlife-use patterns that follow changes to public-use programs and facilities, the Refuge Manager would be able to make adjustments, should disturbance reach unacceptable levels.

Objective 6.2. Inventory activities

The following is a prioritized list of inventory activities to support resource management decisions on the Refuge.

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Develop an inventory and monitoring plan.		✓	✓	✓
Inventory and map invasive exotic plants on both Refuge units.		✓	✓	✓
Conduct breeding and migratory bird inventory of shrub-steppe and riparian habitats on both Refuge units.		✓	✓	✓
Inventory bat use on both Refuge units.		✓	✓	✓
Inventory riparian habitat structure and composition both Refuge units.		✓	✓	✓
Estimate fuel loading in riparian habitat on both Refuge units.		✓	✓	✓
Inventory wildlife use of wetlands.	✓	✓	✓	✓
Inventory plant species composition of emergent beds associated with Lake Lowell.		✓	✓	✓

Rationale: Maintaining an inventory of the Refuge's wildlife and vegetation is necessary to implement adaptive management techniques. The NWRS Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants on each refuge. An inventory and monitoring plan needs to be developed that would include monitoring of vegetation and wildlife to measure responses to habitat management and public uses.

Existing staff and funds are prioritized to perform the most pressing habitat management projects on the Refuge, leaving few resources available to conduct studies of the effectiveness of habitat management or restoration treatments. This lack of data hinders the Refuge's ability to use adaptive management to evaluate the effectiveness of its management practices and make necessary course corrections. At Deer Flat NWR, there is a lack of data for both managed sites as well as appropriate reference sites that are necessary to account for variability.

Objective 6.3 Research

The following is a prioritized list of research projects to support resource management decisions on the Refuge.

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Conduct research to determine species-specific thresholds for disturbances from public use and habitat management actions	✓	✓	✓	✓

implemented as a result of the CCP.				
Conduct an on-refuge contaminant investigation to comprehensively evaluate potential contaminants in sediments, water, invertebrates, and vegetation associated with Lake Lowell to assess risks to fish and wildlife, especially fish-eating birds such as bald eagles, double-crested cormorants, western grebes, herons (great blue and black-crowned night), and pelicans.		✓	✓	✓
Conduct a contaminant investigation to identify and quantify contaminants in water inflows to Lake Lowell in conjunction with Reclamation.		✓	✓	✓
Conduct a contaminants investigation for the Leavitt Tract to determine if rehabilitation and ground disturbance are feasible.		✓	✓	✓
Determine the population structure (age and sex ratios), size, movements, and potential habitat impacts of mule deer on the Lake Lowell Unit.	✓	✓	✓	✓
Determine the population structure (age and sex ratios), size, movements, and potential habitat impacts of mule deer on the Snake River Islands Unit.		✓	✓	✓
Research shorebird disturbance and highest shorebird use areas and determine importance to shorebirds on a regional basis.	✓	✓	✓	✓
Determine if planting of crested wheatgrass in cheatgrass-dominated areas, followed by native bunchgrass planting is a successful restoration technique (Cox and Anderson 2004).		✓	✓	✓
Research on efficacy of biological control methods for cheatgrass.		✓	✓	✓
Evaluate the zone of influence of leashed versus unleashed dogs.	✓	✓	✓	✓
Assess current and potential fuel loading in riparian habitat.		✓	✓	✓
Rationale: Results of research studies would help the Refuge to better accomplish the goals and objectives defined in this plan as well as study issues that would be addressed in step-down plans or issues that are outside of the scope of the CCP. A substantial body of scientific literature has documented the disturbance effects of human activities, including recreational activities on wildlife (Bartelt 1987; Boyle and Sampson 1985; Cole and Knight 1990; Hamann et al. 1999; Havera et al. 1992; Klein 1993; Knight and Cole 1995b; Madsen 1995; Pease et al. 2005). The Refuge is mandated by law to provide wildlife-dependent recreational opportunities that do not materially interfere with the Refuge's ability to manage according to its purposes. Nesting waterfowl and waterbirds, such as great blue herons, western grebes, and Clark's grebes, are a few species of particular concern on Deer Flat NWR because they are especially sensitive to disturbance. The Refuge must design and evaluate public-use programs and facilities based on the best available science while considering disturbance effects. By monitoring changes in wildlife use patterns that follow changes to public use programs and facilities, the Refuge Manager would be able to make adjustments, should disturbance reach unacceptable levels.				

Objective 6.4. Assessments and Information Needs
The following is a prioritized list of scientific assessments and information needs to support resource management decisions on the Refuge.

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Assess use of goose nesting platforms to determine if they are important to the success of nesting Canada geese on the Snake River Islands Unit.		✓	✓	✓
Conduct soil survey of shrub-steppe habitats as a basis for long-term restoration potential and to create a data layer for use in GIS.		✓	✓	✓
To identify the islands with maximum potential long-term value to nesting waterfowl and landbirds, conduct an assessment to prioritize Refuge islands considering the following factors: isolation (function of channel width and depth along with river flow), island size (smaller islands have less predation by mammalian predators), native species well represented in riparian and shrub-steppe, history of waterfowl nesting and nesting success, and >1 mile from domestic livestock operations (as protection from cowbird parasitism and trespass). For isolation, consider the worst-case scenario (lowest anticipated flows in the future).		✓	✓	✓
Conduct real-time kinematic surveys to determine wetland bottom topography and assess Ferrari's (1995) bathymetry mapping.		✓	✓	✓
Complete water resource assessment for the Refuge through the Division of Engineering, Water Resources Branch.		✓	✓	✓
Develop a National Vegetation Classification Standard vegetation data layer for use in GIS for both Refuge units.		✓	✓	✓
Assess quality of Refuge wetlands (i.e., conduct function and values assessment).		✓	✓	✓
Assess the quality/importance of grassland areas on the south side of the Lake Lowell Unit.		✓	✓	✓
Work with partners to obtain funding for a feasibility study that would identify the best methods to improve the water quality (e.g., reducing phosphorus and silt) of Lake Lowell.		✓	✓	✓
Rationale: The Refuge is tasked with using the best available scientific information to make adaptive management decisions in accordance with 522 DM 1 (Implementing Adaptive Management Policy). Many of the tasks described above would serve as baseline information that the Refuge could use to better manage its public-use programs and to achieve the biological goals and objectives of this plan. Much of the information proposed to be collected is baseline information, such as the vegetation map and accurate bathymetry of the lake, and would aid the Refuge in developing more precise management prescriptions (e.g., invasive species treatment, forest management, desired water level conditions) and evaluating the results of habitat restoration and wildlife management actions.				

2.5 Public Use and Cultural Resource Goals, Objectives, and Strategies

2.5.1 Goal 1 (General Visitor Services): Visitors of all ages will enjoy native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat.

Objective 1.1. Welcome and orientation

Within two years of the plan's approval, develop a visitor services plan to integrate welcome and orientation features, facilities, programs, activities, and experiences on the Refuge. Welcome and orientation features would:

- Use both electronic and printed media to reach and orient visitors to the Refuge
- Provide daily opportunities for personal contact with Refuge staff or volunteers
- Be available in Spanish and English
- Provide appropriate visitor amenities at developed sites, such as toilets and picnic tables
- Be consistent with quality criteria in Section 2.3.1

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Install entrance signs at high-use visitor access points and along high-traffic roads bordering the Refuge.		✓	✓	✓
Install orientation signs that alert visitors to the presence of nearby Refuge facilities (e.g., "boat launch," "fishing area," "Visitor Center") on main roads in appropriate locations.		✓	✓	✓
Provide trail signs at all trailheads.		✓	✓	✓
Provide positively worded welcome and orientation/interpretive materials (e.g., maps, brochures, signs) at attractive and visible kiosks near main Refuge access points and at areas where visitors tend to congregate. To encourage compliance, materials would explain, when possible, the regulation's benefit(s) to wildlife or wildlife habitat.				
• Provide kiosks at high-visitation areas at Lake Lowell Unit, such as Lower Dam Recreation Area and Upper Dam boat launches.		✓	✓	✓
• Provide kiosks at major Snake River Islands Unit access points. • Within five years of implementation of the CCP, update panels on these kiosks.	✓	✓	✓	✓
Develop site plan for the Lower Dam Recreation Area to increase educational and interpretive opportunities, improve parking and safety, and improve wildlife habitat.	✓	✓	✓	✓
Develop site plan for either the Upper Dam East, Upper Dam West, or Lower Dam Recreation Area boat launch to provide at least one ADA-accessible boating opportunity.	✓	✓	✓	✓
Construct a visitor contact station (VCS) at Lower Dam Recreation Area. If possible, the existing EE building would be used for the VCS. Continue to allow use of EE building for environmental education activities until building is converted to VCS.		✓	✓	✓
Allow access to Refuge through designated entrances only.		✓	✓	✓
Provide modern restroom facilities at Lower Dam Recreation Area.		✓	✓	
Provide additional bathroom facilities at high-use access points.		✓	✓	

Rationale: Customer service and first impressions are important to visitors feeling safe and welcome at national wildlife refuges. Although 96 percent of visitors to the Lake Lowell Unit of the Refuge are from

the local area (Sexton et al. 2012), interactions with visitors make it clear that many do not realize that they are at a national wildlife refuge or do not realize what that means. Visitors to the Snake River Islands Unit may also not know.

Refuge visitors would therefore benefit from increased opportunities to have personal contact with Refuge staff and volunteers, as well as an integrated set of welcome and orientation features that are easily found and provide accurate, timely, and appropriate orientation materials and information on Refuge facilities, programs, activities, and experiences. These strategies would also increase the Refuge's visibility and promote visitor compliance with Refuge regulations. By increasing staff and volunteer contact with visitors at high-use areas, staff would also gain a better understanding of visitor use patterns.

The designated strategies focus on providing high-quality visitor services and improving information availability by using modern media, exhibits, and orientation panels that are clean, maintained, and accessible; that do not detract from the surroundings; and that provide clear, frequently updated information about where visitors can go, what they can do, and how to safely and ethically engage in Refuge recreational activities. Orientation materials would explain, when possible, the wildlife or habitat benefit of Refuge regulations to encourage compliance.

The Lower Dam Recreation Area would be redesigned to improve traffic flow, provide a VCS, and provide more wildlife-dependent recreational opportunities. Parking and access for boat launches, buildings, and beaches at the Lower Dam Recreation Area are extremely restricted on busy weekends. A new site plan would be developed to improve traffic flow, functionality, and safety at the Lower Dam Recreation Area. Providing volunteer and staff contact at a VCS at this high-use area would increase awareness of the Refuge and Refuge regulations, as well as increasing the enjoyment of visitors by providing information about recreational opportunities around the Refuge.

New restroom facilities have been proposed in Alternatives 2 and 3 in response to several comments requesting improved and additional restroom facilities.

Objective 1.2. On-site interpretation

Within two years of the CCP's approval, develop a visitor services plan to integrate accurate, timely, and appropriate interpretation of Refuge wildlife, habitats, and other resources at the Visitor Center and high-use access points through programs, activities, and experiences on the Refuge for *37,700* visitors of all ages and abilities annually. Interpretive programs would be characterized by:

- A mix of traditional and modern techniques to reach visitors with a variety of learning styles
- Accessible facilities
- Translation into Spanish (for interpretive materials)
- Consistency with quality criteria in Section 2.3.1

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of visitors participating annually in guided and unguided interpretive programs	21,000	37,700	37,700	25,400
Strategies Applied to Achieve Objective *Strategy applies to alternatives (✓) or is modified by replacing text in italics with the text in this row.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Increase interpretive opportunities for visitors at high-use access points. For example: • Use staff and volunteers to facilitate guided/roving		✓	✓	✓

interpretive programs (e.g., bird walks, nocturnal walks, canoe/kayak paddles, boating scavenger hunts) on designated themes at high-use visitor access points to increase visitors' awareness of these themes. • Provide interpretive signs on new and existing trails and facilities. • Develop a nature exploration area at Lower Dam Recreation Area initiated through a community-based design effort involving key stakeholder groups.		✓ ✓	✓ ✓	✓
Within three years of CCP implementation, provide *at least 4* on-site outreach events (e.g., BioBlitz, Creepy Critters, National Wildlife Refuge Week) annually to expand public awareness of interpretive themes.	2	4	4	3
Update and replace existing Visitor Center interpretive materials. For example: • Develop Refuge video to show at Visitor Center. • Update and replace existing interpretive signs.		✓ ✓	✓ ✓	✓ ✓
Allow use of Visitor Center auditorium by external groups as follows: • Wildlife-dependent recreation groups may use the Visitor Center auditorium for organizational meetings with no fee. Other groups may use it for a $20 fee. • Only wildlife-dependent recreation groups may use the Visitor Center auditorium for organizational meetings.	✓	✓	✓	✓

Rationale: Interpretation, when compatible, is a priority public use of the NWRS because it can foster an understanding of and appreciation for our natural resources. Many visitors to national wildlife refuges, including Deer Flat NWR, enjoy participating in guided and self-guided interpretive opportunities. Interpretation can also be an effective resource management tool by providing visitors the opportunity to learn about natural resources, refuges, and the NWRS, as well as helping them understand their role and how their compliance with rules and regulations can help solve or prevent management problems. In all alternatives, the Refuge would work with partners to provide enhanced interpretive opportunities at both units.

Interpretive themes would focus on increasing awareness and understanding of the Refuge and NWRS, of how to be a better Refuge visitor, and of issues facing the Refuge and Refuge wildlife and habitat. Examples of themes include:

- What is a national wildlife refuge? What is the Refuge's purpose?
- The North American model of wildlife management
- The role of Lake Lowell in irrigation
- How visitors can help conserve the Refuge and other wildlife habitats
- Water quality, water conservation, and watersheds
- Invasive species (e.g., carp, plants, domesticated animals, aquatics)
- Migration (e.g., waterfowl, neotropical migrants)
- Individual wildlife species (e.g., waterfowl, grebe) and their habitat requirements
- Urbanization impacts

In the Preferred Alternative, interpretation would be emphasized over EE because we would expect a wide diversity of user groups, and interpretation has the flexibility to reach broader audiences. On-site interpretation allows direct contact with and education of Refuge users and would therefore be more

efficient than EE programming to increase visitor understanding of interpretive themes and to increase compliance with Refuge regulations. These programs would aim to interact with visitors at high-use access points to increase awareness of the Refuge and its wildlife and habitats. The VCS proposed at the Lower Dam Recreation Area could act as a base of operations for roving interpreters.

Interpretive materials are currently provided only at and near the Visitor Center/Refuge Headquarters at the Lake Lowell Unit and at kiosks at the most-used boat launches that access the Snake River Islands Unit, even though many visitors access the Refuge from other locations. In the Preferred Alternative, additional interpretive materials would be added and existing materials would be updated. Welcome and orientation/interpretive kiosks would be installed at the most-used visitor access points. Interpretive panels would be installed along existing and proposed trails to increase the audience for interpretive information. Appropriate electronic tools (e.g., Smartsigns to be used with cell phones to provide regulatory and interpretive information) would be implemented to provide land- and water-based interpretive opportunities.

To increase guided interpretive opportunities, staff-, volunteer-, or concessionaire-guided interpretive opportunities would be provided. Interpretive programs could include guided walks, on-water kayak/canoe trips, and guided walks at night or into closed areas. Guided walks/paddles could be on a variety of topics (e.g., eagle nesting, wintering waterfowl, songbird migration, nocturnal wildlife, grebes, and shorebirds). Both land- and water-based interpretive opportunities could better educate visitors about Refuge resources and recreational impacts on them.

Nature exploration areas provide opportunities for children to experience nature first-hand through unstructured outdoor play. Richard Louv identified the importance of first-hand unstructured experience in nature and the prevalence of "nature deficit disorder" as a serious issue in his book *Last Child in the Woods* (Louv 2005). Research supports Louv's arguments demonstrating that children's positive encounters with nature can lead to development of an environmental ethic (Chawla 1988; Palmberg and Kuru 2000; Wilson 1997).

Objective 1.3. Wildlife observation and photography

Provide quality wildlife and nature observation and photography opportunities for visitors of all ages and abilities on *13* miles of trail and *5* developed viewing facilities on the Refuge. Wildlife observation and photography programs would emphasize opportunities for casual visitors and beginning to moderate birders. Wildlife observation and photography programs would be characterized by:

- Occasional guided opportunities in otherwise-closed areas when that would allow visitors access to unique wildlife/habitat observation opportunities
- Integration with interpretive program to provide visitors with opportunities to make their own discoveries
- Consistency with quality criteria in Section 2.3.1

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of miles of trail available for wildlife and nature observation and photography	10	13	14.5	12
Number of developed viewing facilities (e.g., platforms, and blinds)	3	5	5	4

Strategies Applied to Achieve Objective *Strategy applies to alternatives (✓) or is modified by replacing text in italics with the text in this row.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
See Public Use Objective 1.4 for boating regulations and rationale.	✓	✓	✓	✓
Allow walking access to Snake River Islands Unit for wildlife observation and photography:				
• From June 1 to January 31.	✓			
• From June 15 to January 31 on goose-nesting islands and from July 1 to January 31 on heron- and gull-nesting islands.		✓	✓	✓
Implement seasonal closures on the Snake River Islands Unit to prevent disturbance to waterfowl and colonial-nesting birds.				
• All Refuge islands closed February 1 to May 31.	✓			
• All Refuge islands closed February 1 to June 14 during goose nesting season.		✓	✓	✓
• *Some* Refuge islands closed February 1 to June 30 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns currently nest on four to six islands).		✓	✓	✓
Allow walking access to Lake Lowell Unit for wildlife observation and photography:				
• On all maintained roads and trails.	✓			
• To protect nesting birds, allow access only on maintained roads and trails from February 1 to July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel allowed August 1 to January 31.		✓		
• To protect wintering birds, access to Murphy's Neck through the walk-through on Orchard Avenue allowed only March 15 to September 30.		✓	✓	
• In the East Side Recreation Area, off-trail travel allowed all year.		✓		
• In the Gotts Point area, off-trail travel allowed February 1 to September 30.		✓		
• In areas accessed through the Lower Dam Recreation Area, off-trail travel allowed April 15 to September 30.	✓	✓	✓	✓
• On designated roads and trails.			✓	✓
• Off-trail travel may be restricted in areas that have been rehabilitated (e.g., after a fire) to allow time for plants to re-establish.		✓		
Implement land-based seasonal closures on the Lake Lowell Unit to protect important wildlife areas. See Maps 5-9.				
• Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony would be re-opened. Upland portions of the closures would be open to use from October 1 to January 31.		✓		
• Protect all active and historical grebe nesting colonies by			✓	✓

establishing a 500-yard area not open to public use during boating season. If there is no nesting in a historical colony for three years, the closure around that colony would be reopened. • Establish 300-yard buffer around eagle nests from February 15 to July 15. • Establish 150-yard seasonal closure around osprey nests from March 15 to August 1. • Establish 250-yard buffer around heron rookeries from February 1 to July 1. • Establish 100-yard closure around shorebird feeding and resting areas from July 15 to September 30 during years when the lake level elevation is lower than 2,522 feet. • Continue wildlife closure at Gotts Point from October 1 to January 31. • Continue wildlife closure at Murphy's Neck from October 1 to January 31. • Establish wildlife closure at Murphy's Neck from October 1 to March 14. • Murphy's Neck closed to entry throughout the year. • Continue wildlife closure at Lower Dam Recreation Area from October 1 to April 14.	✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓
Consider whether and how to develop a walking trail in the South Side Recreation Area.		✓		
Maintain existing trails and develop new at appropriate locations to provide wildlife observation and photography opportunities. For example: • Provide 2-mile ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3 with multipurpose (e.g., fishing, observation) docks. • Assess suitability for providing a 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck that would include access to shoreline fishing. • Assess suitability for providing a 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck that would not include access to shoreline fishing. • Provide interpretive trail through restored native area at Lower Dam Recreation Area. • Provide 0.6-mile bike/walking path from entrance to Visitor Center along entrance road to provide connectivity to possible bike paths. • Provide 0.13-mile trail between loops of existing Observation Hill Trail System west of Visitor Center to provide a loop trail experience during eagle nesting season. • Provide 0.63-mile trail or improved trail to the observation platform west of the Visitor Center from the entrance road parking lot. • Provide 1.5-mile self-guided or virtual geocaching on-water trail looping to the east from Parking Lot 1.	✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓

Maintain existing observation facilities (e.g., towers, platforms, blinds) and develop new at appropriate locations. For example: • Provide multipurpose (e.g., fishing, observation) dock/platform at north end of Lower Dam Recreation Area near existing Environmental Education Building. • Provide multipurpose (e.g., fishing, observation, hunting) dock at Parking Lot 1. • Provide multipurpose (e.g., fishing, observation) docks along proposed 2-mile ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3. • Provide a seasonal shorebird observation/photography blind on the northern shoreline of the East Pool east of Tio Lane. Access by SUP. Implement fee for use comparable to fees at other refuges. • Provide observation/photography blind at Upper Dam Marsh for reservation with SUP. Implement fee for use comparable to fees at other refuges.		✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
Provide an ADA-accessible kayak/canoe launch at an appropriate location to access prime wildlife observation areas.		✓	✓	✓
Maintain or provide remote observation opportunities through webcams, for example: • Maintain existing osprey nest webcam. • Install grebe, heron, or eagle nest webcam(s).	✓	✓ ✓	✓ ✓	✓ ✓

Rationale: Wildlife observation and photography, when compatible, are priority public uses of the NWRS. Many visitors to national wildlife refuges, including Deer Flat NWR, enjoy opportunities to watch and photograph wildlife. Scoping comments revealed a desire for additional trails and wildlife observation and photography facilities and programs. In addition, connecting people with nature is a priority for the FWS and many other natural resource agencies interested in maintaining an active constituency. Providing accessible observation and photography opportunities would create greater visitor awareness and appreciation of the Refuge's purpose and its wildlife and habitat resources.

Although wildlife observation and photography can result in disturbance to wildlife, disturbance would be intermittent and short-term when activities are conducted according to the stipulations designated in the Wildlife Observation, Photography, Interpretation, and Environmental Education Compatibility Determination (Appendix B). Pedestrian travel would be restricted to established trails during the nesting season to increase predictability of public use patterns on the Refuge and thus allow nesting wildlife to habituate to nonthreatening activities. Year-round off-trail travel opportunities would be allowed in the East Side Recreation Area, which is less biologically sensitive than other areas of the Refuge. Providing seasonal closures around sensitive wildlife areas would reduce impacts to wildlife while providing recreational opportunities in these areas when the wildlife is less vulnerable.

To provide more observation and photography opportunities, several new facilities are proposed, including trails that provide access to different habitats than existing trails provide and observation/photography blinds that provide access to areas with wildlife concentrations. New facilities would not be considered in upland areas that have been restored (the Sage Fire area northwest of the Visitor Center and the CC Lightning Fire area east of Gotts Point) to provide sanctuary areas for wildlife and minimize introduction of invasive plants in restored areas.

A trail on the south side of the Refuge was suggested by several members of the public during the scoping period. Any ground-level trail in this area would be inundated by irrigation water for much of the winter,

spring, and fall, causing major maintenance issues and unavailability to Refuge visitors. Because of these issues, any trail in the riparian zone on the south side of the Refuge would need to be elevated. Due to the projected cost for the 2-mile boardwalk between Parking Lots 1 and 3, it is not proposed in the Preferred Alternative; instead, the trail concept would be investigated further to determine if a lower-cost option is available.

Objective 1.4. Compatible nonwildlife-dependent public uses – Lake Lowell

Provide opportunities for visitors to enjoy water-based nonwildlife-dependent recreational activities (including motorized, wind-powered, and human-powered boating as well as tow-behind activities and swimming) at the Lake Lowell Unit on *a variable* number of* acres, including wake-causing activities on *a variable number of* acres. Provide opportunities to enjoy land-based, nonwildlife-dependent recreational activities (including horseback riding, jogging, and bicycling) on *8.75* miles of trails. The uses shall adhere to the following guidelines:

- Minimal disturbance to breeding and foraging wildlife
- Minimal conflicts with wildlife-dependent recreationists
- Consistent with quality criteria in Section 2.3.1

* In the Preferred Alternative, areas critical to nesting birds (e.g., grebe colonies, heron rookeries, bald eagle nests) would be closed to public entry on a seasonal basis. These areas would be sized appropriately according to best available science. The area would remain closed until no nesting is observed within the same area the following year.

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of acres available for boating on Lake Lowell	9,000	Varies	5,800	5,400
Number of acres available for wake-causing activities on Lake Lowell	7,300	Varies	3,212	0
Number of designated swim beaches	1	2	1	0
Number of miles of trail available for walking on-leash pets, and riding horses	10.5	8.75	0	0
Number of miles of trail available for bicycling	10.5	8.75	0.75	0
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Nonwildlife-dependent motorized and nonmotorized boating would be allowed on Lake Lowell under all alternatives. No-wake zones, seasonal lake closures, and area closures would be applied to protect wildlife and reduce conflicts with wildlife-dependent recreational activities. See Maps 5-9 for details related to each alternative.				
• Allow boating from April 15 to September 30 during daylight hours. Provide a no-wake zone east from the line between Parking Lot 1 and the shore to the northeast.	✓			
• Allow boating from April 15 to September 30 during daylight hours. Establish no-wake zone east from line between Parking Lot 1 and Gotts Point and within the Narrows		✓		
• Open East and West Pools of lake to no-wake boating from April 15 to September 20. Allow wake boating in West Pool from noon to sunset. Close area east from the line between Parking Lot 1 and the shore to the northeast.			✓	
• Allow no-wake boating from April 15 to September 30 during daylight hours. Close area east from the line between Parking Lot 1 and the shore to the northeast.				✓

• Allow nonmotorized boating from October 1 to April 14 in Fishing Areas A and B (200 yards in front of the Upper and Lower Dams) during daylight hours.	✓	✓	✓	✓
To protect emergent beds for nesting grebes and other wildlife, institute appropriate seasonal closures. See Maps 5-9.				
• Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.		✓		
• Establish no-wake area in the Narrows between the east and west pools.		✓	✓	✓
• Prohibit human activity in emergent plant beds from Parking Lots 3 through 8 during boating season.			✓	
• Protect emergent plant beds on south side of West Pool with a 200-yard no-wake buffer.			✓	
• Prohibit human activity in emergent beds at Murphy's Neck all year.			✓	✓
• Prohibit human activity in emergent plant beds during boating season.				✓
• Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use (Berg et al. 2004) during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony would be reopened. Upland portions of the closures would be open to use from October 1 through January 31.		✓		
• Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use (Berg et al. 2004) during boating season. If there is no nesting in a historical colony for three years, the closure around that colony would be reopened.			✓	✓
To protect sensitive nesting habitat, institute appropriate seasonal closures. See Maps 5-9.				
• 300-yard seasonal closure around eagle nests (Anthony et al. 1995) from February 15 to July 15.		✓	✓	✓
• 150-yard seasonal closure around osprey nests from March 15 to August 1.		✓	✓	✓
• 250-yard seasonal closure around heron rookeries (Vos et al. 1985) from February 1 to July 1.		✓	✓	✓
To protect mudflat habitat and migrating shorebirds, institute appropriate seasonal closures. See Maps 5-9.				
• 100-yard seasonal closure around sensitive shorebird areas (Rodgers and Smith 1997) from July 15 to September 30 when water level elevation falls below 2,522 feet.		✓		
• 100-yard area along the shoreline from Murphy's Neck to the Narrows not open to human activity from July 15 to the end of boating season. Open April 15 to July 14.			✓	
• 100-yard area along the shoreline from Murphy's Neck to the Narrows not open to human activity.				✓
Allow tow-behind activities (e.g., waterskiing, wakeboarding) in areas open to wake activities.	✓	✓	✓	

Prohibit boaters from anchoring or pulling onto land adjacent to closed areas.		✓	✓	✓
To minimize disturbance to shoreline vegetation and on-water nesting species, prohibit internal or external wake-generating devices (e.g., ballasts and hydrofoils) on motorized boats.		✓	✓	✓
To reduce the likelihood of introducing invasive species, prohibit the use of internal or external ballasts.		✓	✓	✓
To minimize noise disturbance to wildlife, enforce Idaho State noise ordinances on Lake Lowell.		✓	✓	✓
To minimize negative impacts to water quality, promote the use of CARB star-rated motors at the level of two stars and above.		✓	✓	✓
Allow kiteboarders and windsurfers to launch from: • Any open shoreline and require compliance with speed limit in no-wake zones. • The Lower Dam Recreation Area and limit use to wake-allowed areas.	✓	✓	✓	
Allow swimming as follows: • From April 15 to September 30 from any open shoreline, with designated swim beach at East Upper Dam boat launch. From boats in open water outside of no-wake zones. • From April 15 to September 30 at designated swim beaches at East Upper Dam boat launch and at Lower Dam Recreation Area in a small buoyed area closed to boating and monitored for water quality effects to human health. • From April 15 to September 30 at Lower Dam Recreation Area in a small buoyed area closed to boating and monitored for water quality effects to human health.	✓	✓	✓	
To protect important wildlife areas, implement land-based seasonal closures surrounding important wildlife areas. See Public Use Objective 1.3.		✓	✓	✓
Allow horseback riding access to Lake Lowell Unit for wildlife observation and photography as follows: • On all maintained roads and trails. • On designatedmulti-use trails (see Map 7).	✓	✓		
Require groups of more than four horses and riders required to obtain a SUP. Prohibit groups larger than 10 people.		✓		
Allow walking with on-leash pets as follows: • On all maintained roads and trails, with no requirement for removal of pet feces. • On designated multiuse trails (see Map 7), with requirement for removal of pet feces.	✓	✓		
Provide pet waste removal stations at the Visitor Center, Gotts Point, and Tio Lane access points.		✓		
Allow jogging and bicycling as follows: • On all maintained roads and trails. • On designated multi-use trails. • On proposed trail adjacent to the entrance road	✓	✓ ✓	✓	
Require groups of more than four joggers or bicyclists to obtain a SUP. Prohibit groups larger than 10 people.		✓		

Allow picnicking as follows: • In any open area. • In designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area.	✓	✓	✓	✓
Allow only nonalcoholic beverages on the Refuge.			✓	✓
Because of the potential for injury of visitors, prohibit glass containers on the Refuge.		✓	✓	✓

Rationale:

Boating at Lake Lowell Unit: Providing opportunities for priority wildlife-dependent recreational activities is in keeping with provisions under the NWRS Administration Act as amended in 1997. Although boating itself is not a wildlife-dependent recreational activity, many wildlife-dependent activities like fishing and wildlife observation are enhanced by boating.

Boating can negatively impact wildlife (see Recreational Boating Compatibility Determination in Appendix B). To reduce impacts of boating activity on wildlife and habitat, seasonal closures or no-wake zones would be implemented around important wildlife areas, such as eagle nests, grebe colonies, osprey nests, heron rookeries, and shorebird feeding areas. Although most literature recommends from 400 to 1,500-yard disturbance buffers for osprey, Colorado Division of Wildlife (2008) and Van Daele and Van Daele (1982) suggest that some osprey populations are tolerant of human activity in the vicinity of their nests. Osprey currently nesting at the Refuge seem to tolerate the 150-yard distance to the highly used Visitor Center. The use of a 150-yard nesting closure would be assessed during the life of the plan and changed to more closely meet the distances cited in scientific literature, if needed. Implementing these restrictions, as well as the boating closure from October 1 to April 14, would provide adequate habitat for migratory birds.

In the Preferred Alternative, the West Pool and western portion of the East Pool would continue to allow wake boating activities and be managed for a safe, multiuse experience. The east end of the East Pool would be managed for wildlife-dependent activities (especially fishing, wildlife observation, and wildlife photography) using watercraft at no-wake speeds to provide a quality experience with minimal impact to wildlife and to other users.

Boating capacity decisions would be made with the Canyon County Marine Patrol and other boating management experts. These decisions would be used in site planning and in determining the number of designated boat trailer parking spots to provide at launches. To prevent an excess of boat trailer parking, we would work with Reclamation to manage overflow parking at the east side of the Upper Dam to improve safety and reduce congestion at the boat ramp and on the lake.

Nonwildlife-dependent boating visitors provide the opportunity for the Refuge to reach out to nontraditional Refuge user groups and to encourage boating users to observe wildlife and to learn about the NWRS. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, boating at Lake Lowell may provide an introduction to a national wildlife refuge.

Swimming at Lake Lowell Unit: Although not a priority general public use as determined by the NWRS Improvement Act of 1997, compatible nonwildlife-dependent beach use at Deer Flat NWR is popular. Although there have been several drowning-related incidents (mostly near-drownings, but there was one swimming fatality in Fiscal Year 2011) at Lake Lowell in the past few years, the Refuge is hopeful that limiting shoreline access for swimming to designated areas that are easily accessible to rescue personnel would help to minimize safety issues. There would be no lifeguards stationed at the swimming areas. If swimming is managed according to the stipulations in the Swimming, Beach Use, and Picnicking

(including Lower Dam Recreation Area) Compatibility Determination (Appendix B), visitors can enjoy the chance to relax on the shores of Lake Lowell. Although their primary activities may be swimming, sunbathing, reading, or relaxing, this activity could result in wildlife observation opportunities as well. For many of these people, swimming and beach use at Lake Lowell may provide an introduction to a national wildlife refuge.

There is currently a human health and safety concern related to swimmers in Lake Lowell. During certain conditions, there are blue-green algae blooms, swimmer's itch is reported, and fecal coliform levels exceed State health standards. The Refuge would work with IDEQ and Southwest District Health (SDH) to monitor water quality and, if necessary, close the swimming beach. When testing at the swimming beach indicates health concerns, testing would also be conducted at other sites around the lake, and the Refuge would work with IDEQ and SDH to institute warnings and closures about water contact at other locations.

Upland nonwildlife-dependent uses: In the Preferred Alternative, visitors would be allowed to walk with their pets in accordance with the stipulations in the Walking with Pets Compatibility Determination (see Appendix B), including restricting leashed pets to designated trails and requiring removal of waste. Keeping pets on designated trails would allow wildlife-dependent visitors the opportunity to use several trails without having to interact with pets.

Horseback riding, jogging, and bicycling are not wildlife-dependent public uses of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.). However, these uses of the existing trails are potential modes for wildlife-dependent uses and are expected to result in only minor additional impacts to wildlife. Restricting the disturbance to an established trail would increase predictability of public use patterns on the Refuge, allowing wildlife to habituate to nonthreatening activities (see Horseback Riding, Jogging and Bicycling Compatibility Determination, Appendix B). Groups of more than four horses and riders would be required to obtain an SUP. Groups larger than 10 people would not be allowed to use the Refuge because large groups may restrict use for other wildlife-dependent users because of limited space both on trails and in parking lots.

To reduce impacts to visitors engaging in wildlife-dependent activities, especially those involved in EE and interpretive programs, pets, horses, and bikes would not be allowed on the Nature, Centennial, Murphy's Neck, or Boardwalk Trails (for more information on trails, see Chapter 5) in the Preferred Alternative. These trails are, for the most part, narrower than the patrol road trails (East Dike, Kingfisher, Gotts Point, and Observation Hill Trail System) and therefore do not lend themselves to multiple uses. The Centennial and Nature Trails are currently used for EE and interpretive programs. To reduce disturbance to these programs, increase the safety of the visiting public, and provide adequate space for multiple-use activities, on-leash pets, horses, and bikes would be allowed only on the entrance road, the East Dike, Kingfisher, and Gotts Point Trails, and the Observation Hill Trail System. Off -leash dogs have been reported in the act of fighting in public use areas. Off-leash pets increase the potential for injury to visitors through biting incidents or trampling of children. In an attempt to address scoping comments that took issue with pet feces on trails, visitors walking pets would be required to pick up their pet's feces under the Preferred Alternative.

Allowing visiting with pets, horseback riding, jogging, and bicycling provides opportunities to reach out to nontraditional Refuge user groups to encourage them to observe wildlife and to learn about the National Wildlife Refuge System. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, multiple-use trails may provide an introduction to a national wildlife refuge.

In the Preferred Alternative, picnicking would be allowed only in designated areas at the east end of the

Upper Dam and at the Lower Dam Recreation Area to reduce the potential for conflict with wildlife-dependent activities (e.g., fishing, wildlife observation, wildlife photography).

2.5.2 Goal 2 (Hunting): Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Objective 2.1. Hunting waterfowl

Provide a quality, safe waterfowl hunt program on *2,250* acres of the Lake Lowell Unit and *1,219* acres of the Snake River Islands Unit capable of supporting about *5,000* hunter visits per season. Hunt programs would include youth hunting opportunities and opportunities for hunters with disabilities. Hunts would be characterized by:

- Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives
- To the extent practicable, consistency in Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations
- Increased opportunities while maintaining hunt quality
- Reliable/reasonable opportunities to experience a successful waterfowl hunt
- ADA compliance
- Consistency with quality criteria in Section 2.3.1

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of acres available for waterfowl hunting on the Lake Lowell Unit	2,250	2,250	1,300	1,800
Number of acres available for waterfowl hunting on the Snake River Islands Unit	1,219	1,219	1,219	1,219
Number of waterfowl hunter visits per season	5,000	5,000	2,900	4,000
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Allow waterfowl hunting allowed on all islands in the Snake River Islands Unit.	✓	✓	✓	✓
Allow waterfowl hunting at the Lake Lowell Unit (see Maps 4, 5, 8, and 9) as follows: • Waterfowl hunting allowed between Parking Lots 1 and 8. Hunting allowed from an electric- or human-powered boat within 200 yards of the shoreline of hunt zones on the south side of the lake. • Walk-in waterfowl hunting allowed from the east boundary of the Leavitt Tract west to the Greenhurst Road entrance at Gotts Point. • Waterfowl hunting allowed between Parking Lots 3 and 8. Hunting allowed from an electric- or human-powered boat within 200 yards of the shoreline of hunt zones on the south side of the lake.	✓ ✓	✓ ✓	✓	✓
Prohibit waterfowl hunting on foot from the ice on the Lake Lowell Unit.		✓	✓	✓
During waterfowl hunting season, allow public use activities in all waterfowl hunting areas.	✓	✓		
Post signs at Refuge access points to notify Refuge users when a hunt		✓	✓	✓

is underway.				
Take measures to improve goose nesting success on Snake River Islands Unit (e.g., implement predator control measures, shorten the end of waterfowl hunt season, or implement habitat restoration) if shown to be necessary by goose nesting analysis/study.		✓	✓	✓
Allow use of dogs for waterfowl hunting. Require that dogs be leashed unless actively hunting and remain under strict voice control at all times.	✓	✓	✓	✓
Provide youth waterfowl hunt in accordance with IDFG regulations at designated area. Allow hunting from an electric- or human-powered boat within 200 yards of the shoreline of hunt zones on the south side of the lake. • Youth hunt within all designated waterfowl hunt zones. • Youth hunt east of Parking Lot 1. Walk-in access or human-powered boats only within 200 yards of the water's edge.	✓	 ✓	✓	 ✓
Establish a controlled hunting opportunity (e.g., sign-in/out at parking areas or lottery).			✓	
Evaluate whether to charge a hunt fee and/or institute a more structured hunt opportunity.		✓		
Provide ADA-compliant hunting blind at appropriate location(s) available to parties with at least one hunter with an IDFG-issued disabled hunt license.	✓	✓	✓	✓
Establish daily limit of 25 shotgun shells per hunter on Lake Lowell Unit.		✓	✓	✓

Rationale: Hunting, when compatible, is identified as one of the priority recreational uses of the NWRS. Waterfowl hunting would therefore continue to be allowed in the Preferred Alternative.

Current hunters report that the Lake Lowell Unit provides a unique hunting opportunity for southwest Idaho when the riparian zone is flooded, because hunters can jump ducks in the wooded areas. At the Lake Lowell Unit, waterfowl hunters seem to view hunting from Parking Lots 5 through 7 as a higher-quality hunting opportunity.

To improve safety and minimize conflict with other priority uses, signs would be posted at Refuge access points to notify Refuge users when a hunt is underway.

To encourage young hunters, access for the IDFG annual Youth Waterfowl Hunt would be provided east of Parking Lot 1 in the Preferred Alternative to provide a higher-quality hunt in an area used by higher concentrations of ducks.

In the Preferred Alternative, Refuge staff would evaluate whether to charge a fee and/or institute a more structured hunt opportunity to address complaints about limited access due to all-day hunters and a "good old boys' club" in which some hunters new to the area feel pressured to hunt elsewhere. We considered but rejected the possibility of a controlled hunt with blinds because it would require too much management, due to the fluctuating water levels at Lake Lowell.

There would be a 25-shot limit to address complaints about sky busting. "Sky busting" is a term used by waterfowl hunters to describe the act of shooting at waterfowl that are too high overhead to be within effective range of a shotgun. In an area like Lake Lowell where hunters are relatively close together, sky busting is a nuisance because it deters waterfowl from coming into a decoy spread where close, ethical shots can be achieved. There is concern that sky busting decreases the probability of making a clean kill

and/or recovery of a wounded bird after being hit from a long distance. According to the IDFG 2009 Progress Report for Waterfowl Fall and Winter Surveys, Production, Summer Banding and Harvest, the three-year average for breeding pairs in the Snake River/Payette River survey area was below the minimum goal for the fifth consecutive year (IDFG 2009a). Analyzing the possible reasons for this discrepancy may lead to several possible solutions to increase the number of breeding pairs in the area. The Refuge hopes to work closely with IDFG to determine and implement possible solutions. Some solutions may include predator control efforts, habitat restoration, and/or shortening of the hunting season to reduce the impact to breeding pairs.

Objective 2.2. Hunting upland game birds

Provide a quality, safe upland game hunt program on *2,250* acres of the Lake Lowell Unit and *1,219* acres of the Snake River Islands Unit, capable of supporting about *1,100* hunter visits per season. Hunt programs would include opportunities for disabled hunters. The hunt would be characterized by:

- No stocking of nonnative game
- Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives
- To the extent practicable, consistency of Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations
- Reliable/reasonable opportunities to experience a successful upland game hunt
- As possible, upland hunting opportunity for mobility-impaired hunters
- Consistency with quality criteria in Section 2.3.1

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of acres available for upland game hunting on the Lake Lowell Unit	2,250	2,250	400	0
Number of acres available for upland game hunting on the Snake River Islands Unit	1,219	1,219	1,219	1,219
Number of upland hunter visits per season	1,100	1,100	510	390
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Allow upland game hunting on the Snake River Islands Unit.	✓	✓	✓	✓
Allow upland bird hunting at the Lake Lowell Unit as follows: • From the east boundary of the Leavitt Tract west to the Greenhurst Road entrance at Gotts Point and between Parking Lots 1 and 8. • From the west boundary of the Leavitt Tract west to the Greenhurst Road entrance at Gotts Point. Hunting not allowed within the emergent vegetation beds.	✓	✓	✓	
During upland hunting season: • Allow public use activities in all upland hunting areas. • Allow wildlife-dependent activities in all upland hunting areas. • Post signs at Refuge access points to notify Refuge users when a hunt is underway	✓	✓ ✓	✓ ✓	✓
Allow use of dogs for upland hunting. Require that dogs be leashed unless actively hunting and remain under strict voice control at all times.	✓	✓	✓	✓
Evaluate whether to implement restricted hunting hours to reduce conflicts with waterfowl hunters.		✓		

Rationale: Hunting, when compatible, is identified as one of the priority recreational uses of the NWRS. Upland hunting would therefore continue to be allowed. Hunting is provided for existing naturalized populations of nonnative upland game birds (e.g., ring-necked pheasant, California quail). These populations would not be supplemented, and no habitat management would be performed solely for the benefit of these species.

To improve safety and minimize conflict with other priority uses, signs would be posted at Refuge access points to notify Refuge users when a hunt is underway.

Refuge staff would evaluate whether to implement restricted hunting hours to reduce conflicts with waterfowl hunters. If upland hunters reduce the quality of the waterfowl hunt, a start time of 10 AM for upland hunting may be imposed.

Objective 2.3. Hunting deer on the Snake River Islands Unit*

Provide and promote quality, safe deer hunt on 1,219 acres of the Snake River Islands Unit of the Refuge capable of supporting about 75 hunter visits per season. The hunt would be characterized by:

- Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives
- To the extent practicable, consistency of Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations
- Reliable/reasonable opportunities to experience a successful deer hunt
- Consistency with quality criteria in Section 2.3.1

*See Section 2.3.1 for Deer Hunting at Lake Lowell Unit

Alternatives	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of acres available for deer hunting on the Snake River Islands Unit	1,219	1,219	1,219	1,219
Number of deer hunter visits per season	75	75	75	75
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Allow deer hunting on the Snake River Islands Unit.	✓	✓	✓	✓
Prohibit use of lead buckshot.	✓	✓	✓	✓

Rationale: Hunting, when compatible, is identified as one of the priority recreational uses of the NWRS. A deer hunt would therefore continue to be provided at the Snake River Islands Unit in all action alternatives. Lead buckshot is prohibited to reduce consumption of lead shot by target and nontarget species.

2.5.3 Goal 3 (Fishing): Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Objective 3.1. Provide quality fishing opportunities

Provide quality shoreline and boat fishing opportunities at Lake Lowell aimed at providing successful fishing for beginning, casual, and local anglers on *a variable* number of* acres of the Lake Lowell Unit and *66* miles of shoreline at the Snake River Islands Unit. Together, these areas are capable of supporting about *45,300* angler visits per season. Fishing programs would include youth event(s) and opportunities for disabled anglers. The fishing opportunity would be characterized by:

- Close cooperation and coordination with IDFG and ODFW for management of fishing opportunities

on the Refuge and in setting population management goals and objectives
- Stocking of the following species by IDFG as appropriate to provide a quality fishery: black crappie, bluegill, channel catfish, Lahontan cutthroat trout, largemouth bass, yellow perch, rainbow trout, and smallmouth bass
- To the extent practicable, consistency of Refuge fishing regulations with IDFG and ODFW fish and wildlife laws and regulations
- Minimal disturbance from artificial noise
- ADA-compliant accessibility
- Consistency with quality criteria in Section 2.3.1

***** In the Preferred Alternative, areas critical to nesting birds (e.g., grebe colonies, heron rookeries, bald eagle nests) would be closed to public entry on a seasonal basis. These areas would be sized appropriately according to best available science. The area would remain closed until no nesting is observed within the same area the following year.

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of acres available for fishing on the Lake Lowell Unit	9,000	Varies	5,800	5,400
Number of miles of shoreline available for fishing on the Snake River Islands Unit	66	66	66	66
Number of angler visits per season	45,300	45,300	21,700	11,900
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Implement seasonal closures on Snake River Islands Unit to prevent disturbance to waterfowl and colonial-nesting birds as follows:				
• All Refuge islands closed February 1 to May 31.	✓			
• All Refuge islands closed February 1 to June 14 during goose nesting season.		✓	✓	✓
• Some Refuge islands - closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns are currently nesting on four to six islands).		4-6	4-6	4-6
Apply boating regulations and facilities described in Public Use Objective 1.4 for Lake Lowell Unit to float tubes used for fishing.	✓	✓	✓	✓
Allow wading access to fishing at Lake Lowell Unit from April 15 to September 30 and all year in Fishing Areas A and B.	✓	✓	✓	✓
Allow access to bank fishing at Lake Lowell Unit as follows:				
• From any open shoreline except during waterfowl hunting season. During waterfowl hunting season in Fishing Areas A and B.	✓			
• To protect nesting birds, access only on maintained roads and trails from February 1 to July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 yards of shoreline on either side of trails accessing the lakeshore. Off-trail travel allowed August 1 to January 31.		✓		
• To protect wintering birds, access to Murphy's Neck through the walk-through on Orchard Avenue allowed from March 15 to September 30.		✓	✓	
• In the East Side Recreation Area, off-trail travel allowed all year.		✓		
• In the Gotts Point area, off-trail travel allowed February 1 to September 30.		✓		

• In areas accessed through the Lower Dam Recreation Area, off-trail travel allowed April 15 to September 30.	✓	✓	✓	✓
• From designated trails and docks except during waterfowl hunting season.			✓	✓
• During waterfowl hunting season in Fishing Areas A and B, on the Lower Dam Recreation Area multipurpose dock, and from docks on trail between Parking Lots 1 and 3.			✓	
• During waterfowl hunting season in Fishing Areas A and B.				✓
• Implement seasonal closures surrounding important wildlife areas (e.g., eagle nests, grebe colonies, osprey nests, heron rookeries, and shorebird feeding and resting areas). See Public Use Objective 1.3.		✓	✓	✓
Implement land-based seasonal closures on the Lake Lowell Unit to protect important wildlife areas. See Maps 5 through 9.				
• Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony would be reopened. Upland portions of the closures would be open to use from October 1 to January 31.		✓		
• Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use during boating season. If there is no nesting in a historical colony for three years, the closure around that colony would be reopened.			✓	✓
• Establish a 300-yard buffer around eagle nests from February 15 to July 15.		✓	✓	✓
• Establish a 150-yard seasonal closure around osprey nests from March 15 to August 1.		✓	✓	✓
• Establish a 250-yard buffer around heron rookeries from February 1 to July 1.				
• Establish a 100-yard closure around shorebird feeding and resting areas from July 15 to September 30 during years when the lake level elevation is lower than 2,522 feet.		✓	✓	✓
• Continue wildlife closure at Gotts Point from October 1 to January 31.	✓	✓	✓	✓
• Continue wildlife closure at Murphy's Neck from October 1 to January 31.	✓			
• Establish wildlife closure at Murphy's Neck from October 1 to March 14.		✓	✓	
• Murphy's Neck closed to entry throughout year.				✓
• Continue wildlife closure at Lower Dam Recreation Area from October 1 to April 14.	✓	✓	✓	✓
Provide access at Gotts Point as follows:				
• Open Gotts Point to vehicle access up to the first lakeshore parking area.	✓			✓
• Fully open Gotts Point to vehicle access upon completion of memorandum of understanding (MOU) or cooperative agreement with Canyon County to resolve law-enforcement issues.		✓	✓	

• Provide ADA-accessible trail from Gotts Point parking area 1 to parking area 2 and then to the water. • Provide designated fishing ADA-accessible trails from parking areas at Gotts Point. • Provide ADA-accessible dock at Gotts Point.		 ✓ ✓	 ✓ ✓	✓ ✓ ✓
Access to Murphy's Neck for fishing may be moved to the Murphy's Neck trail if a trail is installed (see Public Use Objective 1.3).		✓		
Develop new trails to access the lake for fishing at appropriate locations, for example: • At Parking Lots 4 and 7 • At Parking Lots 2 and 3 • From 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck if that trail is installed.		 ✓ ✓ ✓	 ✓	 ✓ ✓
Provide multipurpose (e.g., fishing, observation) docks or platforms at appropriate locations, such as: • At north end of Lower Dam Recreation Area near existing Environmental Education Building. • Just west of boat launch at east end of the Upper Dam. • Multipurpose (e.g., fishing, observation, hunting) dock at Parking Lot 1. • Along a proposed 2-mile, ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3.		 ✓ ✓ ✓	 ✓ ✓ ✓	 ✓ ✓ ✓
Allow fishing tournaments at Lake Lowell as follows: • During boating season except May 14 to July 9. All no-wake zones, area closures, and State fishing regulations must be followed (exception to catch and release with permission from IDFG before the end of June). Bass tournaments only allowed every other weekend (to provide opportunities for nontournament anglers). All bass tournaments must launch from the Lower Dam Recreation Area. Fee of $100, with 100-boat limit. • From July 1 to end of boating season. All no-wake zones, area closures, and State fishing regulations must be followed (including catch and release). Bass tournaments only allowed every other weekend (to provide opportunities for nontournament anglers). All bass tournaments must launch from the west Upper Dam boat launch. Fee to be adjusted to reflect cost recovery needs, with 30-boat limit	✓	✓	 ✓	 ✓
Prohibit live, nonnative aquatic bait per Service policy (605 FW 3).		✓	✓	✓
Provide fishing line receptacles.		✓	✓	✓
Coordinate with the Board of Control and IDFG to increase bottom structure to benefit fish that does not interfere with the irrigation purpose of the reservoir.		✓	✓	✓
Coordinate with IDFG on the stocking of the following fish species at the Lake Lowell Unit: largemouth bass, smallmouth bass, bluegill, channel catfish, black crappie, yellow perch, rainbow trout, and Lahontan cutthroat trout. Stocking of any other	✓	✓	✓	✓

fish species would require additional planning.				
Develop a cooperative agreement with IDFG for resident fish and wildlife management.	✓	✓	✓	✓

Rationale: Fishing, when compatible, is identified as one of the priority recreational uses of the NWRS. Fishing attracts visitors to the Refuge and often enhances their appreciation of natural resources. Fishing would therefore continue to be provided at the Snake River Islands and Lake Lowell Units in the Preferred Alternative.

Currently, Refuge anglers complain about a reduced-quality fishing experience because of conflict with nonwildlife-dependent recreationists on the lake, limited bank- and dock-fishing, and difficulty in accessing bank-fishing opportunities. According to a survey conducted by IDFG, most Idaho anglers fish from the bank (IDFG 2007), so additional trails and docks would be provided to facilitate shoreline access and fishing. Improved facilities would mitigate negative impacts associated with concentrated shoreline fishing. These facilities would also concentrate use and thus reduce the footprint of deleterious impacts. Fishing line can injure or kill birds and other wildlife, so fishing line receptacles would be provided at major fishing access points.

To provide safer access to a popular spring fishing area, walk-through access to Murphy's Neck may be removed after installation of the proposed 0.65-mile ADA-accessible interpretive Murphy's Neck loop trail and additional shoreline access trails.

The majority of the road to Gotts Point was closed to vehicles in 2007 after years of persistent law enforcement issues. In the Preferred Alternative, the road to Gotts Point would be reopened upon completion of an MOU with Canyon County to formalize agreements about law enforcement and maintenance.

Refuge staff would monitor angling activities on Deer Flat NWR and apply adaptive management as issues arise. Monitoring efforts would be a part of an overall fisheries management plan that would help guide fisheries management into the future.

2.5.4 Goal 4 (Environmental Education): Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats.

Objective 4.1. Environmental education

Provide quality EE opportunities for *9,400* students aligned with grade-specific State curriculum standards. On-site and teacher-led programs would be emphasized over off-site programs. As a result of participating in Refuge EE programs, students would show an 80 percent increase in understanding about the topic presented, as measured by pre- to post-tests. EE programs would be characterized by:

- Techniques to reach students with a variety of learning styles
- Emphasis on enjoyable, hands-on, inquiry-based learning
- Maximum 10:1 student-to-adult ratio during field trips
- Use of only local examples of flora and fauna
- Appropriate facilities
- Positive teacher feedback
- Consistency with quality criteria in Section 2.3.1

Alternatives *Objective is modified by replacing type in italics with text in these columns.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Number of students participating annually in on- and off-site programs	11,000	9,400	9,400	11,000
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Within two years, meet with teachers and school districts (especially Caldwell, Nampa, and Vallivue) to determine which themes and age groups to target and to refine the Refuge's scope of EE programming to that best suited for Refuge field trips and traveling trunks. Eliminate EE programming that is better suited to other educational venues or that is delivered at other local educational sites.		✓	✓	✓
Within seven years, develop EE curricula to be used with teacher-led classes and Refuge-specific instructor training for teachers ("teach the teacher" programs). Enlist local teachers to help develop curricula to ensure that educational requirements are met. After programs are developed, offer at least two teacher training workshops annually and establish a program to encourage and select trained teachers to use the Refuge's facilities, curricula, and programs for teacher-led EE. By the end of 15 years, teachers would lead 75 percent of educational visits.		✓	✓	✓
Within two years, modify existing EE programs not targeted at school classrooms/field trips (e.g., day camps, Scout Day, Youth Conservation Corps) to be consistent with EE themes. Eliminate EE programming that is better suited to other educational venues or that is delivered at other local educational sites.		✓	✓	✓
Provide at least 2 EE study sites for 25 students in areas that facilitate EE programs on designated themes. This might include a portable learning lab (i.e., a trailer).		✓	✓	✓
Rent Environmental Education Building to groups for EE activities with camping allowed. (Note: EE building would be available for EE activities until remodeled into or replaced with a Visitor Contact Station in Alternatives 2 through 4; see Public Use Objective 1.1).	✓			

Rationale: Environmental education, when compatible, is a priority public use of the NWRS and can be used to educate visitors and residents of local communities about natural resources, refuges, and the NWRS, as well as their role in wildlife conservation and how their compliance with Refuge rules and regulations can help solve or prevent management problems. EE would therefore continue to be provided in the Preferred Alternative. However, under Alternative 2, we expect a wider range of user groups, and interpretation has greater flexibility than EE to reach broader audiences. Therefore, interpretation would be emphasized over EE in the Preferred Alternative (and Alternative 3). Existing EE programs (e.g., Scout Day, day camps, off-site programs, and the on-site Discover Wildlife Journeys program) may be reduced or restructured to allow enough staff and volunteer time to provide for increased on-site interpretation.

Refuge staff would work with teachers and school districts (especially Caldwell, Nampa, and Vallivue) to determine which themes and age groups to target and to refine the Refuge's scope of EE programming to that best suited for Refuge field trips and traveling trunks. EE programming that is better suited to other educational venues or that is delivered at other local educational sites would be eliminated. Restructuring of Refuge EE programs would consider the Proposed Idaho Environmental Literacy Plan (Fletcher 2011).

EE themes would focus on increasing awareness and understanding of the Refuge and NWRS, of how to be a better Refuge visitor, and of issues facing the Refuge and Refuge wildlife and habitat. Possible themes would include:

- What is a national wildlife refuge? What is the Refuge's purpose?
- The North American model of wildlife management
- The role of Lake Lowell in irrigation
- How visitors can help conserve the Refuge and other wildlife habitats
- Water quality, water conservation, and watersheds
- Invasive species (e.g., carp, plants, domesticated animals, aquatics)
- Migration (e.g., waterfowl, neotropical migrants)
- Individual wildlife species (e.g., waterfowl, grebe) and their habitat requirements
- Urbanization impacts

On-site EE programs would be prioritized over off-site programming, because higher-quality experiences are possible during an on-site field trip. When programs are conducted off-site, requests from Canyon and Owyhee Counties would be top priority because these areas are closer to the Lake Lowell Unit where staff members are stationed. Requests from Ada, Payette, and Washington Counties in Idaho and Malheur County in Oregon would be second priority. Although the Snake River Islands Unit falls within Payette, Washington, and Malheur Counties, the distance from Refuge Headquarters makes it less feasible to respond to as many of these requests. Given that the Refuge does not fall within Ada County and there are many other EE opportunities and resources based in Ada County, requests from Ada County would not be top priority.

We would emphasize "teach the teacher" programs because this approach has the potential to both expand the potential number of students served and to broaden the base of knowledgeable EE instructors in the community. Indirectly, this might have the effect of broadening support for the Refuge within the local community. Because it takes time for teachers to receive the training, become comfortable with the educational materials, and become familiar with the Refuge, we anticipate slowly but gradually moving toward 75 percent of on-site programs being led by teachers over the life of the CCP.

EE study sites would be constructed under Alternatives 2 through 4. These structures would provide covered areas to gather students during EE programs. Currently, students have no cover from weather during the outdoor portions of field trips. Because field trips are scheduled mostly in the spring and fall, weather can span the extremes of intense sunshine and pouring rain.

2.5.5 Goal 5 (Law Enforcement): Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors.

Objective 5.1 Provide safe public use opportunities				
Reduce illegal activities (e.g., trespass into closed areas, pets off leash, vandalism, trash dumping) by 10 percent per year from previous year.				
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Use variety of techniques to educate Refuge users about Refuge regulations and deter illegal public uses (e.g., brochures, leaflets, signage, news releases, and increased law enforcement patrols).		✓	✓	✓
Pursue MOU with County Sheriff to patrol Gotts Point and Lower		✓	✓	✓

Dam Recreation Area; on-water, enforce existing State decibel limits.				
Pursue codification of Refuge regulations with County Sheriff or creating a joint jurisdiction agreement.		✓	✓	✓
Meet annually to educate County Sheriff's deputies on Refuge regulations and purposes, as well as other appropriate issues.		✓	✓	✓
For both Refuge management and law enforcement officer(s), work with partners to facilitate safe public use opportunities, such as: • Meet with IDFG Conservation Officers annually to discuss law enforcement needs, issues, and opportunities to partner. • Coordinate with local emergency response entities for search and rescue. • Create a "neighborhood watch" for the Refuge in which Refuge neighbors notify Refuge staff about illegal activities.		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
Rationale: Reducing illegal activities that cause wildlife disturbance, trash issues, and safety concerns is a priority. Because of illegal activities, Refuge visitors and staff do not always feel safe everywhere on the Refuge. Eliminating illegal uses, defining access routes, restoring habitat, and creating a sense of community pride in the Refuge would all be necessary for the Lake Lowell Unit to serve as high-quality wildlife habitat and for the public to feel safe using the site for priority public uses. To succeed in this endeavor, we would partner with others who can enforce Refuge regulations. We would use positively worded signs and explain the rationale behind regulations in brochures, signs, and interpretive talks. Finally, we would install infrastructure that would help to reduce illegal activities (e.g., lights and automatic gates). Many comments were provided during the scoping period about visitors not following regulations, so the Refuge would investigate technologies that may reduce the likelihood of illegal activity. Remote video cameras and electronic gates may allow the Refuge to decrease illegal activities, increase the Refuge's ability to catch those engaged in illegal activities, and provide unobstructed use of the Refuge during daylight hours.				

2.5.6 Goal 6 (Volunteers and Partners): The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Objective 6.1. Volunteers				
Recruit, train, use, and retain volunteers for support of Refuge programs and activities. • Annually recruit new volunteers to replace volunteers lost through attrition. • Orient and train 30 new and returning volunteers annually • Use and retain volunteers so that within three years, the number of volunteers that provide 10 or more hours of service exceeds 100 annually				
Strategies Applied to Achieve Objective *Strategy applies to alternatives (✓) or is modified by replacing text in italics with the text in this row.*	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Offer *at least 5* volunteer orientation, refresher, and training sessions annually.	3+	5	5	5
Hold *at least 2* volunteer appreciation events annually.	1	2	2	1
Hold at least *at least 3* community work days annually.	2	3	3	2
Maintain *at least 8* trained EE volunteers annually.	5	8	8	10

Rationale: In FY11, more than 550 people volunteered at the Refuge, serving more than 11,000 hours by removing noxious weeds and litter, assisting with EE programs and special events, and conducting wildlife surveys. However, most of these volunteers participated on a one-time basis; in FY11, just 66 of the 550 volunteers contributed more than 10 hours each. These repeat volunteers have an excellent knowledge of the Refuge and its resources, and they often add value to programs by working on more than one project and better knowing the resource. Increasing this core of dedicated repeat volunteers would provide major benefits to both habitat management and public use programs. Increasing participation of local residents in even one-time activities would increase awareness of and support for the Refuge and its programs.

Objective 6.2. Partners and Friends

Maintain and enhance at least one partnership within each of the following themes to increase partner knowledge of the Refuge's purpose and leverage resources to increase the effectiveness of the Refuge's programs. Partnership themes consist of:

- EE and interpretation
- Fishing
- Hunting
- Photography and wildlife observation
- Compatible nonwildlife-dependent surface-water recreation
- Water quality
- Urbanization and agriculture
- Invasive species

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3	Alt 4
Work with Friends Group board on board development, member recruitment, and member involvement.	✓	✓	✓	✓
Work with partners to facilitate EE and interpretive opportunities such as:				
• Partner with Caldwell, Nampa, and Vallivue School Districts to develop educational programming for multiple disciplines and grade levels to maximize the Refuge as an educational resource.		✓	✓	✓
• Conduct outreach to colleges that identifies possible use of the Refuge as a research, field lab, or service learning opportunity.		✓	✓	✓
• Partner with Caldwell YMCA to create programs for a proposed day camp.		✓	✓	✓
• Work with Friends Group and community partners to create a community-wide Refuge event (like Snake River Days).		✓	✓	✓
• Partner with Be Outside, Idaho and other efforts to develop programs to connect people with nature.		✓	✓	✓
• Partner with Snake River Canyon Scenic Byway to post interpretive signs at the Lake Lowell and Snake River Island Units.		✓	✓	✓
• Partner with Snake River Water Trail to post interpretive signs at the Snake River Island Unit.		✓	✓	✓
Work with partners to facilitate wildlife observation and photography opportunities such as:				
• Partner with Idaho Watchable Wildlife Committee and Idaho Birding Trail to promote and enhance wildlife observation and photography opportunities.		✓	✓	✓

• Work with partners to host photography workshops.		✓	✓	✓
• Partner with Canyon County and the cities of Caldwell and Nampa to connect their bike and pathways plans to Refuge facilities.		✓	✓	✓
For Refuge management, work with partners to facilitate hunting opportunities such as working with local County and City Developmental Services Departments to create hunting safety zones around designated hunt areas.			✓	✓
For Refuge management, work with partners to facilitate fishing opportunities such as:				
• Work with partners to provide fishing workshops that target new or novice anglers.		✓	✓	✓
• Work with partners to provide events to encourage participation in fishing by youth (e.g., Kids' Fishing Day).	✓	✓	✓	✓
• Work with partners to provide events to encourage participation in fishing by disabled visitors.		✓	✓	✓
Seek partnerships with State and private groups for funding and publication of tear sheets (e.g., for fishing, hunting, wildlife observation, and photography).		✓	✓	✓
For Refuge management, work with partners to facilitate wildlife and habitat objectives such as:				
• Work with IDFG and other partners to develop and implement methods to reduce carp biomass in Lake Lowell.	✓	✓	✓	✓
• Work with partners to obtain funding for a feasibility study to identify the best methods for improving the water quality (e.g., reducing phosphorus and silt) of Lake Lowell.		✓	✓	✓
• Work with partners and volunteers to control the spread of weeds.		✓	✓	✓
• Work with adjacent landowners to address cattle trespass problems in targeted locations on the Snake River Islands Unit.		✓	✓	✓
• Work with partners and volunteers to install and maintain wildlife nesting structures (e.g., goose nesting platforms, wood duck boxes).		✓	✓	✓
• Work with a local nursery to propagate harvested seed for restoration.		✓	✓	✓
Rationale: Partnerships are key to the successful management of public lands and vital to implementation of the Refuge's programs, plans, and projects, especially in times of declining budgets.				

2.5.7 Goal 7 (Cultural Resources): The Refuge will protect and manage its cultural resources and look for ways to gain new understanding of the history and cultural resources of both the Lake Lowell Unit and the Snake River Islands Unit.

Objective 7.1. Inventory, evaluate, monitor, and protect the Refuge's cultural resources				
Work with Service Cultural Resources staff and interested Tribes to identify, protect, and enhance the Refuge's cultural resources.				
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Develop systematic cultural resource inventory and monitoring plan consistent with Section 110 of the National Historic Preservation Act.		✓	✓	✓

Identify any resources for potential inclusion in the National Register of Historic Places.		✓	✓	✓
Rationale: Advanced knowledge of cultural resources can help in the design and implementation of restoration activities.				

Objective 7.2. Present the Refuge's cultural resources				
Work with Service Cultural Resources staff, interested Tribes, and the local community to interpret the Refuge's cultural resources.				
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Increase public awareness and appreciation of the Refuge's historic and archaeological resources through interpretation.		✓	✓	✓
Partner with the Tribes, historical societies, and volunteers to provide cultural and natural heritage interpretation to existing EE programs.		✓	✓	✓
Rationale: Understanding cultural resources serves to protect these resources and connect visitors, Refuge staff, and the local community with tangible elements of shared heritage.				

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Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 4 - ALTERNATIVE 1 (Status Quo)

Lower Dam Recreation Area
Murphy's Neck
Low Line Canal
Malt Road
Lower Dam
Fishing Area A
Wake 4/15 - 9/30
Orchard Avenue
South Indiana
Lake Avenue
West Roosevelt
Upper Dam
Fishing Area B
Narrows
Wake 4/15 - 9/30
Iowa Avenue
Greenhurst Rd
Gotts Point
Marsing Road
Walker Lake
Lake Shore Drive
P8
P7
P6
P5
P4
P3
P2
P1
Farner Road
Locust Road
Lewis Lane
Rim Road
No Wake 4/15 - 9/30
Midland Blvd
Locust Lane
Burke Lane
Tio Lane
Leavitt Tract
New York Canal
Lake Shore Drive
45

0 0.5 1 2 Miles

Current Use
- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Designated Swimming Area
- Parking Area
- Wildlife Viewing Platform/Blind

- Existing Entrance Road
- Multiuse Trail
- Refuge Boundary
- Fishing Areas A & B Open During Hunt Season
- Waterfowl Hunt Area
- Upland Hunt Area
- Wildlife Habitat and/or Administration Area Closed All Year - Except as noted for hunting
- No-Wake Zone
- Wake Zone
- Wintering/Migration Closures: Lower Dam - 10/1 - 4/14 Gotts Point 10/1 - 1/31 Murphy's Neck - 10/1 - 1/31
- Eagle Nesting/Perching Area Closed 2/15 - 7/15
- Other Refuge Land

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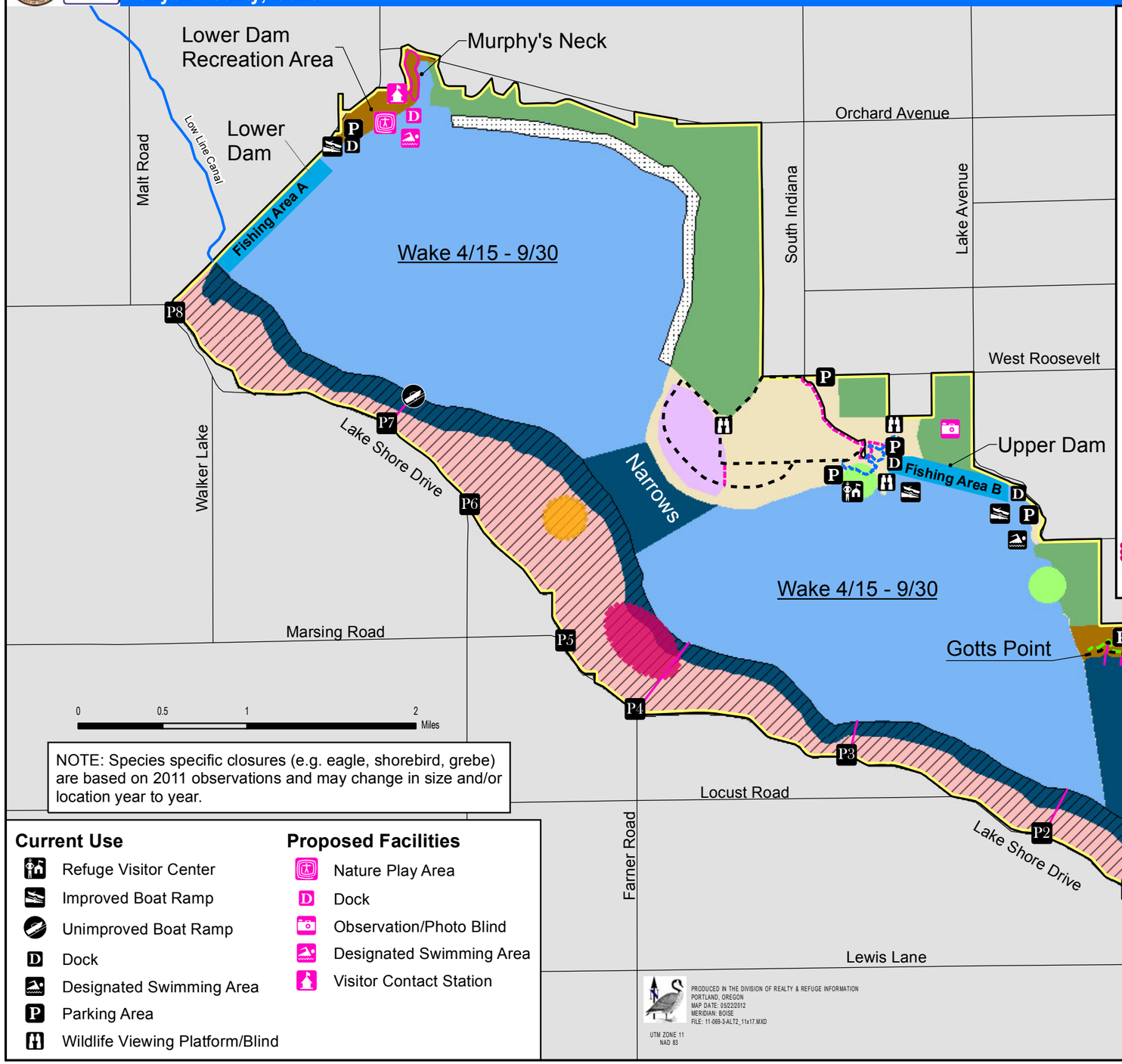
Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 5 - ALTERNATIVE 2 (Preferred)



NOTE: Species specific closures (e.g. eagle, shorebird, grebe) are based on 2011 observations and may change in size and/or location year to year.

Current Use

- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Designated Swimming Area
- Parking Area
- Wildlife Viewing Platform/Blind

Proposed Facilities

- Nature Play Area
- Dock
- Observation/Photo Blind
- Designated Swimming Area
- Visitor Contact Station

- Existing Entrance Road
- Multiuse Trail
- Walking Trail
- Proposed Road (Gotts Point)
- Proposed Multiuse Trail
- Proposed Walking Trail
- Refuge Boundary
- Fishing Areas A & B Open During Hunt Season
- Youth Waterfowl Hunt Area
- Waterfowl Hunt Area
- Upland Hunt Area
- Wildlife Habitat and/or Administration Area Closed All Year - Except as noted for hunting
- No-Wake Zone (<5mph)
- Wake Zone
- Shorebird Closure 7/15 - 9/30
- Wintering/Migration Closures: Lower Dam - 10/1 - 4/14 Gotts Point 10/1 - 1/31 Murphy's Neck - 10/1 - 3/14
- Eagle Nesting/Perching Area Closed 2/15 - 7/15
- Osprey Nesting Area Closed 3/15 - 8/1
- Heron Rookery Seasonal Closure (2/1 - 7/1)
- Grebe Colony Closure (500yd closure around existing grebe colonies until 7/15 of the following year)
- Other Refuge Land

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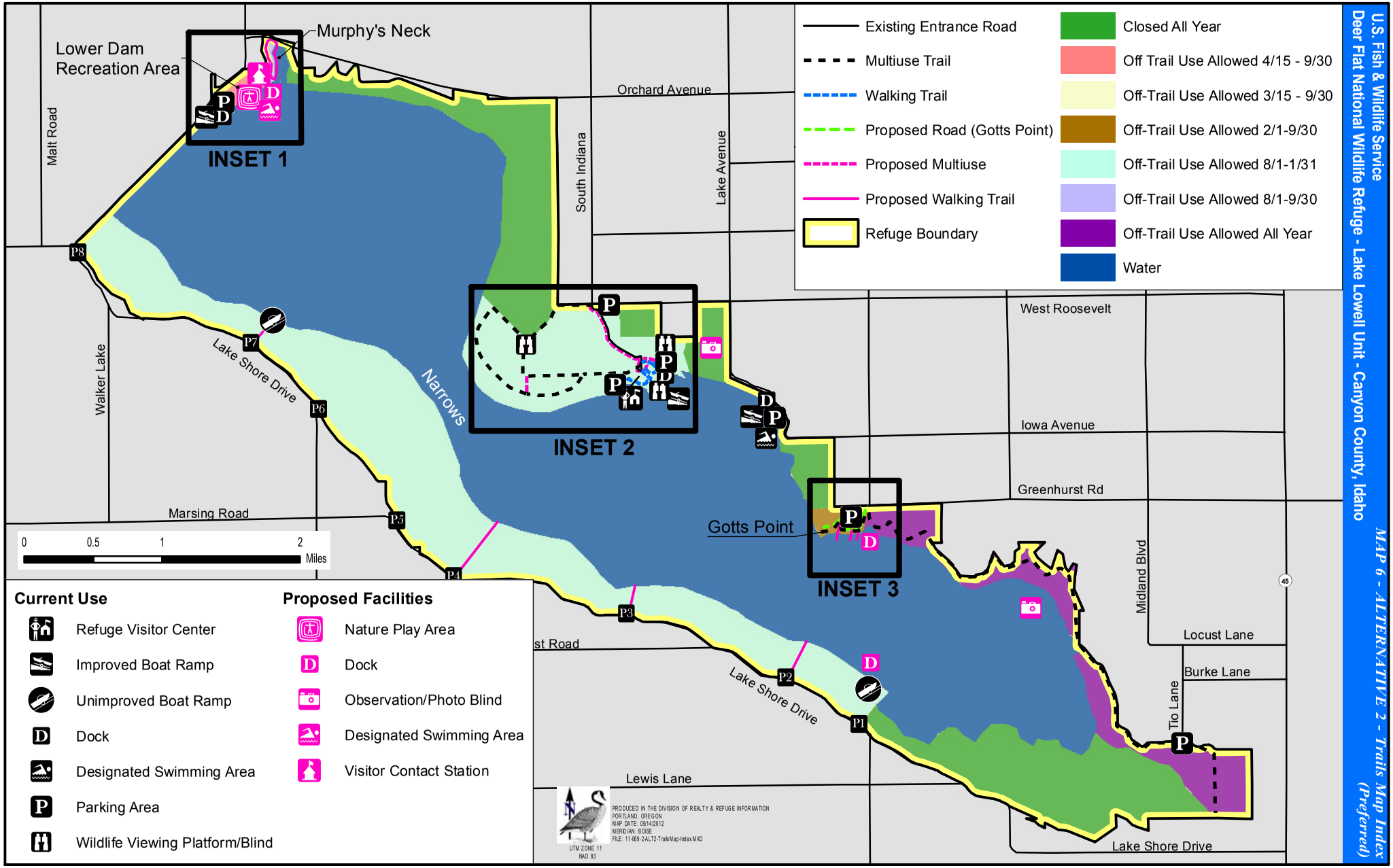
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Deer Flat National Wildlife Refuge - Lake Lowell Unit - Canyon County, Idaho
MAP 6 - ALTERNATIVE 2 - Trails Map Index (Preferred)
Existing Entrance Road
Multiuse Trail
Walking Trail
Proposed Road (Gotts Point)
Proposed Multiuse
Proposed Walking Trail
Refuge Boundary
Closed All Year
Off Trail Use Allowed 4/15 - 9/30
Off-Trail Use Allowed 3/15 - 9/30
Off-Trail Use Allowed 2/1-9/30
Off-Trail Use Allowed 8/1-1/31
Off-Trail Use Allowed 8/1-9/30
Off-Trail Use Allowed All Year
Water
Lower Dam Recreation Area
Murphy's Neck
INSET 1
INSET 2
INSET 3
Malt Road
Orchard Avenue
South Indiana
Lake Avenue
West Roosevelt
Iowa Avenue
Greenhurst Rd
Midland Blvd
Locust Lane
Burke Lane
Tio Lane
Walker Lake
Lake Shore Drive
Narrows
Marsing Road
Gotts Point
st Road
Lewis Lane
Lake Shore Drive
P1
P2
P3
P4
P5
P6
P7
P8
0 0.5 1 2 Miles
Current Use
Refuge Visitor Center
Improved Boat Ramp
Unimproved Boat Ramp
Dock
Designated Swimming Area
Parking Area
Wildlife Viewing Platform/Blind
Proposed Facilities
Nature Play Area
Dock
Observation/Photo Blind
Designated Swimming Area
Visitor Contact Station
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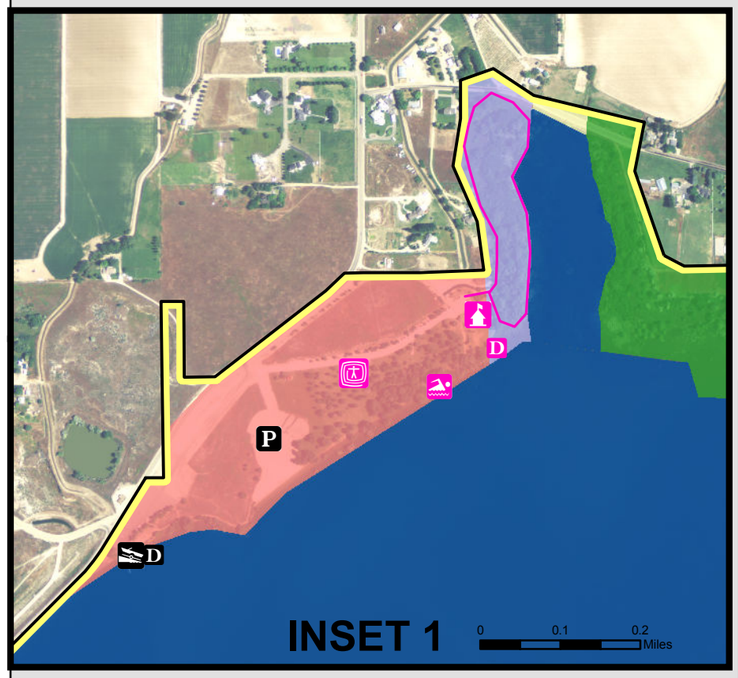
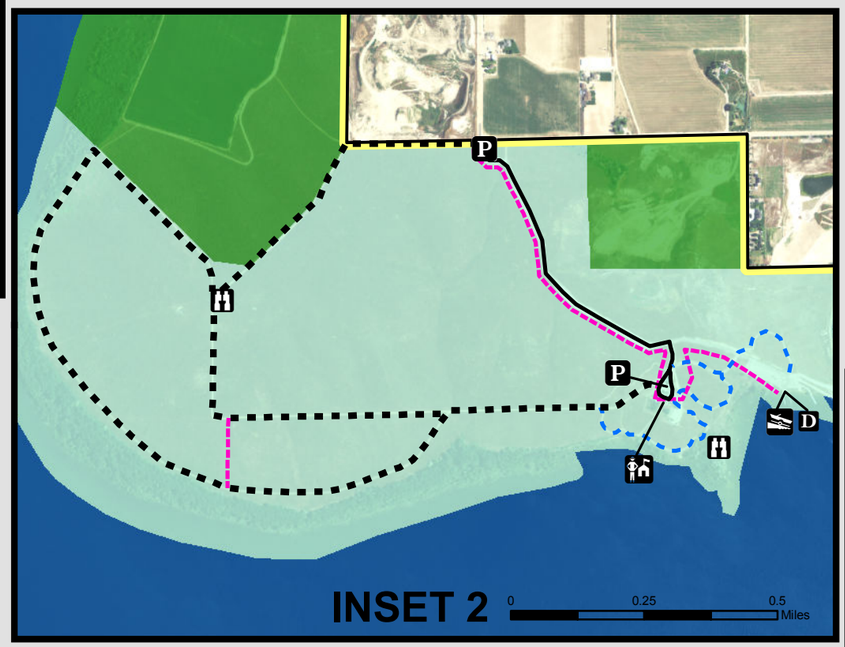
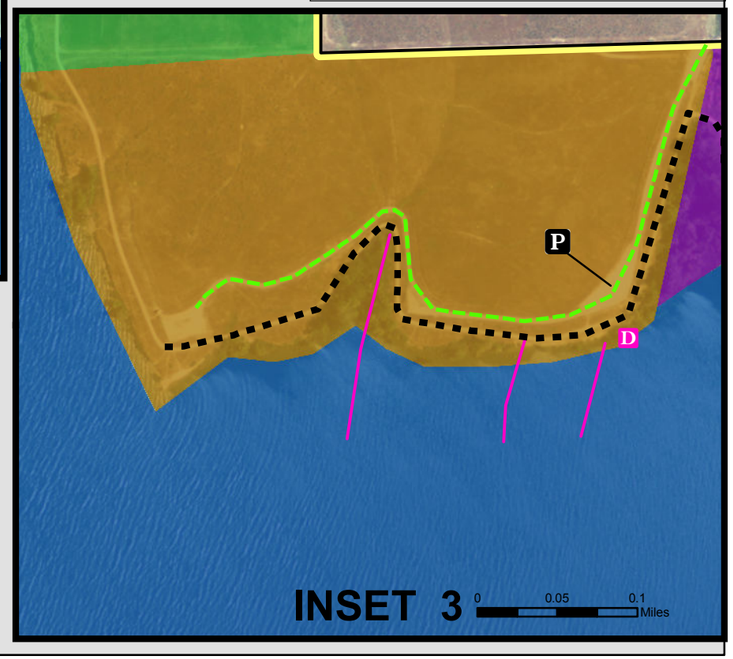
Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 7 - ALTERNATIVE 2 - Trails Map - Inset Maps (Preferred)





- Existing Entrance Road
- Multiuse Trail
- Walking Trail
- Proposed Multiuse Trail
- Proposed Walking Trail
- Proposed Road (Gotts Point)
- Refuge Boundary
- Closed All Year
- Off Trail Use Allowed 4/15 - 9/30
- Off-Trail Use Allowed 3/15 - 9/30
- Off-Trail Use Allowed 2/1-9/30
- Off-Trail Use Allowed 8/1-1/31
- Off-Trail Use Allowed 8/1-9/30
- Off-Trail Use Allowed All Year
- Water



Current Use

- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Designated Swimming Area
- Parking Area
- Wildlife Viewing Platform/Blind

Proposed Facilities

- Nature Play Area
- Dock
- Observation/Photo Blind
- Designated Swimming Area
- Visitor Contact Station

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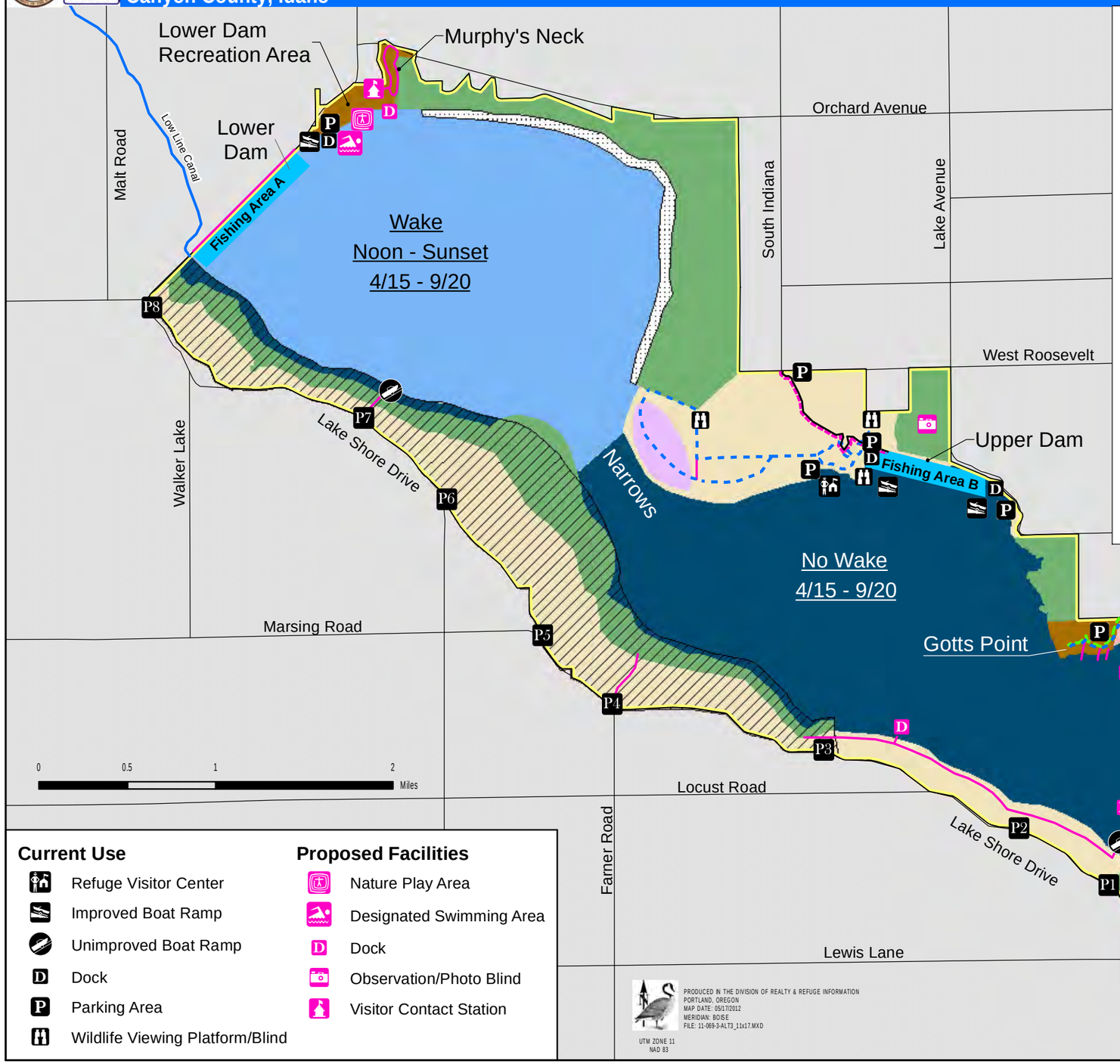
Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 8 - ALTERNATIVE 3



Current Use

- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Parking Area
- Wildlife Viewing Platform/Blind

Proposed Facilities

- Nature Play Area
- Designated Swimming Area
- Dock
- Observation/Photo Blind
- Visitor Contact Station

- Existing Entrance Road
- WalkingTrail
- Proposed Walking Trail
- Proposed Multiuse Trail
- Proposed Road (Gotts Point)
- Refuge Boundary
- Fishing Areas A & B Open During Hunt Season
- Waterfowl Hunt Area
- Upland Hunt Area
- Wildlife Habitat and/or Administration Area Closed All Year - Except as noted for hunting
- No-Wake Zone (<5mph)
- Wake Zone
- Shorebird Closure 7/15 - 9/20
- Wintering/Migration Closures: Lower Dam -10/1 -4/14 Gotts Point 10/1 - 1/31 Murphy's Neck - 10/1 - 3/14
- Eagle Nesting/Perching Area Closed 2/15 - 7/15
- Other Refuge Land

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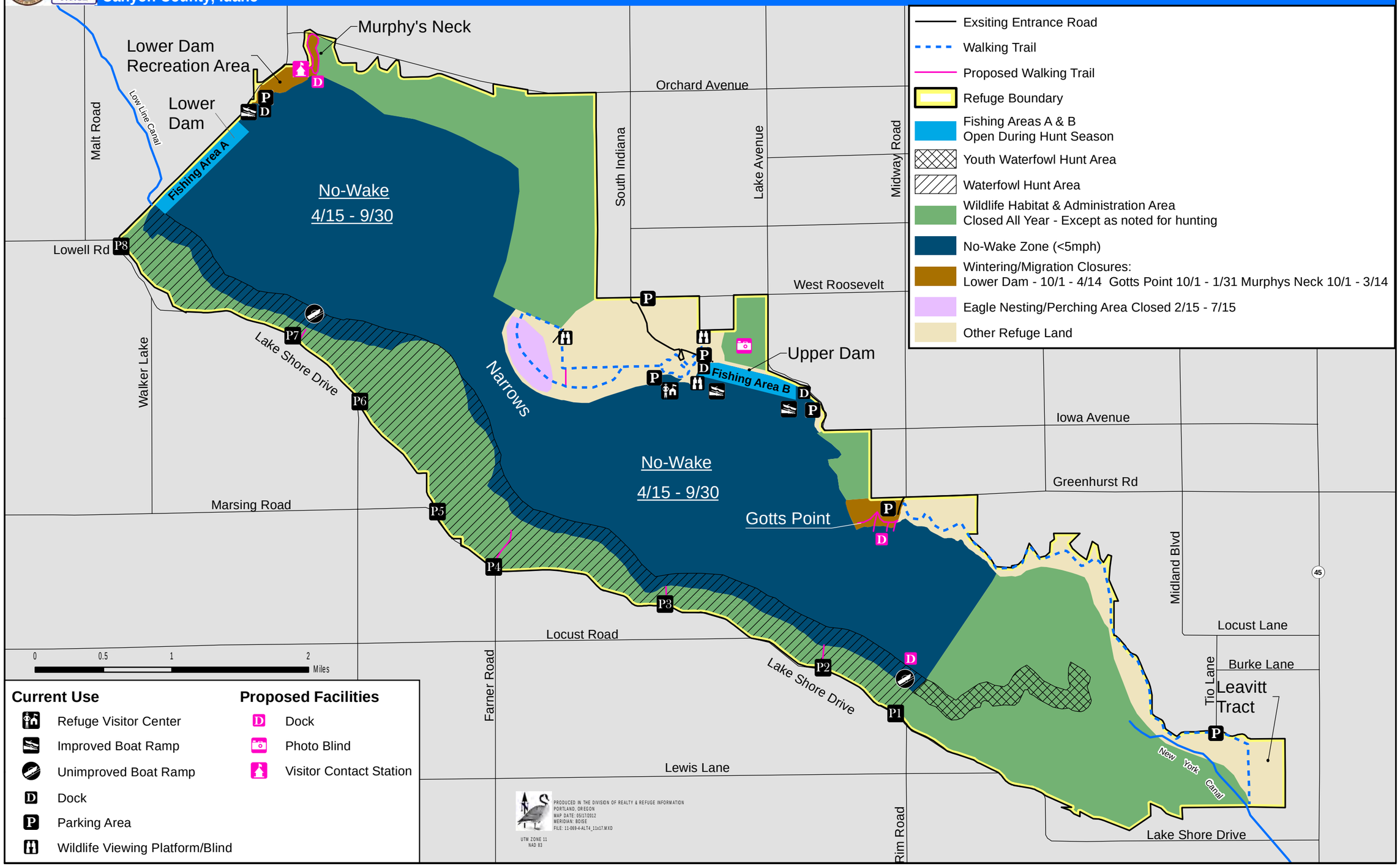
Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 9 - ALTERNATIVE 4



Current Use

- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Parking Area
- Wildlife Viewing Platform/Blind

Proposed Facilities

- Dock
- Photo Blind
- Visitor Contact Station

- Exsiting Entrance Road
- Walking Trail
- Proposed Walking Trail
- Refuge Boundary
- Fishing Areas A & B Open During Hunt Season
- Youth Waterfowl Hunt Area
- Waterfowl Hunt Area
- Wildlife Habitat & Administration Area Closed All Year - Except as noted for hunting
- No-Wake Zone (<5mph)
- Wintering/Migration Closures: Lower Dam - 10/1 - 4/14 Gotts Point 10/1 - 1/31 Murphys Neck 10/1 - 3/14
- Eagle Nesting/Perching Area Closed 2/15 - 7/15
- Other Refuge Land

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Darkling beetle
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Chapter 3 Physical Environment

Chapter 3 Physical Environment

This chapter describes the existing conditions of the physical environment in the Deer Flat NWR planning area. The planning area consists of both the Lake Lowell Unit and the Snake River Islands Unit of the Refuge.

3.1 Climate

3.1.1 General Climate

The Deer Flat NWR planning area is situated in a dry climate region characterized by hot and dry summer months and cold and wet mild winters (IDEQ 2010). Climate in Idaho is largely governed by two influences: the Continental Divide and the Pacific Ocean. Although Deer Flat NWR is located more than 300 miles from the Pacific Ocean, its climate is nevertheless affected by the air that is borne eastward on the prevailing westerly winds from the coast (Western Regional Climate Center [WRCC] 2011a). Additional information about wind is presented below. The growing season in the Deer Flat NWR region, including the central Snake and lower Boise, Payette, and Weiser River Basins, averages 150 days or more (WRCC 2011a).

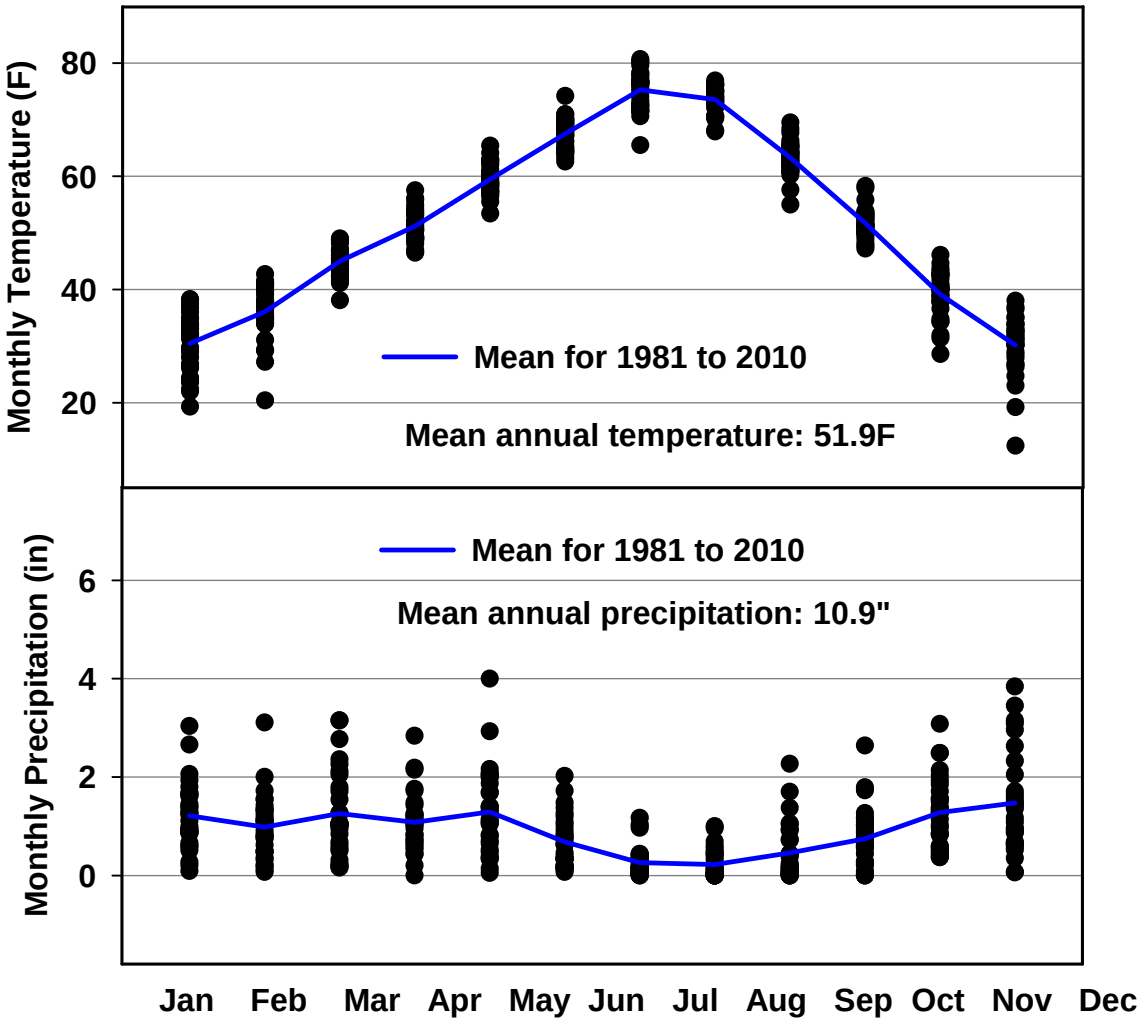
Climate influenced by the Pacific Ocean includes variability that is strongly shaped by two large-scale patterns: the El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Each ENSO phase typically lasts six to 18 months, and, during the twentieth century, each PDO phase typically lasted for 20 to 30 years (Climate Impacts Group [CIG] 2011). These climate drivers can act separately and in concert in creating patterns of warm/dry or cool/wet winters (CIG 2011). With their influence over both winter temperature and winter precipitation, these natural climate patterns exert significant influence on snowpack and hydrology.

3.1.1.1 Temperature

It is rare that Idaho experiences periods of extreme heat or cold that last more than a week at a time, because the normal ongoing progression of weather systems moving across the state usually results in weather changes at rather frequent intervals (WRCC 2011a). Figure 3-1 illustrates the distribution of historical monthly temperatures and precipitation at Nampa, Idaho from 1981 to 2010. The climate station at Nampa is located about 4 miles northeast of the Refuge. It is within the U.S. Historical Climatology Network (USHCN), a high-quality data set of daily and monthly records of basic meteorological variables from 1,218 observing stations across the conterminous United States (Menne et al. 2011). The USHCN data have been corrected to remove biases or heterogeneities from nonclimatic effects such as urbanization or other landscape changes, station moves, and instrument and time of observation changes. The network has been developed over the years at the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) to assist in the detection of regional climate change and for monitoring temperature and precipitation across the United States. Data are accessible at http://cdiac.ornl.gov/epubs/ndp/ushcn/monthly_doc.html.

The average annual temperature at Nampa is 52°F. The highest monthly temperatures tend to occur in July and August and average 74°F to 75°F. The lowest monthly temperatures occur in December and January and average 30°F to 31°F.

Figure 3-1. Mean and Distribution of Monthly Temperature (top plot) and Precipitation (bottom plot) for the Nampa, Idaho USHCN Station for the Period 1981 to 2010



Source: Menne et al. (2011).

3.1.1.2 Precipitation

The primary source of moisture for precipitation in Idaho is the Pacific Ocean (WRCC 2011a). In winter, air masses moving inland from the Pacific Ocean to the continent pick up unlimited moisture from the ocean. The Cascade Range, some 200 miles west of the Refuge, forces this moisture-laden marine air from the Pacific Ocean to rise as it moves eastward. The resultant cooling and condensation produces heavy winter moisture on the western side of the Cascades and a rain shadow effect that extends across eastern Oregon and western Idaho.

Annual precipitation averages 10.9 inches per year at the USHCN station in Nampa, Idaho, for the period 1981 to 2010 (Figure 3-1). Summers are typically quite dry; July, August, and September all average less than 0.5 inch of precipitation per month. In portions of the Boise, Payette, and Weiser river drainages, less than 30 percent of the annual precipitation falls between the months of April and September (WRCC 2011a). The dry season in southern Idaho tends to end by October (IDEQ 2010). Snowfall occurs at the Refuge but rarely accumulates. However, snowmelt is an important contributing factor to the Snake River drainage.

3.1.1.3 Wind

Windstorms are not uncommon events, but there is an extremely small incidence of tornadoes and no history of destructive storms such as hurricanes (WRCC 2011a). Windstorms that are strong enough to cause minor damage to trees or disrupt power and communication facilities can occur at any time from October into July (WRCC 2011a). On average, prevailing winds in the Lake Lowell area are from the west-northwest from April through October and from the south-southeast the remainder of the year (WRCC 2011b). Monthly wind data as reported at Caldwell Airport (the nearest reporting station) are presented in Table 3-1.

Table 3-1. Average Prevailing Wind Speed and Direction at Caldwell Airport

Parameter (Period of Record)	Mean Monthly Data											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed (mph) (1997-2006)	5.8	7.5	7.9	7.7	6.7	6.6	5.6	5.3	5.0	5.3	5.8	6.1
Wind direction (1992-2002)	SSE			WNW			SSE			SE		

Source: WRCC (2011b, 2011c).

3.1.2 Climate Change

As stated in Department of the Interior Secretarial Order 3226, issued in 2001, and the Service's Climate Change Strategic Plan, the Service considers and analyzes climate change in long-range planning and other activities.

3.1.2.1 Potential Effects from Climate Change

Global Greenhouse Gases: The greenhouse effect is a natural phenomenon that assists in regulating and warming the temperature of our planet. Just as a glass ceiling traps heat inside a greenhouse, certain gases in the atmosphere, called greenhouse gases (GHGs), absorb heat from sunlight. The primary GHGs occurring in the atmosphere include carbon dioxide (CO_2), water vapor, methane, and nitrous oxide. CO_2 is produced in the largest quantities, accounting for more than half of the current impact on the Earth's climate.

A growing body of scientific evidence from basic theory, climate model simulations, and observations has emerged to support the idea that humans are changing the Earth's climate (Intergovernmental Panel on Climate Change [IPCC] 2007; National Academy of Sciences 2008; U.S. Global Climate Change Research Program [USGCRP] 2009). The concentrations of heat-trapping GHGs have increased significantly over the last several hundred years due to human activities such as deforestation and the burning of fossil fuels.

Although climate variations are well documented in the Earth's history, even in relatively recent geologic time (for example, the Ice Age of 10,000 years ago), the current warming trend differs from shifts earlier in geologic time in two ways. First, this climate change appears to be driven primarily by human activity, particularly the burning of fossil fuels, which results in a higher concentration of atmospheric GHGs. Second, atmospheric CO_2 and other GHGs, levels of which are strongly correlated with the Earth's temperature, are now higher than at any time during the last 800,000 years (USGCRP 2009). Prior to the start of the Industrial Revolution in 1750, the amount of CO_2 in the atmosphere was about 280 parts per million (ppm). Current levels are about 390 ppm and are

increasing at a rate of about 2 ppm per year. The current concentration of CO_2 and other GHGs and the rapid rate of increase in recent decades are unprecedented in the prehistoric record.

Temperature and Precipitation: There is a direct correlation between GHG concentrations and the temperature of the Earth's surface. Global surface temperatures have increased about 1.3°F since the late nineteenth century (USGCRP 2009), and the rate of temperature increase has risen in more recent years (Figure 3-2). The IPCC, a large group of scientists convened by the United Nations to evaluate the risk of climate change caused by human activities, reported in 2007 that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC 2007).

In the Northern Hemisphere, recent decades appear to be the warmest since at least about A.D. 1000, and the warming since the late nineteenth century is unprecedented over the last 1,000 years. Globally, 2010 and 2005 are tied as the warmest years in the instrumental record from 1880 to the present. 1998, 2002, 2003, 2006, 2007, and 2009 are all tied for the second warmest on record, according to independent analyses by NOAA and the National Aeronautics and Space Administration (NASA; Table 3-2). The new 2010 record is particularly noteworthy because it occurred in the presence of a La Niña (a period of unusually cold ocean temperatures in the Equatorial Pacific) and a period of low solar activity, two factors that have a cooling influence on the planet. However, in general, decadal trends are far more important than any particular year's ranking.

Trends in global precipitation are more difficult to detect than changes in temperature because precipitation is generally more variable. Over the last century, there have been increases in annual precipitation in the higher latitudes of both hemispheres and decreases in the tropical regions of Africa and southern Asia (USGCRP 2009). Most of the increases have occurred in the first half of the twentieth century, and it is not clear that this trend is due to increasing GHG concentrations.

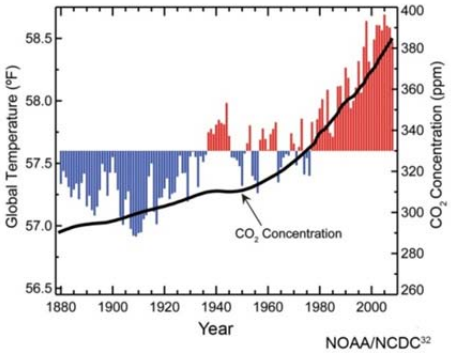
Just as important as precipitation totals are changes in the intensity, frequency, and type of precipitation. Warmer climates, owing to increased water vapor, lead to more intense precipitation events, including more snowstorms and possibly more flooding, even with no change in total precipitation. The prevalence of extreme single-day precipitation events over time has increased, especially in the last two decades. On the other hand, more droughts and heat waves have occurred because of hotter, longer-lasting high pressure systems that dry out the land.

3.1.2.2 Pacific Northwest Climate Indicators and Trends

Temperature and Precipitation: In the Pacific Northwest, regionally averaged temperature rose 1.5°F between 1920 and 2000 (Figure 3-3), slightly more than the global average. Warming was largest for the winter months of January through March. Minimum daily temperatures have increased faster than maximum daily temperatures. Longer-term precipitation trends in the Pacific Northwest are more variable and vary with the period of record analyzed (Mote et al. 2005). Looking at the period 1920 to 2000, precipitation has increased almost everywhere in the region. Most of that increase occurred during the first part of the record.

In the Pacific Northwest, increased GHGs and warmer temperatures have resulted in a number of physical and chemical impacts to the region. These include changes in snowpack, streamflow timing and volume, flooding and landslides, sea levels, ocean temperatures and acidity, and disturbance regimes like wildfires, insect, and disease outbreaks (USGCRP 2009).

Figure 3-2. Global Average Temperature and CO_2 Concentration from 1880 to 2008



Global annual average temperature (as measured over both land and oceans). Red bars indicate temperatures above and blue bars indicate temperatures below the average temperature for the period 1901-2000. The black line shows atmospheric carbon dioxide (CO_2) concentration in parts per million (ppm). While there is a clear long-term global warming trend, each individual year does not show a temperature increase relative to the previous year, and some years show greater changes than others.[33] These year-to-year fluctuations in temperature are due to natural processes, such as the effects of El Niños, La Niñas, and the eruption of large volcanoes.

Source: USGSRP (2009).

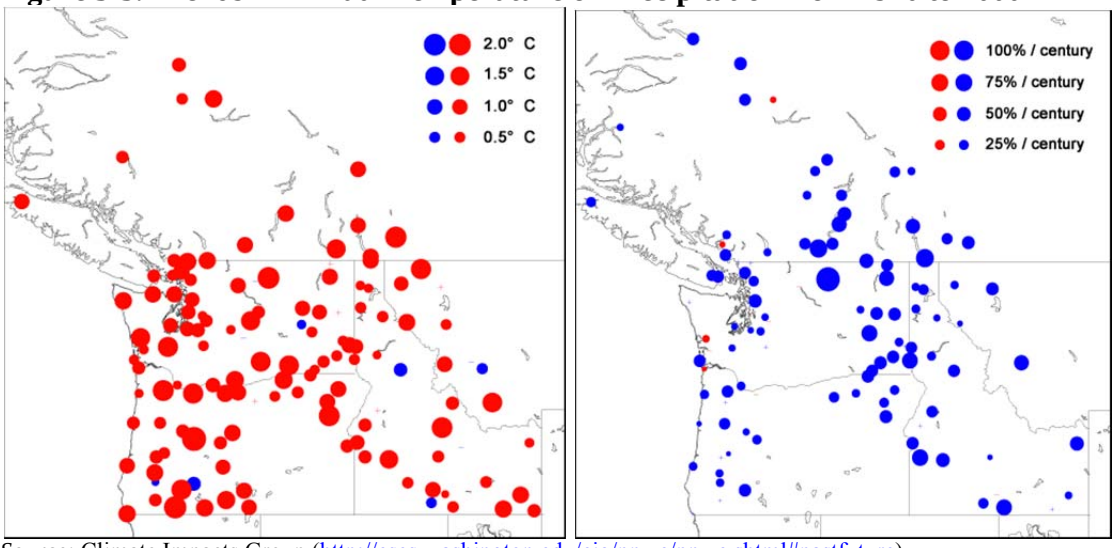
Table 3-2. Top 10 Warmest Years in the Instrumental Record from 1880 to 2010

Global Top 10 Warmest Years (January-December)	Anomaly (˚F)
2010	1.12
2005	1.12
1998	1.08
2003	1.04
2002	1.04
2009	1.01
2006	1.01
2007	0.99
2004	0.97
2001	0.94

Source: NCDC (2010).

The *instrumental record* refers to the period with recorded temperatures. Anomalies are differences from the mean.

Figure 3-3. Trends in Annual Temperature or Precipitation from 1920 to 2000



Source: Climate Impacts Group (http://cses.washington.edu/cig/pnwc/pnwc.shtml#pastfuture).
Red (blue) circles indicate warming (cooling) air temperatures or decreasing (increasing) precipitation.

Snowpack Changes: One of the most important responses to warmer winter temperatures in the Pacific Northwest has been the loss of spring snowpack (Mote et al. 2005). As temperatures rise, the likelihood of winter precipitation falling as rain rather than snow increases. This is especially true in the Pacific Northwest where mountainous areas of snow accumulation are at relatively low elevation and winter temperatures are near freezing. Small increases in average winter temperatures can lead to increased rains, reduced snowpack, and earlier snowmelt. The loss of spring snowpack in the Pacific Northwest has been significant, with most of the weather stations showing a decrease on average (Figure 3-4). Data recorded each April 1 show that snowpacks have declined 25 percent over the past 40 to 70 years (Mote et al. 2005). The fact that the declines are greatest at low-elevation sites and that the trend has occurred in the absence of significant decreases in winter precipitation implicates temperatures rather than precipitation as the cause of the trend.

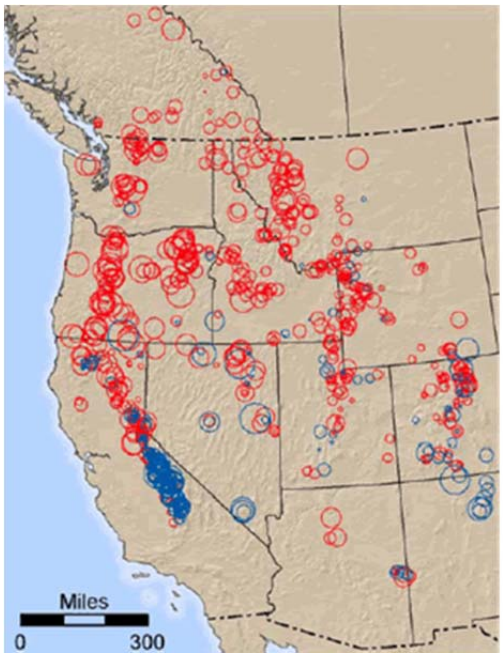
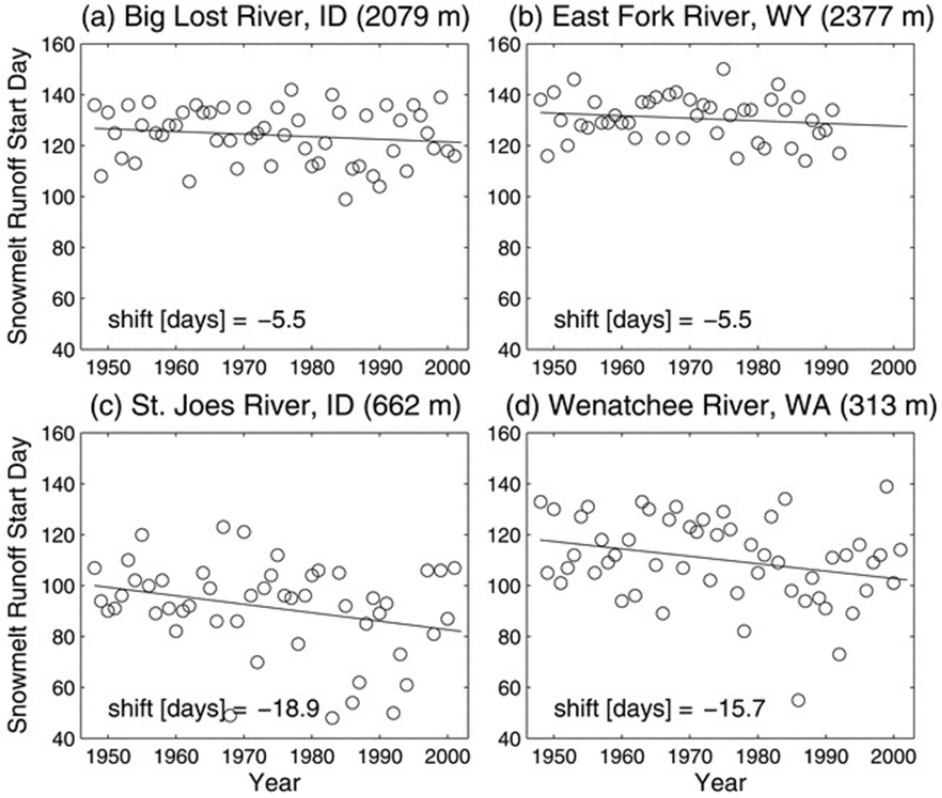


Figure 3-4. Trends in April 1 Snow Water Equivalent in the Western United States from 1950 to 1997

Source: Mote et al. (2005).
Red (blue) circles indicate decreasing (increasing) snow water equivalent, with the size of the symbol indicating the magnitude of the trend.

Streamflow Changes: The decrease in spring snowpack and earlier snowmelt has led to a change in streamflow in many systems, including earlier spring runoff peaks, increased winter streamflow, and reduced summer and fall streamflows. Stewart et al. (2005) examined 302 streamflow gages in the western United States and reported that the timing of winter runoff and annual streamflow had advanced by one to four weeks from 1948 to 2002. The degree of change depends on the location and elevation of the specific river basin. Basins located significantly above freezing levels have been much less affected by warmer temperatures than those located at lower elevations (Figure 3-5). River basins whose average winter temperatures are close to freezing are the most sensitive to climate change, as is apparent from the dramatic shifts in streamflow timing that have resulted from relatively small increases in wintertime temperatures. The advance in streamflow timing also results in decreased summer and fall base flows, at precisely the time when streamflow is needed most. In addition, warmer temperatures have lengthened the growing season (defined as the time between the last frost of spring and the first frost of fall) in the western United States by an average of about 10 to 15 days. Warmer temperatures and longer growing seasons increase water requirements for evapotranspiration, hydropower, and irrigation, resulting in potential water supply shortages and conflicts.

Figure 3-5. Observed Spring Pulse of Snowmelt-generated Streamflow for Two High (a and b) and Two Mid-elevation (c and d) Pacific Northwest Streams, Illustrating the Much Greater Advance in Timing in the Mid-elevation Streams



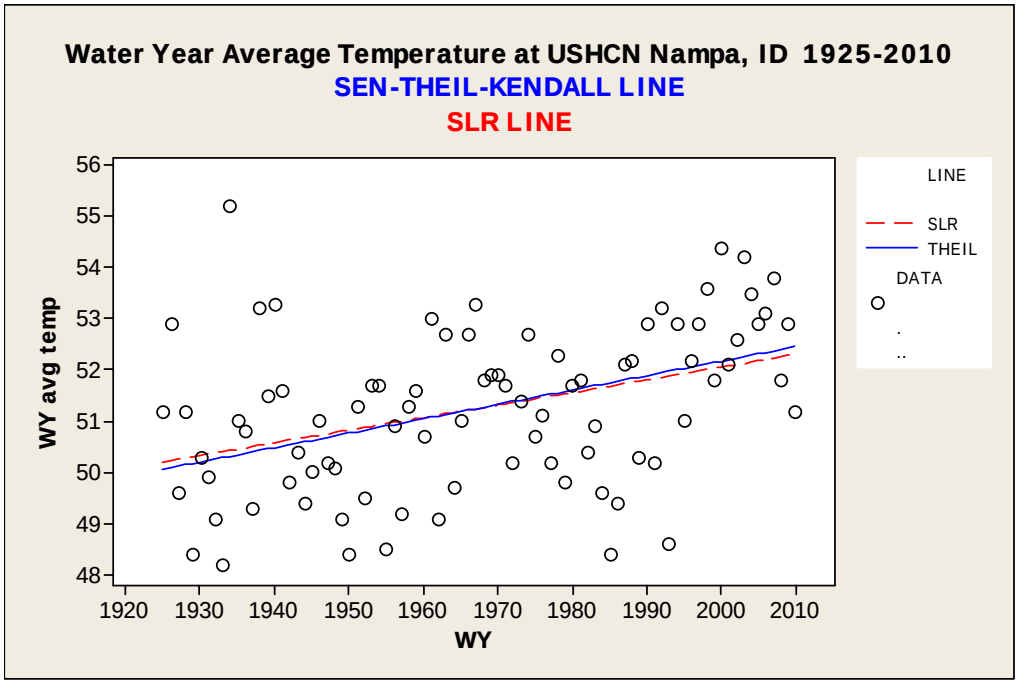
Source: Stewart et al. (2005).

3.1.2.3 Climate Change Indicators and Historical Trends at Deer Flat NWR

There has been a statistically significant increase of 2.4°F ($p<0.000$) in average annual temperature from 1925 to 2010 at the USHCN Nampa, Idaho station (Figure 3-6). This is greater than the average for the Pacific Northwest (Mote et al. 2005). Trends in monthly temperatures at Nampa over the same period vary from month to month. January and March monthly temperatures have increased about twice as much as annual temperatures. Increases in July, August, and September are also significant. Winter temperatures, particularly in January and March, have been shown by other studies to be increasing significantly across the West (Hamlet and Lettenmaier 2007; Knowles et al. 2006). Such increases are important; warmer winters can cause more precipitation to fall as rain versus snow, resulting in reduced spring snowpack, earlier snowmelt, and changes in streamflow. Warmer summers can lead to increased fire frequency and drought, longer growing seasons, and increased water requirements.

There is no overall trend in precipitation at Nampa for the same period but precipitation has become more variable in recent decades, with alternating multiyear cycles of wet and dry years.

Figure 3-6. Trend in Water Year Average Temperature for Nampa, Idaho, from 1925 to 2010

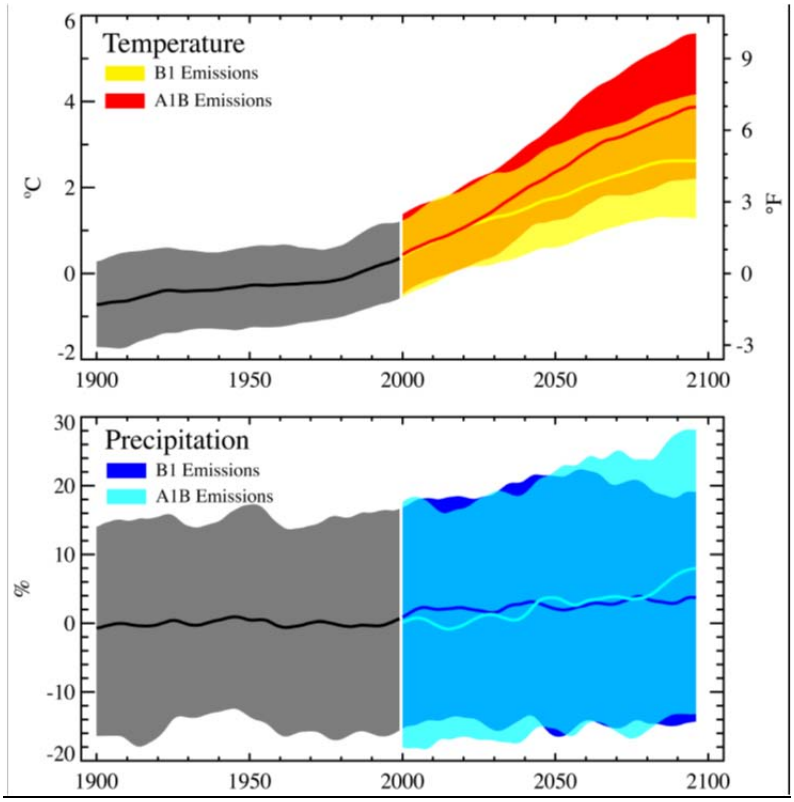


3.1.2.4 Projecting Climate Change into the Future

Looking toward the future, the University of Washington CIG has projected changes in mean annual temperature and precipitation for the Pacific Northwest, based on several global climate models and two carbon emissions scenarios (Figure 3-7) (Mote and Salathé 2009, 2010). Considering both scenarios, average annual temperature is projected to increase 2.0°F by the decade of the 2020s, 3.2°F by the decade of the 2040s, and 5.3°F by the decade of the 2080s, relative to the 1970-1999 average temperature. The projected changes in average annual temperature are substantially greater than the 1.5°F (0.8°C) increase in average annual temperature observed in the Pacific Northwest

during the twentieth century. Seasonally, summer temperatures are projected to increase the most. It should be noted that actual global emissions of GHGs in the past decade have so far exceeded even the highest emissions scenario (the A2 scenario), which was not modeled by CIG. If this trend continues, the temperature increases could actually turn out to be much greater than those projected in Figure 3-7.

Figure 3-7. Simulated Temperature Change (top panel) and Percent Precipitation Change (bottom panel) in the Pacific Northwest from Twentieth and Twenty-first Century Global Climate Model Simulations



Sources: Mote and Salathé (2009, 2010).
The black curve for each panel is the weighted average of all models during the twentieth century. The colored curves are the weighted average of all models in that emissions scenario ("low" or B1, and "medium" or A1B) for the twenty-first century. The colored areas indicate the range (5th to 95th percentile) for each year in the twenty-first century. All changes are relative to 1970-1999 averages.

The CIG also performed projections using two regional climate models (Salathé et al. 2010), versus ensembles of global climate models as described above. Regional climate models provide the advantage of accounting for local geographic features and their effect on regional climate patterns, such as the strong influence of the Cascade Mountain Range. The results of these models confirm the warming increases described above, with variations—both slightly higher and slightly lower.

Projected changes in mean annual precipitation are less clear (see Figure 3-7). The projected trends are very small relative to the interannual variability in precipitation. Seasonally, precipitation is projected by Mote and Salathé (2009, 2010) to decrease in the summer and increase in the autumn and winter by most climate models, although the average shifts are small. However, even small changes in seasonal precipitation could have impacts on streamflow flooding, summer water demand,

drought stress, and forest fire frequency. Salathé et al. (2010) project wetter autumns and drier or stable summers. But the regional models vary whether winter and spring seasons will turn wetter or drier.

In addition to changes in the amount of precipitation, a major concern in the Pacific Northwest is the change in the form of winter precipitation expected due to warmer temperatures. CIG has modeled changes in the current and future peak snowpack versus October-to-March precipitation for watersheds in the Columbia Basin area, including basins surrounding the Snake River Plain. Generally, there is a large shift in the form of winter precipitation from snow to rain, with basins in Lower Snake River Plain affected before those in the Upper Snake River Plain, because of the lower basin elevations in this area. As these changes occur, there will be likely be a tendency for higher winter flows and possible increased risk of flooding, earlier snowmelt and runoff peaks, and lower summer streamflows.

Casola et al. (2009) evaluated the impact of global warming upon Pacific Northwest snowpack using the Cascades portion of the Puget Sound drainage basin as an example that can be extrapolated for the region. They evaluated four analytical and modeling methods to determine the temperature sensitivity of snowpack: (1) simple geometric considerations, (2) regression of April 1 snow water equivalent measurements upon seasonal mean temperature, (3) a hydrological model forced with historical daily temperature and precipitation data, and (4) a simple analysis of inferred accumulated snowfall. The researchers concluded that a 20 percent reduction in snowpack (mean April 1 snow water equivalent) occurs for each degree Celsius of warming (1.8°F) in the absence of indirect effects, and a 16 percent reduction occurs taking into account a projected warming-induced increase in precipitation.

Considering projected warming scenarios (as described above [Mote and Salathé 2009, 2010]), Table 3-3 shows the decrease in snowpack using the analysis by Casola et al. (2009).

Table 3-3. Projected Decrease in Snowpack

Average Annual Temperature Projected Increase (relative to the 1970-1999 average temperature)	Projected Decrease in Snowpack (taking into account a projected warming-induced increase in precipitation)
2.0°F by the decade of the 2020s	18% decrease in snowpack by 2020s
3.2°F by the decade of the 2040s	28% decrease in snowpack by 2020s
5.3°F by the decade of the 2080s	47% decrease in snowpack by 2020s

This loss of snowpack is especially the case for the most vulnerable, lower-elevation snowfields. Spring snowpack is a good indicator for summertime flows in most watersheds, and these snowpack loss projections therefore foretell strong negative impacts to the region's overall water resources. In many watersheds in the Pacific Northwest, snowfields act as reservoirs that collect fresh water during the wetter winter months and release this water during the drier summer months, effectively distributing water more equitably across the seasons. Loss of snowpack would disrupt this cycle, vastly altering streams whose hydrologies are largely determined by snowpack runoff and/or groundwater input.

3.2 Hydrology

The major surface waters within the Deer Flat NWR planning area are Lake Lowell and the Snake River. The entire upland area of the Lake Lowell Unit drains into the lake, and all of the Refuge islands drain directly to the river. The two surface-water features are described below.

3.2.1 Lake Lowell

Lake Lowell is an off-stream storage reservoir within Reclamation's Boise Project Arrowrock Division (Ferrari 1995; IDEQ 2010; Reclamation 2011). It is formed by three earth-fill embankments and one dike that hold water in a natural topographic depression: Deer Flat Upper Dam, Deer Flat Middle Dam, Deer Flat Lower Dam, and Deer Flat East Dike (Ferrari 1995; IDEQ 2010; Reclamation 2011; Simonds 1997). Construction of these embankments took place from 1906 through 1911(Ferrari 1995), with closure and first storage occurring in 1909 (pers. comm., S. Dunn 2012). IDEQ (2010) describes the tributaries contributing to the lake as consisting of: New York Canal, Ridenbaugh Canal, Highline Canal, two canal wasteways, six named agricultural drains, and many unnamed drains that discharge to the lake (IDEQ 2010). However, Ridenbaugh Canal and Garland Drain actually flow into New York Canal before it enters Lake Lowell, and Highline Canal flows into the lake through the two canal wasteways. Table 3-4 describes the average annual inflows to Lake Lowell.

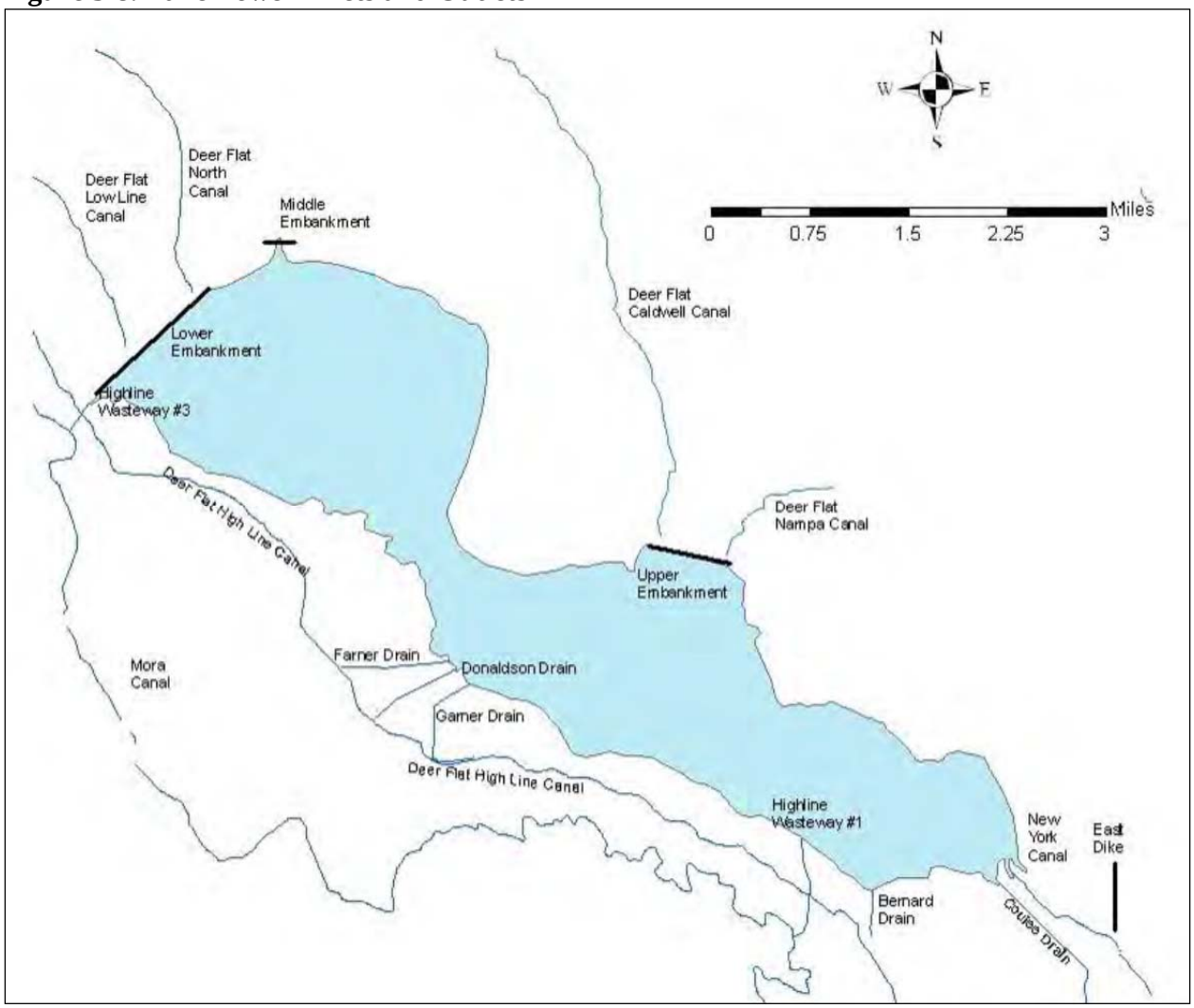
Outlets from the lake at the Deer Flat Lower Dam feed the Deer Flat North Canal and the Deer Flat Lowline Canal and outlets from the Deer Flat Upper Dam feed the Deer Flat Caldwell Canal and Deer Flat Nampa Canal (IDEQ 2010). The Blinkenstaff pumps, located near Deer Flat Highline Wasteway Number 3, lift lake water to the Mora Canal (IDEQ 2010). Approximately 3,200 acre-feet of water is also lost from the lake through evaporation and groundwater infiltration. Lake Lowell inlets and outlets are shown in Figure 3-8. Table 3-5 describes the average annual outflows from the lake.

Table 3-4. Average Annual Measured Inflows to Lake Lowell

Lake Lowell Tributary	Average Annual Inflow (acre-feet)
New York Canal (including Ridenbaugh Canal and Garland Drain)	180,000
Deer Flat Highline Wasteway #1	1,800
Deer Flat Highline Wasteway #3	20,000
Coulee Drain	1,900
Bernard Drain	1,200
Garner Drain	400
Donaldson Drain	900
Farner Drain	1,800
Other minor unmonitored drains	5,900
Total	**213,900**

Source: IDEQ (2010).

Figure 3-8. Lake Lowell Inlets and Outlets



Source: IDEQ (2010).

Table 3-5. Average Annual Measured Outflows from Lake Lowell

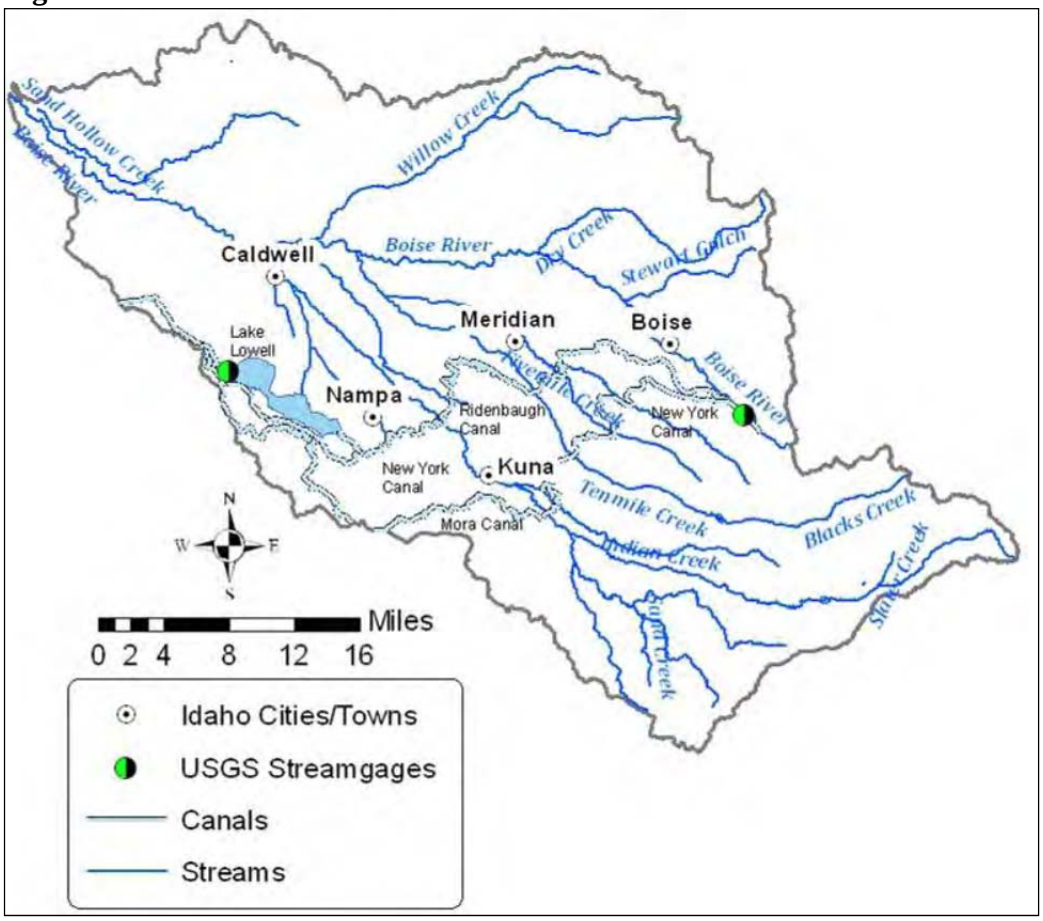
Lake Lowell Tributary	Average Annual Inflow (acre-feet)
Deer Flat Lowline Canal	203,000
Deer Flat Caldwell Canal	2,900
Deer Flat Nampa Canal	3,600
Blinkenstaff pumps	1,200
Total	**210,700**

Source: IDEQ (2010).

The Lake Lowell watershed covers approximately 63.5 square miles of the Lower Boise River Subbasin within Ada and Canyon Counties (IDEQ 2010). During the nonirrigation season, Lake Lowell is primarily filled by water diverted at the Boise River Diversion Dam and conveyed to the lake via the 40-mile-long New York Canal, which discharges into the eastern (upper) end of the lake (Reclamation 2011). Ridenbaugh Canal is also diverted off the Boise River and flows through the densely populated areas of Boise, Meridian, and southeast Nampa before joining the New York Canal just before it flows into Lake Lowell (IDEQ 2010). Other water inputs to the lake via the New York Canal include stormwater from surrounding population centers and agricultural runoff from

lands in southern Ada and Canyon Counties as well as septic system inputs and groundwater (IDEQ 2010). Stream gages maintained by the U.S. Geological Survey (USGS) monitor the flow directed to Lake Lowell as well as the reservoir storage levels (IDEQ 2010). Figure 3-9 shows the Lower Boise River Subbasin and inlets to Lake Lowell.

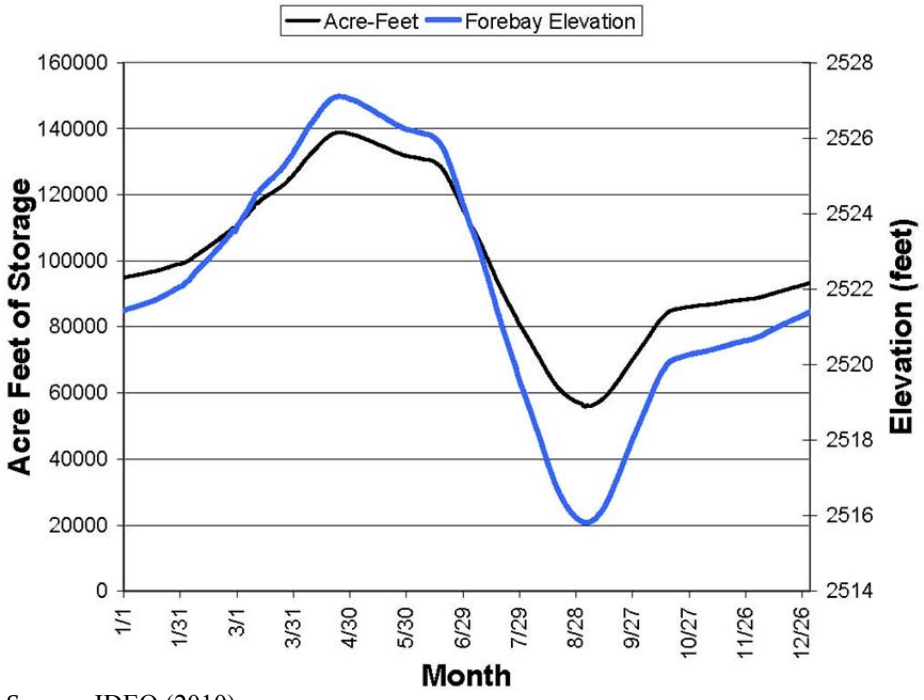
Figure 3-9. Lower Boise River Subbasin



Source: IDEQ (2010).

Lake Lowell is managed first for irrigation purposes. The irrigation season is from March 15 to October 15 (IDEQ 2010). The water stored in the lake irrigates 302,264 acres of land in the Snake and Boise River Basins throughout the summer (IDEQ 2010). Water storage in the lake declines rapidly from late June through August as the irrigation releases exceed inflow from the New York Canal (IDEQ 2010). The lowest water levels are generally reached in late August or early September, exposing mudflats around the shallower portions of the lake; levels rise again in the fall as irrigation demands subside and the New York Canal continues to flow (IDEQ 2010). Figure 3-10 provides a graph of the annual average water levels by month. Map 10 shows average low and average high water levels at Lake Lowell.

Figure 3-10. Lake Lowell Average Monthly Water Storage (1954-2009)



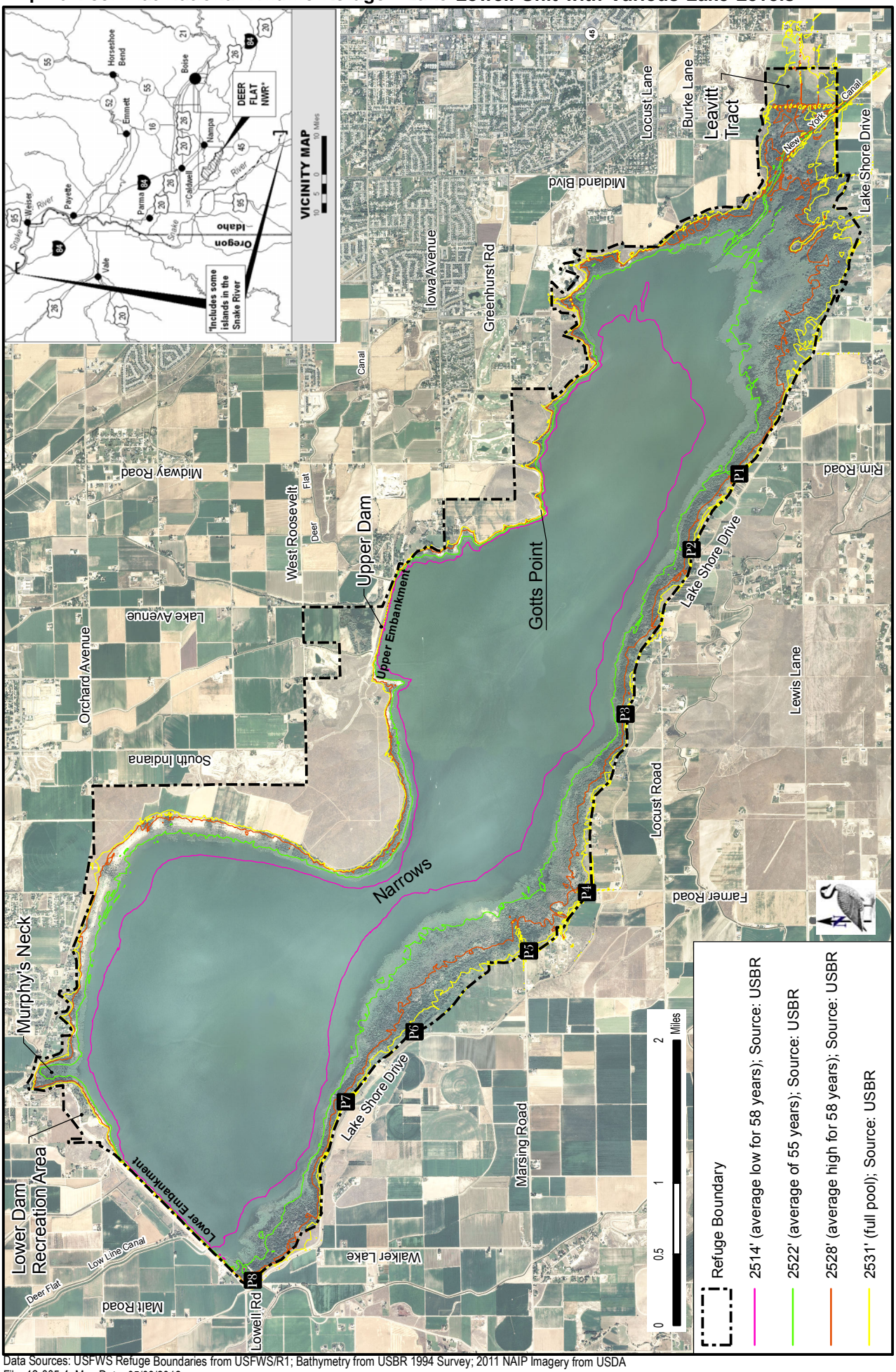
Source: IDEQ (2010).

There are three important elevation ranges for irrigation and reservoir operations (Ferrari 1995):

- 159,365 acre-feet of active capacity, or active irrigation conservation storage, occurs between elevations of 2,504 and 2,531 feet;
- 5,823 acre-feet of inactive storage of water between elevations of 2,501 and 2,504 feet; and
- 7,855 acre-feet of dead storage of water below 2,501 feet in elevation.

Active irrigation conservation storage refers to the water that will be available for gravity-fed irrigation through the four outflow canals. The inactive storage water cannot be gravity fed; it must be pumped out to the irrigation canal system. Dead storage water is not available for irrigation purposes; it provides for sediment settling, fish habitat during low water levels, and a hydraulic head for the upper layers of water storage. A detailed account of the canal's inflows and outflows can be found in the Lower Boise River Subbasin Assessment and TMDLs (IDEQ 2010). Table 3-6 describes the various areas and capacities of Lake Lowell. The hydrologic operations of the lake affect the quality and quantity of Refuge habitats, which are discussed in more detail in Chapter 4.

Map 10 Deer Flat National Wildlife Refuge - Lake Lowell Unit with Various Lake Levels



Data Sources: USFWS Refuge Boundaries from USFWS/R1; Bathymetry from USBR 1994 Survey; 2011 NAIP Imagery from USDA
File: 12-005-4 Map Date: 05/09/2012

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Table 3-6. Lake Lowell Area and Capacity

Lake Lowell Reservoir Parameter	Measurement
Maximum water surface elevation	2,531.2 feet
Surface area (at full pool)	9,024.8 acres
Total capacity	173,043 acre-feet
Active capacity	159,365 acre-feet
Length of reservoir at full pool	9.2 miles
Average width of reservoir at full pool	0.65 mile

Source: IDEQ (2010).

Depending on the storage level in Lake Lowell, the lake will gain or lose water from or to local groundwater. During periods of high storage volume (December to June), Lake Lowell loses water to groundwater, and during low lake water level periods (July to October), groundwater flows into the lake (IDEQ 2010). On average, the lake gains 3,750 acre-feet of water volume annually from groundwater (IDEQ 2010).

Water rights affecting Lake Lowell are managed by Idaho Department of Water Resources (IDWR), Water District 63 (Boise District). Water rights are authorizations to use water in a prescribed manner and not ownership of the water. The Refuge holds three water rights. Table 3-7 provides details of the Refuge's water rights.

Table 3-7. Deer Flat Refuge Water Rights

Water Right No.	Source	Beneficial Use	From	To	Diversion Rate (cfs)	Volume (afa)	Diversion Location	Place of Use/Total Acres
63-2898	Groundwater	Irrigation	March 1	November 15	1	315	T3N R3W Sec. 36 NWSE	70
63-2997	Groundwater	Irrigation	March 1	November 15	1.12	495	T3N R3W Sec. 27 NWNE	110
63-7594	Groundwater	Domestic	January 1	December 31	0.09	1.5	T3N R3W Sec. 35 NENW	Refuge office and visitor center

Source: IDWR (2011).
cfs: cubic feet per second.
afa: acre-feet per annum.

3.2.2 Snake River

The source of the Snake River is in the Rocky Mountains of Wyoming. The river flows for 1,040 miles and drains 107,510 square miles before it discharges into the Columbia River (Krammerer 1990). The elevation at its source is 8,927 feet above mean sea level (MSL); the river elevation drops over its course to 358 feet above MSL at its mouth near Burbank, Washington. The Snake River Islands Unit of the Refuge is contained within the Middle Snake River, between river miles (RMs) 335 and 448. The Middle Snake Subbasin consists of the Snake River and all the lands that drain to it from Shoshone Falls to Hells Canyon Dam (Ecovista and IDFG 2004).

Major tributaries to the Middle Snake River include the Malheur, Owyhee, Boise, Payette, Weiser, Powder, Burnt, and Bruneau Rivers. The subbasin drains approximately 8.3 million acres and includes 367 miles of the Snake River mainstem as well as many small tributaries (Ecovista and IDFG 2004). The majority of the Middle Snake Subbasin (82 percent) is located in southern Idaho, with the remainder in small portions of Oregon and Nevada (Ecovista and IDFG 2004). Much of the

portion of the river that contains the Snake River Islands Unit forms the border between Idaho and Oregon.

Streamflows in the spring and early summer in the Snake River are driven by snowmelt and runoff from areas where precipitation falls in the form of snow (Ecovista and IDFG 2004). The Middle Snake River is one of the most regulated portions of the Snake River, with much of the annual flow diverted for irrigation. There are many storage and run-of-the-river dam facilities located along the Middle Snake River, but there are no facilities within the portion of the river containing the Refuge islands (U.S. Army Corps of Engineers 2010). The first facility upstream of the Refuge islands is the Swan Falls Dam, a hydroelectric dam, and the first facility downstream of the Refuge islands is the Brownlee Dam, a storage and hydroelectric dam (Ecovista and IDFG 2004). With such a high degree of water regulation, it has been estimated that the late summer and early fall flows downstream of the Snake River Islands Unit are typically greater than they were before flow regulation began (IDEQ and Oregon Department of Environmental Quality [ODEQ] 2004).

Typical mean annual flow volumes in the Middle Snake River are between 11,000 and 16,000 cubic feet per second (cfs). The mean daily flow over a 77-year record period (1914-1990) at the Murphy gage, near Swan Falls Dam, was 11,159 cfs with mean annual minimum flow of 6,427 cfs (Dixon and Johnson 1999). At approximate RM 351 near Weiser, Idaho, the river flow volume averages 15,700 cfs (IDEQ and ODEQ 2004). Pre-dam flow volumes are not available because construction of the dams was completed in 1911, prior to installation of stream gages. Anomalies to these typical volumes were experienced in the early 1990s. Zoellick et al. (2004a, 2004b) studied Snake River flows between RMs 409 and 449 from 1990 through 1992 to identify the level of island isolation in relation to flows and rates of mammalian predation on waterfowl nests. They describe 1992 Snake River flows in the upper 40 RMs of the Snake River Islands Unit as being the lowest on record since the river was first gaged in 1914. Average daily flows during March, April, and May (Canada goose nesting season) in 1992 were only 5,898 cfs. Conversely, the average during the same season from 1937 through 1992 was 11,689 cfs (Zoellick et al. 2004a, 2004b). Dixon and Johnson (1999) describe similar flow anomalies during their 1990 fieldwork season as compared to the previous 25-year flow history. Table 3-8 provides mean monthly flow volumes for the Murphy gage and the Weiser gage.

Table 3-8. Mean Monthly Discharge Volumes for the Snake River at the Upstream and Downstream Extents of the Snake River Islands Unit

Gage Location (Period of Record)	Mean Discharge (cfs)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Murphy (1913-2010)	11,300	11,500	11,900	13,100	12,700	12,500	7,880	7,310	8,330	10,300	11,000	11,100
Weiser (1910-2010)	16,200	18,300	22,000	26,900	27,600	25,100	11,800	9,760	11,500	13,900	14,700	15,300

Source: USGS (2011).
cfs: cubic feet per second.

3.3 Topography and Bathymetry

The Deer Flat NWR units are situated in the Middle Snake Subbasin. The Middle Snake Subbasin lies in the Snake River Plain and is surrounded by several mountain ranges: Jarbidge and Owyhee Mountains to the southwest, Boulder Mountains and the Sawtooth Range in the northeast, and the Seven Devils and Wallowa Mountains surrounding the northwestern areas of the subbasin (Ecovista

and IDFG 2004). The highest elevation in the subbasin is 11,817 feet and occurs in the Boulder Mountains; the lowest elevation (1,568 feet) is at Hells Canyon Reservoir (Ecovista and IDFG 2004).

3.3.1 Lake Lowell Unit

The Lake Lowell Unit of Deer Flat NWR is situated on a plateau between the Snake River and Boise River (IDEQ 2010). The lake itself was constructed in a natural depression in the Lower Boise River Valley (IDEQ 2010). Its shoreline sits at 2,531 feet above MSL at full pool, 300 feet lower in elevation than the origin of the New York Canal (IDEQ 2010). The Deer Flat Upper Dam is 74 feet high with a crest elevation of 2,539.2 feet (±0.2 feet). The Deer Flat Lower Dam is 46 feet high with a crest elevation of 2,539.3 feet (±1.6 feet). The Deer Flat Middle Dam is 16 feet high with a crest elevation of 2,536.0 feet (±0.1 feet) (Ferrari 1995). The crest of the Middle Dam is lower than that of the Upper and Lower Embankments and serves as an emergency spillway (IDEQ 2010). The highest upland areas within the Refuge boundary at Lake Lowell sit at approximately 2,640 feet above MSL (USGS 1971a).

Lake Lowell is 14.5 square miles in surface area, has 28 miles of shoreline, and covers approximately 9,000 surface acres at full pool (IDEQ 2010). Much of the lake is fringed with riparian habitat and mudflats that are pronounced at low-pool elevation levels (IDEQ 2010). The maximum water surface elevation of the lake is 2,531 feet above MSL (IDEQ 2010). The deepest part of the lake is 2,483.6 feet above MSL, just in front of the Upper Dam headwall (Ferrari 1995). The other deep spot of the lake is just in front of the Lower Dam headwall, at 2,501 feet above MSL (Ferrari 1995). At full pool, these areas are approximately 47 and 30 feet deep, respectively.

In general, the bathymetric map created as a result of the 1994 reservoir survey effort (Ferrari 1995) shows that the banks along the northern portion of the lake are more steeply sloped than those along the southern shoreline. The east end of the lakebed is shallow with a broad, gentle slope (Ferrari 1995). The large pool at the western end of the lake, in front of the Lower Dam, has a deeper lakebed that is also broad and relatively flat (Ferrari 1995).

3.3.2 Snake River Islands Unit

A review of the USGS 7.5-minute series of topographic maps in which the Refuge islands are located indicates the topographic relief of the Refuge islands above the waterline varies from just a few feet to as much as 20 feet; the vast majority of the islands have 10 feet or less of relief (USGS 1951, 1952, 1967, 1968, 1971b, 1971c, 1971d, 1974a, 1974b, 1974c, 1975, 1992a, 1992b, 1992c, 1992d). Although the Snake River falls 7,000 feet over its entire length (IDEQ and ODEQ 2004), it only loses 140 feet of elevation over the course of its flow within the Snake River Islands Unit. The topography of the river path drops from approximately 2,260 feet above MSL at RM 448 (USGS 1992d) to approximately 2,120 feet above MSL at RM 335 (USGS 1974a).

3.4 Geology and Geomorphology

3.4.1 Lake Lowell Unit

The Lake Lowell Unit is located within a large alluvial-filled basin that is underlain by hundreds of meters of unconsolidated to slightly consolidated sediments (IDEQ 2010). The majority of the sediments are fluvial but some are lacustrine in origin (IDEQ 2010). Outcropping in some areas near

the lake are composed of the Ten-Mile Gravel formation, described as being as much as a 152-m (500-foot) layer of poorly consolidated silt, sand, gravel, and cobbles; scattered, thin deposits of sand, gravel, and windblown silt cover the thick layer of sediments (IDEQ 2010). Geologically, the vast majority of the area draining to Lake Lowell consists of detritus deposited by the action of water during the Pleistocene epoch (1.8 million to 10,000 years ago). The soils types that dominate the area draining to Lake Lowell are moderately erosive. Soils are discussed in detail in the following section.

3.4.2 Snake River Islands Unit

The Snake River Islands Unit is located within the western Snake River Plain. The river flows through a major hydrologic and topographic transition between the eastern and western Snake River Plains, which are divided near King Hill, Idaho (Ecovista and IDFG 2004). Groundwater permeability and transmissivity are quite high in the eastern plain and fairly low in the western plain (Ecovista and IDFG 2004). The western plain is 30 to 43 miles wide and trends northwest; it is far lower in elevation than is the eastern plain (Ecovista and IDFG 2004). The Snake River Islands Unit sits within a fault-bound basin with the land surface and rock layers dipping toward the axis of the plain (Ecovista and IDFG 2004). The western plain is filled with lacustrine and fluviatile sedimentary deposits that are interbedded with basalt (Ecovista and IDFG 2004). For most of its course in the Snake River Plain, the river is deeply incised in the sedimentary deposits (O'Connor 1993). Two significant geologic flood events that have made marked impacts on the geomorphology of the Snake River and the Snake River Plain are described below. The Lake Idaho and the Lake Bonneville geologic flood events are not only responsible for the course and character of the Snake River itself but also for features such as the depression in which Lake Lowell was developed.

3.4.2.1 Lake Idaho

The present course and character of the Snake River in the Snake River Plain are the result of the integration of the Snake River and Columbia River drainages (O'Connor 1993). Until about 1.5 million years ago, the Snake River Plain was isolated from the Columbia River Basin. At that time, Lake Idaho sat behind a lava flow that dammed the Snake River at the narrows of Hells Canyon and backed up the river to Twin Falls, Idaho (Orr and Orr 1996). Lake Idaho eventually cut through the lava flow dam at what is now Hells Canyon and eventually drained Lake Idaho, creating a free-flowing river; once the Snake and Columbia River Basins were connected, the Snake River and its tributaries began to cut their current valleys (Malde 1991; Wood and Clemens 2002). Prior to the integration of these two river drainages, the western Snake River Plain was a depositional center characterized by low-energy fluvial and lacustrine environments (Malde 1991). The remnants of Lake Idaho are evident in the lake sediment and playa lithologies above Hells Canyon Dam (Ecovista and IDFG 2004).

3.4.2.2 Lake Bonneville Flood

More recently, approximately 14,500 years ago, the Lake Bonneville Flood resulted from nearly 1,200 cubic miles of water spilling out of the Great Basin and into the Snake River drainage (O'Connor and Costa 2004). This basin-breach flood occurred when Lake Bonneville (the ice-age predecessor to the Great Salt Lake) overtopped its basin rim at Red Rock Pass, and the spillover caused rapid erosion that further released huge volumes of flow into the Snake River Plain (O'Connor 1993; O'Connor and Costa 2004). The flood entered the Snake River Plain north of Pocatello and followed the vast volcanic plain westward for about 370 miles before turning north and entering Hells Canyon (O'Connor 1993). The Snake River is the primary topographic feature on the

plain, and its canyons and valleys were the major conduit for the floodwaters (O'Connor 1993). The sustained peak discharge of about 1 million cfs filled a canyon that was 328 feet deep and overflowed onto the basalt uplands of the Snake River Plain (O'Connor and Costa 2004).

3.5 Soils

3.5.1 Lake Lowell Unit

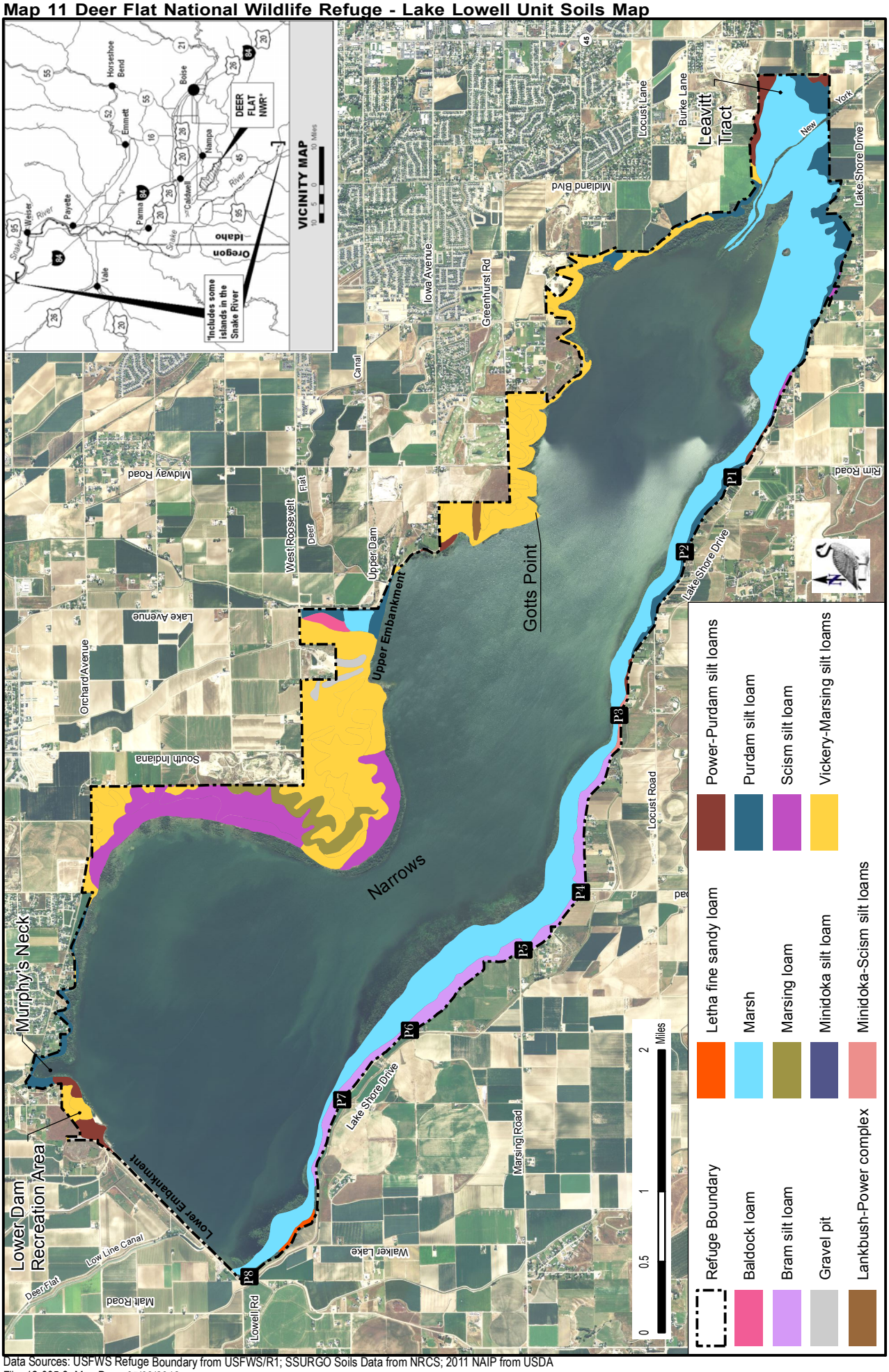
The *Soil Survey of Canyon Area, Idaho* (Priest et al. 1972) describes the soils surrounding Lake Lowell as primarily consisting of a mix of Vickery and Marsing soils with lesser areas of Scism, Purdam, Power-Purdam, and Bram soils (Map 11). Some of the areas on the Refuge lands immediately surrounding Lake Lowell are mapped as Marsh and the lake itself, of course, is mapped as Water. With the exception of the Bram soils, which are somewhat poorly drained, the soils mapped on the Lake Lowell Unit are well drained. According to the soil survey, typical vegetation in the Canyon County area consists mainly of big sagebrush, bluebunch wheatgrass, Sandberg's bluegrass, giant wildrye, and cheatgrass. About 85 percent of the county is used for irrigated crops or improved pasture, and the principal crops are irrigated small grains, corn, sugar beets, and alfalfa (Priest et al. 1972). The soils surrounding the Refuge, and to a lesser extent, on the Refuge, have been affected by agriculture. They have been irrigated under artificial hydrology patterns and altered through the typical soil-turning activities associated with agriculture.

The area surrounding upper Lake Lowell (the east pool) consists primarily of soils in the Vickery and Marsing series: Vickery-Marsing silt loams, 1 to 3 percent slopes (Map Unit VmB) and Vickery-Marsing silt loams, 3 to 7 percent slopes (Map Unit VmC) (Priest et al. 1972). Small areas of Purdam silt loam, 1 to 3 percent slope (Map Unit PrB), which occurs in old stream terraces, are also mapped in the upper lake area (Priest et al. 1972). In addition to areas of Vickery-Marsing silt loams, the Refuge uplands north of middle Lake Lowell are also characterized by areas of Scism silt loam (Map Units ScB [1 to 3 percent slopes] and ScC [3 to 7 percent slopes]). The erosion hazard from irrigation water in the 1 to 3 percent slope unit is slight to moderate, and in the 3 to 7 percent slope unit it is severe (Priest et al. 1972). Lower Lake Lowell (the west pool) is also surrounded by a great deal of Vickery-Marsing silt loam, especially to the immediate northeast. In addition, there is a mix of Power-Purdam silt loams (Map Units PpA and PpB), Purdam (Map Unit PrB), and Purdam-Sebree silt loam (Map Unit PtB) to the north and a small area of Bram silt loam (Map Unit BrA) in the most northwestern area of the Refuge surrounding the lake.

Table 3-9 lists the soil types mapped in the Lake Lowell Unit and the characteristics of the upper layers (i.e., the root zone for vegetation growth).

Document continues on next page.

Map 11 Deer Flat National Wildlife Refuge - Lake Lowell Unit Soils Map



Data Sources: USFWS Refuge Boundary from USFWS/R1; SSURGO Soils Data from NRCS; 2011 NAIP from USDA
File: 12-005-3 Map Date: 05/03/2012

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Table 3-9. Soil Series Mapped in the Lake Lowell Unit and Characteristics of Upper Soil Layers

Soil Series	Typical Root Zone Soil Profile of Soil Series	Soil Formation	Typical Native Vegetation
Marsing series	• 0 to 9 inches: loam; very fine, granular structure; friable • 9 to 23 inches: loam; hard; friable; calcareous	Formed in alluvium derived from quartzic, basaltic, and rhyolitic materials; moderately deep soils over sand and gravel	Big sagebrush, cheatgrass, and shadescale
Power series	• 0 to 9 inches: silt loam; very fine to medium coarse, granular to blocky structure; friable • 9 to 12 inches: silty clay loam; prismatic structure; noncalcareous • 12 to 21 inches: silt loam; blocky structure; moderately calcareous	Formed in loess or loesslike alluvium derived mainly from granitic and other acid igneous rock material	Bluebunch wheatgrass, Sandberg's bluegrass, big sagebrush, and forbs
Purdam series	• 0 to 10 inches: silt loam; fine to medium, granular to blocky structure; slightly hard and friable • 10 to 13 inches: silty clay loam; blocky structure; noncalcareous • 13 to 24 inches: silt loam; blocky structure; slightly calcareous	Formed in moderately deep loess mantle over medium-textured or moderately coarse textured alluvium or lacustrine sediments derived mainly from acid igneous rock	Bluebunch wheatgrass, Sandberg's bluegrass, cheatgrass, and big sagebrush
Scism series	• 0 to 8 inches: silt loam; very fine, granular structure; very friable; calcareous • 8 to 21 inches: silt loam; massive structure; slightly hard, very friable; strongly calcareous • 21 to 30 inches: light silt loam; massive structure; hard, very friable; strongly calcareous	Formed in light silty loess or loesslike alluvium derived from calcareous mixed minerals	Cheatgrass, big sagebrush, wild mustard, and Sandberg's bluegrass
Sebree series	• 0 to 1 inch: silt loam; massive structure; soft, very friable • 1 to 3 inches: silty clay loam; very fine prismatic to very fine, angular, blocky structure; hard; noncalcareous • 3 to 11 inches: silty clay loam; very fine and fine to moderate, subangular blocky structure; hard; noncalcareous	Formed mainly in a thin layer of wind-laid silts underlain by unconsolidated or very weakly consolidated sediments	Cheatgrass, medusahead wildrye, and annual weeds

Soil Series	Typical Root Zone Soil Profile of Soil Series	Soil Formation	Typical Native Vegetation
Vickery series	• 0 to 4 inches: silt loam; moderate, thin, and very thin platy structure; slightly hard; friable; noncalcareous • 4 to 7 inches: silt loam; medium and coarse, subangular blocky structure; slightly hard; friable • 7 to 13 inches: heavy silt loam; medium and coarse prismatic structure; slightly hard; friable; noncalcareous • 13 to 23 inches: silt loam; coarse prismatic to medium, subangular blocky structure; slightly hard; friable	Formed in a thin mantle of wind-laid silt deposited over unconsolidated sediments high in quartz, feldspar, and mica content	Bunchgrasses, big sagebrush, and herbaceous plants

Source: Priest et al. (1972).

3.5.2 Snake River Islands Unit

Soil types are mapped for the majority of islands in the Snake River Islands Unit, and, of the mapped islands, the majority are mapped as Riverwash (Map Unit Re). Riverwash is loose water-washed sand, gravel, cobblestones, and stones and occurs mostly as gravel bars along the Snake River (Lovell 1980; Rasmussen 1976). According to the Canyon County soil survey, Riverwash soils in general support very little plant growth, but when plants are present they typically consist of weeds, willows, sagebrush, and annual grasses; it is generally only suitable as wildlife habitat (Lovell 1980; Rasmussen 1976). Vegetation occurring on islands in the Refuge differs from the soil survey's characterization of vegetation found on Riverwash soils. Islands on the Refuge contain trees and thick stands of vegetation in many areas, and there are also islands on which vegetation has been altered due to past farming and grazing. A baseline study conducted along the reach of the Middle Snake River containing the Snake River Islands Unit summarizes island vegetation as consisting of approximately 44 percent riparian habitats, 48 percent upland vegetation, and 9 percent agriculture (Dixon and Johnson 1999). The baseline study further concluded that riparian vegetation of islands was composed of 65 percent riparian shrub, 23 percent dense woodland, and 3 percent herbaceous riparian. Approximately two-thirds of the trees were exotic species, principally Russian olive and tamarisk. Regionally native species documented included peachleaf willow and netleaf hackberry (Dixon and Johnson 1999). There are also several other soil types represented among the islands. Table 3-10 lists the soils types and the survey areas in which they are described as well as the drainage class for each. Although the majority of islands in the Snake River Islands Unit were mapped for soil types in the various surveys, none of the islands in Owyhee and Washington Counties were mapped for soil types; therefore, other soil types may occur in addition to those included in Table 3-10.

Table 3-10. Soil Types Mapped for the Snake River Islands Unit of Deer Flat NWR

Map Unit Code	Soil Name	Drainage Class
Canyon Area, Idaho		
BdA	Baldock loam, 0 to 1 percent slopes	Somewhat poorly drained
BdB	Baldock loam, 1 to 3 percent slopes	Somewhat poorly drained
BhA	Baldock loam, high water table, 0 to 1 percent slopes	Somewhat poorly drained
BsA	Bram silt loam, saline-alkali, 0 to 1 percent slopes	Somewhat poorly drained
Cu	Cruickshank fine sandy loam	Somewhat poorly drained
FeB	Feltham loamy fine sand, 0 to 3 percent slopes	Somewhat excessively drained
GaB	Garbutt silt loam, 1 to 3 percent slopes	Well drained
MtB	Moulton fine sandy loam, 1 to 3 percent slopes	Somewhat poorly drained
OgA	Oliaga loam, 0 to 1 percent slopes	Somewhat poorly drained
Re	Riverwash	NA
TuB	Turbyfill fine sandy loam, 1 to 3 percent slopes	Well drained
Malheur County, Oregon		
7	Falk variant fine sandy loam	Moderately well drained
8A	Feltham loamy fine sand, 0 to 2 percent slopes	Excessively drained
12A	Garbutt silt loam, 0 to 2 percent slopes	Well drained
20	Notus-Falk variant complex	Moderately well drained
29	Riverwash	NA
33A	Turbyfill fine sandy loam, 0 to 2 percent slopes	Well drained
34	Umapine silt loam	Somewhat poorly drained
Payette County, Idaho		
No	Notus coarse sandy loam	Somewhat poorly drained
Rh	Riverwash	NA

Source: Lovell (1980); Priest et al. (1972); Rasmussen (1976).

3.6 Fire

The Refuge has an approved fire management plan, and much of the information described in this section is captured from that plan. A copy of the complete approved plan can be found in Appendix K. Despite the inclusion of prescribed fire in the approved plan, this method has not been used as a management tool for at least a dozen years because of smoke management concerns, proximity to urban interfaces, and lack of available fire personnel (USFWS 2009a). Mechanical fire suppression treatments have been completed on 1,002 acres of the Lake Lowell Unit during the decade prior to 2009. Treatments included reduction of fire fuels (i.e., invasive tree removal and riparian understory mastication) and fireline discing. No treatments have been implemented on the Snake River Islands Unit during that period.

Because of the arid conditions of this area, fires can occur during almost any month of the year. Most fires on the Refuge occur from June through August; most fires are caused by humans and result from high visitor use. From 1997 to 2007 the Refuge experienced 30 wildfires that burned a total of 320 acres (USFWS 2009a). The majority of the fires occurred in the sagebrush-steppe habitat with a few occurring in the dense riparian area next to Lake Lowell. The two largest fires, CC Lightning and Sage Fires, occurred in 2003 and 2006 and burned 100 and 105 acres, respectively, of sagebrush-steppe habitat (USFWS 2009a). The vast majority of the individual fires recorded during the 10-year reporting period burned less than 10 acres each. Fire frequency on the Refuge has ranged from 16 fires in one year (1977) to a five-year period (from 1951 to 1956) with no fires. The fire management plan in Appendix K includes the complete fire history for the Refuge.

Refuge habitats are heavily infested with cheatgrass, which has greatly increased the natural fire frequency of this sage-steppe community. Invasion by cheatgrass leads to a grass-fire cycle in which cheatgrass promotes large fires that allow further increases in cheatgrass (Baker 2006). Additional discussion of cheatgrass and habitat is contained in Chapter 4, Biological Resources.

3.7 Air Quality

The EPA has established national standards for six "criteria" pollutants: carbon monoxide, ozone, nitrogen dioxide, lead, particulate matter, and sulfur dioxide. The State of Idaho has adopted the EPA standards as state rules. The standards are for the protection of human, plant, and animal welfare and to prevent damage to the natural and built environment. IDEQ is responsible for supervising and administering the state air quality program. EPA and IDEQ also identify and regulate toxic or hazardous air pollution.

The mission of the Service's Air Quality Program is to protect and enhance air quality in support of ecosystem management in the NWRS. The vision of this program is a Refuge System free of impacts from human-caused air pollution that is consistent with the Refuge System Improvement Act (Public Law 105-57), which requires that "the biological integrity, diversity, and environmental health of the [Refuge] System are maintained" (USFWS 2011b). Refuge contributions to air quality on the Refuge as well as to the larger Boise region are likely negligible. Management activities such as prescribed fire are not currently being implemented on the Refuge, and sources of pollutant emissions due to heavy machinery use for habitat management and farming activities are limited.

Deer Flat NWR is located in the IDEQ Boise Region, which encompasses 10 southwestern Idaho counties, including those in which the Refuge lands are located: Canyon, Owyhee, Payette, and Washington. Most of the air quality focus in this region is centered on the Treasure Valley, in which much of the Refuge lands are located. The majority of the valley's population and emission sources are concentrated in Ada and Canyon Counties; other counties in the region are sparsely populated and have few emission sources (IDEQ 2011a). It is likely that emission sources in eastern Oregon and northern Nevada contribute to the air quality of the Treasure Valley as well.

Topography and weather patterns in the Treasure Valley create some of the most severe wintertime inversions in the Intermountain West, during which pollution accumulates in the colder, denser air that is trapped at the earth's surface beneath a warmer air layer (IDEQ 2011a). It is during these events that the air pollution monitors in the valley have recorded levels above the national ambient air quality standards for both fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}) (IDEQ 2011a). The valley experiences air pollution in the summer months as well when stagnant air conditions, heat, and intense sunlight combine to produce an accumulation of unhealthy levels of ozone (IDEQ 2011a). Monitoring in the IDEQ Boise Region has shown occurrences of unhealthy ozone levels during the past several summers (IDEQ 2011a). The IDEQ uses the Air Quality Index (AQI) as a guide for reporting the daily air quality. The AQI is a scale that runs from 0 to 500, and it is divided into six categories. Each category corresponds to a different level of health concern. The six categories of health concern are: good; moderate; unhealthy for sensitive groups (USG); unhealthy; very unhealthy; and hazardous. The higher the AQI value is, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality. Table 3-11 shows the number of days per month in each AQI category for Canyon County in 2006.

Table 3-11. 2006 Air Quality Index for Canyon County

Month	Good	Moderate	USG	Unhealthy	Max AQI	Date	Pollutant	Location
January	28	3	0	0	57	1/26/06	$PM_{2.5}$ [a]	Nampa
February	27	1	0	0	53	2/19/06	$PM_{2.5}$	Nampa
March	31	0	0	0	35	3/12/06	$PM_{2.5}$	Nampa
April	30	0	0	0	49	4/26/06	PM_{10} [b]	Nampa
May	30	1	0	0	59	5/16/06	Ozone	Nampa
June	29	1	0	0	54	6/28/06	PM_{10}	Nampa
July	25	6	0	0	73	7/22/06	Ozone	Nampa
August	14	17	0	0	84	8/10/06	$PM_{2.5}$	Nampa
September	15	13	2	0	108	9/7/06	$PM_{2.5}$	Nampa
October	30	1	0	0	61	10/14/06	$PM_{2.5}$	Nampa
November	28	2	0	0	58	11/1/06	$PM_{2.5}$	Nampa
December	26	5	0	0	65	12/4/06	$PM_{2.5}$	Nampa
Totals	313	50	2					

Source: IDEQ (2007).
[a] $PM_{2.5}$: coarse particulate matter.
[b] PM_{10}: fine particulate matter.

Based on an evaluation of potential air pollution problems in the Treasure Valley, IDEQ has developed an airshed management strategy. An airshed is an area covered by a volume of air that has similar characteristics and is separated from other volumes of air by weather patterns or topography (IDEQ 2011a). The IDEQ's airshed management strategy focuses on particulate matter, carbon monoxide, ozone, and toxic air pollutants (IDEQ 2001). The valley had a history of issues with coarse particulate matter (PM_{10}) and carbon dioxide resulting from woodstove smoke, emissions from older vehicles, and road dust (IDEQ 2011a). These problems have been mostly resolved through Federal regulations, technological changes, and implementation of comprehensive air quality management plans. However, IDEQ continues to monitor PM_{10} and carbon monoxide levels in Ada and Canyon Counties (IDEQ 2011a).

3.8 Visual Quality

The quality of a viewshed is generally defined on a spectrum from the most natural state of the landscape to the degree in which it is altered with regard to basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. A viewshed is an area that is visible from a specific location. It may be considered as the viewshed toward or from a particular area or point.

USFWS has not classified the viewsheds of the Refuge, nor is the undertaking of a key observation point analysis part of this planning effort. On a broad landscape level and as part of the effort to develop resource management plans, the BLM has classified much of the land surrounding the Deer Flat NWR units based on the BLM Visual Resource Management (VRM) classification system (classes 1 through 4). VRM is classified based on measures of scenic quality, sensitivity levels, and distance zones. Scenic quality is a measure of visual appeal, visual sensitivity is a measure of public concern for scenic quality, and distance zones are based on relative visibility from travel routes or observation points (BLM 2008).

The broad landscape surrounding the Lake Lowell Unit is classified as VRM 4. This classification level is reserved for the areas with the most alteration or disturbance in the viewshed. For example,

the BLM's management objectives for VRM 4 areas describe activities that may require major modification of the existing character of the landscape (BLM 2008). Because of the high level of agricultural practices and urban interface in the Lake Lowell area as well as continuing urban development, VRM 4 is an appropriate classification for the area surrounding the Refuge. In contrast to the surrounding area, the Refuge itself is mostly undeveloped; however, the landscape of the Refuge has been altered to some extent by past human development. The Refuge contains human-made structures including the dams, roads, and recreational facilities surrounding Lake Lowell, the Visitor Center, and Maintenance Area.

The BLM Four Rivers Field Office Resource Management Plan (RMP) and EIS defines the Snake River corridor from approximately RM 352 to approximate RM 447 as VRM 3 (BLM 2008). The BLM's management objectives for VRM 3 areas are to partially retain the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer (BLM 2008). The same RMP/EIS defines the Snake River downstream to approximate RM 266 as VRM 2 (BLM 2008). BLM describes that overall Snake River corridor as providing high-quality scenery with diverse vegetation, water features, rock formations, and potential for wildlife viewing (BLM 2008). BLM further defines the characteristics of high-quality scenery as providing color variations from the more muted upland hues; incorporating seasonal variations in color that are more dynamic along the river relative to the uplands; and including water that moves through the corridor, draws the eye, and dominates the foreground views (BLM 2008). The Owyhee RMP also defines the Snake River corridor from approximate RM 407 to approximate RM 446 as VRM 3 (BLM 1999). The Owyhee RMP planning area borders the Four Rivers planning area at the Snake River in Idaho. The portion of the Snake River corridor bordering the Four Rivers planning area in Oregon is not classified for VRM (BLM 2001).

3.9 Water Quality

The Idaho water quality standards program is a joint effort between IDEQ and EPA. IDEQ develops and enforces water-quality standards that protect beneficial uses. According to the Idaho Administrative Code, beneficial use is defined as "any of the various uses which may be made of the water of Idaho, including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics. The beneficial use is dependent upon actual use, the ability of the water to support a nonexisting use either now or in the future, and its likelihood of being used in a given manner (Idaho Administrative Procedure Act [IDAPA] 58.01.02.010 [08])." Lake Lowell has three designated beneficial uses: support of warm water aquatic life, use for primary contact recreation, and a special resource water (IDEQ 2010). Lake Lowell is designated as a special resource water (for wildlife habitat) because it is within the Refuge and is of prime importance to the mission of the Refuge.

The Clean Water Act (CWA; 33 U.S.C. 1251) requires states to adopt water quality standards for each of the possible designated uses they assign to their waters. Section 303(d) of the CWA establishes requirements for states to identify and prioritize water bodies that are water quality-limited (i.e., water bodies that do not meet water quality standards). States must periodically publish a priority list (a "303(d) list") of impaired waters. Currently, this list must be published every two years. For waters identified on this list, states must develop a TMDL for the pollutants resulting in the impaired water quality. A TMDL is a calculation of the maximum amount, or load, of a pollutant that a water body can receive from human-caused sources and still meet water quality standards

(IDEQ 2011b). Data collected for development of the Lake Lowell TMDL indicate that the beneficial uses of Lake Lowell are not met due to excessive algal and macrophyte growth (IDEQ 2010).

The EPA develops regulations, policies, and guidance to help the State of Idaho implement its water quality program and to ensure that Idaho's adopted standards are consistent with the requirements of the CWA. The State has adopted both numeric and narrative water quality standards to protect beneficial uses. Numeric criteria have been adopted for pollutants such as bacteria, dissolved oxygen (DO), pH, ammonia, temperature, and turbidity, and narrative criteria have been adopted for pollutants such as sediment and nutrients (IDAPA 58.01.02.250). Examples of narrative criteria include the following:

- "Sediment shall not exceed quantities specified in Sections 250 and 252 or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350" (IDAPA 58.01.02.200.08).
- "Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses" (IDAPA 58.01.02.200.06).

Table 3-12 includes the numeric criteria commonly used in TMDLs in Idaho's water quality standards.

Table 3-12. Selected Numeric Criteria Supportive of Designated Beneficial Uses in Idaho Water Quality Standards

Designated and Existing Beneficial Uses			
Water Quality Parameter	**Primary Contact Recreation**	**Secondary Contact Recreation**	**Warm Water Aquatic Life**
Bacteria, pH, and DO	Less than 126 *E. coli* per 100 mL[a] as a geometric mean of five samples over 30 days; no sample containing greater than 406 *E. coli* organisms per 100 mL.	Less than 126 *E. coli* per 100 mL as a geometric mean of five samples over 30 days; no sample containing greater than 576 *E. coli* organisms per 100 mL.	pH between 6.5 and 9.0 DO[b] exceeds 5.0 mg/L[c] This does not apply to the bottom 20% of water depth in lakes or reservoirs 35 meters or less and waters of the hypolimnion in stratified lakes and reservoirs.
Temperature[d]			33°C or less daily maximum; 29°C or less daily average.
Mercury			Surface waters of the State shall be free from deleterious materials in concentrations that impair designated beneficial uses. For purposes of aquatic life protection it is assumed that if the weighted trophic level average of fish tissue samples meets the human health consumption standard of 0.03 mg/kg[e] methylmercury, that aquatic life will also be protected.
Turbidity			Turbidity shall not exceed background by more than 50 NTU[f] instantaneously or more than 25 NTU for more than 10 consecutive days.
Ammonia			Ammonia not to exceed calculated concentration based on pH and temperature.

Source: IDEQ (2010).
[a] *Escherichia coli* per 100 milliliters.
[b] DO: dissolved oxygen.
[c] mg/L: milligrams per liter.
[d] Temperature exemption: Exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the ninetieth percentile of the seven-day average daily maximum air temperature calculated in yearly series over the historical record measured at the nearest weather reporting station.
[e] mg/kg: milligrams per kilogram.
[f] NTU: nephelometric turbidity unit.

In order to meet CWA requirements, every two years IDEQ prepares an integrated report containing the 303(d) list of impaired waters as well as a general report on water quality of all State waters, the 305(b) report. Each integrated report is submitted by the State to the EPA for approval. In each integrated report, all State waters are assigned to one of five different water quality categories. Table 3-13 describes the five categories.

Table 3-13. State of Idaho Water Quality Categories

Water Quality Category	Description
1	Waters are attaining water quality standards and no uses are threatened.
2	Waters are attaining some designated uses, and no uses are threatened, but there are insufficient (or no) data and information available to determine if the remaining uses are attained or threatened.
3	Waters have insufficient data (or no data) and information to enable determining if designated uses are being attained.
4	Waters do not support (or threaten) a standard for one or more designated uses, but they do not require the development of a TMDL. There are three subcategories under Category 4: • *Category 4a* waters have had a TMDL completed and approved by EPA. • *Category 4b* waters have had pollution control requirements placed on them—other than a TMDL—and these waters are reasonably expected to attain the water quality standard in the near future. • *Category 4c* waters are those waters for which nonsupport of the water quality standard is not caused by a pollutant.
5	Waters do not meet (or they threaten) applicable water quality standards for one or more designated uses by one or more pollutants. Category 5 water bodies make up the 303(d) list of impaired waters.

Source: IDEQ (2009).

3.9.1 Lake Lowell

The Service works with State and Federal agencies to help identify and implement water quality improvements where possible. The opportunity to partner on water quality improvement projects may increase once the TMDL Implementation Plan is released (release is anticipated in summer 2012). Lake Lowell is a filter and containment basin for upstream pollutants and was added to the 1998 303(d) list for nutrients and low DO; these designations were carried forward to subsequent lists. Lake Lowell is included in the 2008 Integrated (303[d]/305[b]) Report's list of waters impaired by nonpollutants (IDEQ 2009), which indicates the lake is listed for "nutrient suspected impairment" and "low dissolved oxygen due to suspected organic enrichment" (IDEQ 2009). Excessive algae and macrophyte production result in oxygen depletion. Algal mats interfere with the primary contact recreation and aesthetic values of this special resource water. Decreased levels of DO impair warm water aquatic life. The sources of nutrient loading include phosphorus contributed by canal and drain tributaries and waterfowl. Very high concentrations of phosphorus from agricultural runoff were

measured in tributary waterways to Lake Lowell (IDEQ 2010). To address these two narrative criteria impairments and to improve water quality, IDEQ developed a TMDL plan for Lake Lowell, which has been approved by the EPA (IDEQ 2010). The Lake Lowell TMDL includes a loading limit for total phosphorous, which acts as a surrogate for DO (IDEQ 2010). Implementation of the TMDL is predicted to result in a 37 percent reduction of incoming loads of total phosphorus, which is expected to eliminate nuisance levels of aquatic vegetation and attain the water quality standard of 5 milligrams per liter (mg/L) DO for warm water aquatic life. All TMDLs required for Lake Lowell are complete; therefore, Lake Lowell will be moved to category 4a of the next integrated report (IDEQ 2010).

While the 303(d) list does not specify the beneficial uses that are impacted as a result of the impaired water status, data collected for development of the Lake Lowell TMDL indicate that the beneficial uses of warm water aquatic life, primary contact recreation, special resource water (for wildlife habitat), and aesthetics are not met due to excessive algal and macrophyte growth (IDEQ 2010). Table 3-14 provides a description of all beneficial use designations used by the State and identifies those that apply to Lake Lowell as well as those that are recognized as impaired.

Table 3-14. Beneficial Uses of Waters within Idaho and Lake Lowell Designations

Idaho Surface Water Use Designations	Description	Lake Lowell Designated Beneficial Uses	Impaired Designated Beneficial Use
Aquatic life support			
Bull trout	Species-specific use.		
Cold water	Water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species.		
Salmonid spawning	Waters that provide or could provide a habitat for active self-propagating populations of salmonid fishes.		
Seasonal cold water	Water quality appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures.		
Warm water	Water quality appropriate for the protection and maintenance of a viable aquatic life community for warm water species.	X	X
Modified	Water quality appropriate for an aquatic life community that is limited due to one or more conditions that preclude attainment of reference streams or conditions.		
Contact recreation			
Primary (swimming)	Applies to waters where people engage in activities that involve immersion in, and likely ingestion of, water, such as swimming, waterskiing, and skin diving.	X	X
Secondary (boating)	Applies to waters where people engage in activities where ingestion of water may occasionally occur, such as fishing, boating, and wading; also where swimming is infrequent.		
Water supply			
Domestic	Water quality appropriate for drinking water supplies.		

Idaho Surface Water Use Designations	Description	Lake Lowell Designated Beneficial Uses	Impaired Designated Beneficial Use
Agricultural	Water quality appropriate for the irrigation of crops or as drinking water for livestock. This use applies to all surface waters of the State.		
Industrial	Water quality appropriate for industrial processes. This use applies to all surface waters of the State.	X	
Wildlife habitats	Protect water quality appropriate for wildlife habitat. This use applies to all surface waters of the State.	X	X
Aesthetics	Applies to all surface waters of the State.	X	X

Source: IDEQ (2011c).

Sources of nutrient loading in Lake Lowell include high concentrations of phosphorus contributed through the canal and drain tributaries flowing into the lake from the surrounding agricultural lands. The New York Canal brings the largest phosphorus load into Lake Lowell; it averages almost 158 pounds per day (IDEQ 2010). By comparison, the second-largest phosphorus conveyance into the lake is Deer Flat Wasteway Number 3, which carries a load of approximately 48 pounds per day (IDEQ 2010). Monitoring conducted by the Idaho State Department of Agriculture indicated that irrigation drains were major contributors of phosphorus to the lake (10.8 tons) during the irrigation season (Campbell 2003). Based on analysis of total suspended solids at the sampling sites, 88 percent of the phosphorus entering Lake Lowell was in particulate form (Campbell 2003). It should be noted that monitoring sites in the Campbell study were all located along the southern shoreline of the lake. The monitoring report stated that the bulk of the total suspended solids entering from one sample site was due to high discharge rates and not high concentrations; however, the high load quantities recorded at the other two sample sites were due to high concentrations of total suspended solids. Sediment loads from the drains that enter along the south side of Lake Lowell appear to settle out in the shallow bay areas along the shoreline, where the bulk of aquatic plant (macrophyte) growth occurs (Campbell 2003). These excessive loads of sediment and nutrients may lead to human-induced eutrophication consisting of increases in phytoplankton biomass, macrophyte biomass, nuisance algae blooms, loss of water clarity, and loss of oxygen in bottom waters (Campbell 2003). The amount of nutrient-rich sediment recycled or flushed from the system likely depends upon the speed of drawdown during the irrigation season (Campbell 2003).

Lake Lowell has a history of green and blue-green algal blooms associated with increased levels of phosphorus (Reclamation 1977, Reclamation 1980, IDFG 1965, and USFWS 2000 as cited in IDEQ 2010). In addition to algae being a nuisance for recreation, blue-green algae (cyanobacteria) can pose a health hazard; under certain conditions, blue-green algae can release toxins that are harmful to humans, pets, and livestock (IDEQ 2010). For example, in July 2009, an incident of blue-green algae on Lake Lowell prompted Southwest District Health to issue advisories for Lake Lowell and outlet canals, warning recreationists to avoid swimming in areas with algae blooms and to restrict pet access to the water (IDEQ 2010). Blooms typically form in late summer and dissipate in mid- to late fall when water temperatures cool (IDEQ 2010).

Additional water quality concerns for Lake Lowell include mercury and pesticides. As mentioned above, the lake is designated to support beneficial uses of warm water aquatic life and special resource water. The special resource water designation is applied here because of the importance of migratory waterfowl and other habitat within Deer Flat NWR. Mercury and contaminants that are

present and/or bioaccumulate in fish can have a detrimental effect on wildlife, particularly on fish-eating birds. In October 2006, IDEQ collected fish from Lake Lowell for fish tissue methylmercury analysis. The goal was to determine the mean methylmercury fish tissue concentration across fish trophic levels in the reservoir. The data were used to determine whether methylmercury concentrations exceed water quality standards in Lake Lowell. The trophic-level weighted average concentration of mercury for fish sampled in 2006 is 0.241 mg/kg, which is 0.059 mg/kg less than the water quality standard (WQS) of 0.3 mg/kg. Sucker and carp are used in Lake Lowell trophic level weighted averages as a conservative measure, because the average fish tissue mercury concentration is relatively high in comparison to bass and bluegill tissue concentrations. In 2007, IDEQ developed a monitoring plan to identify and quantify methylmercury concentrations in fish in Idaho surface waters, including Lake Lowell, and fish samples were collected for analysis. The calculated trophic level weighted average of mercury from fish collected in 2007 is 0.277 mg/kg, which is 0.023 mg/kg below the WQS. Two separate data collection events document that the WQS for mercury is not exceeded, and so a TMDL is not required (IDEQ 2010). Although the mercury level in fish tissue samples did not exceed water quality standards when last tested in 2007, it has been increasing over time (IDEQ 2010). Additional discussion of mercury and pesticide presence is provided below in Section 3.11.

3.9.2 Snake River

Several segments of the Snake River within the Snake River Islands Unit are listed on the Idaho and Oregon 303(d) lists of impaired waters. Those segments, as well as their designated beneficial uses and listed pollutants, are listed in Table 3-15. TMDLs have been approved for the Snake River–Hells Canyon Subbasin, which includes the portion of the river containing the Refuge islands. TMDL implementation and management in this portion of the state is a joint effort between the States of Idaho and Oregon.

Table 3-15. Snake River Islands Unit–Specific 303(d) Listings for the Snake River (RM 335-449)

Segment (from upstream to downstream)	State 303(d) Listed Pollutants	State-designated Beneficial Uses
Idaho segments		
RM 409 to 396.4 (Oregon-Idaho border near Homedale to Boise River inflow)	• Bacteria • Dissolved oxygen • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 396.4 to 351.6 (Boise River inflow to Weiser River inflow)	• Bacteria • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 351.6 to 347 (Weiser River inflow to Scott Creek inflow)	• Bacteria • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 347 to 285 (Scott Creek inflow to Brownlee Dam)	• Dissolved oxygen • Mercury • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply • Special resource water

Segment (from upstream to downstream)	State 303(d) Listed Pollutants	State-designated Beneficial Uses
Oregon segments		
RM 409 to 395	• Mercury • Temperature	• Public/private domestic water supply • Industrial water supply • Irrigation water • Livestock watering • Salmonid rearing and spawning (trout) • Resident fish (warm water) and aquatic life • Water contact recreation • Wildlife and hunting • Fishing • Boating • Aesthetics
RM 395 to 335 (Malheur Basin)	• Mercury • Temperature	• Public/private domestic water supply • Industrial water supply • Irrigation water • Livestock watering • Salmonid rearing and spawning (trout) • Resident fish (warm water) and aquatic life • Water contact recreation • Wildlife and hunting • Fishing • Boating • Aesthetics

Source: IDEQ (2010).

3.10 Surrounding Land Uses

3.10.1 Lake Lowell Unit

The Lake Lowell Unit of Deer Flat NWR sits just outside the southwestern boundary of the Nampa comprehensive planning boundary (City of Nampa 2004) and just south of the Caldwell comprehensive planning boundary (City of Caldwell 2010). The remainder of the unit is surrounded by the Canyon County comprehensive planning area (Canyon County 2011a, 2011b). The Refuge is surrounded by developed and agricultural lands. As such, the Refuge is isolated from large, contiguous blocks of significant wildlife habitat areas.

The current Nampa comprehensive plan recognizes there are conflicts associated with the agricultural/urban interface in the region such as the noise and dust created during the day and evening in the harvest season, and the difficulty of having to move tractors through subdivisions to change fields (City of Nampa 2004). The plan also acknowledges that the Lake Lowell Unit of the Refuge does not have adequate lands to support the existing diverse wildlife population and that the existing agricultural areas surrounding the Refuge provide food and cover for wildlife as well as protection for wetlands and watersheds (City of Nampa 2004). Therefore, the future land use map for the City of Nampa designates areas along Lake Lowell within the comprehensive plan impact area as agricultural with an open space overlay (City of Nampa 2004).

The current *City of Nampa Comprehensive Plan* (2004) maps existing land uses north of the east pool as mostly agricultural land with a mix of rural residential (less than 1.45 dwelling units per acre)

and low-density residential (1.46-4.00 dwelling units per acre). The plan's future land use map indicates a conversion of the agricultural lands bordering the Refuge to rural and low-density residential (City of Nampa 2004). A narrow band of rural residential lands would surround a larger core area of low-density residential lands. Table 3-16 illustrates the differences between existing and future land use inventory acreages. The plan states that the future land use inventory acreages represent a long-range vision of community development; however, a time frame for this future land use is not provided. These changes in land use patterns are driven by population growth forecasts and future housing need projections (City of Nampa 2004).

Table 3-16. City of Nampa Land Use Inventories

Land Use	Existing (2004) Acres per Land Use	Existing (2004) Percentage of Land Use Type	Future Predicted Acres per Land Use
Agriculture	39,781	67.2%	13,902
Rural residential	4,199	7.1%	10,940
Low-density residential	7,339	12.4%	19,955
Medium-density residential	677	1.1%	2,407
High-density residential	539	0.9%	937
Office	-	-	63
Commercial	1,896	3.2%	2,880
Industrial	3,290	5.6%	6,219
Public	696	1.2%	813
Parks	803	1.3%	1,104
Total	**59,220**	**100%**	**59,220**

Source: City of Nampa (2004).

The City of Caldwell adopted its current comprehensive plan in 2010. Although the Caldwell plan does not itemize a land use inventory like the Nampa plan, it does project similar population growth rates and housing needs. The City of Caldwell Official Comprehensive Plan Map (City of Caldwell 2010) identifies the area surrounding the north end of the west pool (Lower Lake Lowell) as residential estate land use. It also illustrates a narrow band of land immediately adjacent to the shoreline as environmentally sensitive and as public open space (City of Caldwell 2010). Residential estate land use is characterized by similar qualities as rural residential and low-density residential with a semirural character (City of Caldwell 2010). The public open space areas are suitable for active and passive recreation; environmentally sensitive areas include lands preserved for open space or that are undevelopable, such as wetlands and floodways (City of Caldwell 2010).

The vast majority of the land surrounding the Lake Lowell Unit is in unincorporated Canyon County and is zoned for agriculture (Canyon County 2011b). In addition to acknowledging Lake Lowell as an important natural resource in the county, the *Canyon County 2020 Comprehensive Plan* (2011a) recognizes the importance of Deer Flat NWR as a special area in the county and encourages land use patterns around the Refuge that promote the integrity and purpose of the Refuge. The plan also acknowledges that the County needs to preserve its natural resources while allowing for the expansion of cities and growth of the unincorporated areas (Canyon County 2011a). The Canyon County future land use map (Canyon County 2011a) categorizes the County lands south of Lake Lowell as residential, which indicates that the land use of Lake Lowell is converting from agriculture to some form of residential use.

3.10.2 Snake River Islands Unit

The lands surrounding the Snake River Islands Unit are predominantly private and used for agriculture (Ecovista and IDFG 2004). In Canyon County, with the exception of a few small sections with rural residential zoning designations, the lands adjacent to the Refuge islands are zoned for agricultural uses (Canyon County 2011b). Similar uses exist on the lands across the river in Owyhee County (Owyhee County 2002). Surrounding land uses along the Snake River Islands Unit in Payette County and Washington County are similar (Payette County 2006; Washington County 2010).

3.11 Environmental Contaminants

3.11.1 Lake Lowell Unit

There is an abandoned Canyon County landfill site within the Refuge boundary. The former landfill is located northwest of the westernmost portion of the Deer Flat Upper Dam, near the Visitor Center. It is positioned approximately 40 feet above lake elevation. The 40-acre site served as a landfill for Canyon County from the late 1950s through approximately 1973 (GeoEngineers 2006). The site was seeded in 1976 and is now covered in soil and grass (GeoEngineers 2006). The majority of the waste is covered by 0 to 2 feet of nonengineered cap/fill, and the depth of waste is greater than 15 feet in certain areas; the waste primarily consists of ordinary household items (GeoEngineers 2006). Although minimal elevated levels of some chemicals of concern were detected in soil, groundwater, and surface water samples, none appeared to be at concentrations that could pose an unacceptable risk or hazard to human or ecological site receptors (GeoEngineers 2006).

Thomas and Burch (2005) conducted contaminant sampling at the Refuge by examining sediment, invertebrate tissue, whole-body bullfrogs, whole-body fish tissue, bird eggs, and bird feather samples. Detailed observations of nesting birds conducted in 2001 as part of this study indicated that all prey were being collected from Lake Lowell. Samples were analyzed for organochlorines and inorganics, including trace scans for 26 compounds. They concluded that concentrations of inorganic contaminants were generally low in sediment from the Refuge and, for the most part, were below levels associated with adverse effects. One exception was the mercury concentrations in bald eagle feathers. The concentrations were within the range associated with impaired reproduction, suggesting that concentrations in the food chain may adversely impact bald eagles (Thomas and Burch 2005). The other exception was that although selenium concentrations in fish species were below the threshold for general toxic effects for whole-body fish samples (4 micrograms per gram), concentrations exceeded levels associated with mortality in species of fish known to be more sensitive to selenium exposure such as salmonids. This suggests that some fish species and sensitive life stages present in Lake Lowell may be adversely affected by current selenium concentrations (Thomas and Burch 2005). In the same study, Thomas and Burch concluded that organochlorine pesticide concentrations in sediment, fish, and invertebrates did not appear to be at levels harmful to aquatic resources with the exception of DDE levels in certain individual egg samples from grebe and heron species. On the whole, mean concentrations of DDE in grebe and heron eggs were below levels associated with adverse effects (Thomas and Burch 2005).

More recent recommendations in the Lake Lowell TMDL (IDEQ 2010) include additional sampling of reproductive success and mercury concentrations in bald eagles and continued monitoring of piscivorous water birds in order to reduce uncertainty regarding whether mercury is bioaccumulating

in eagles and piscivorous water birds and resulting in population level impacts due to effects on reproduction, and to monitor trends in chemical concentrations.

3.11.2 Snake River Islands Unit

Contaminants in the Middle Snake River are the result of surrounding land uses in the subbasin, and nutrient loading to the Middle Snake River also comes from the upstream segment of the Snake River. The highest concentrations of nitrates in the river are driven by the agricultural and urban land uses (Ecovista and IDFG 2004; IDEQ and ODEQ 2004). Historical use and discharge of mercury to surface waters in mining operations has resulted in increased mercury concentrations in the rivers of the subbasin, including the Snake River (Ecovista and IDFG 2004; IDEQ and ODEQ 2004). Current mining operations are predominantly focused on sand and gravel extraction and are concentrated around the town of Ontario, Oregon (Ecovista and IDFG 2004). The highly regulated flow regimes resulting from dams and irrigation diversions influence pollutant transport and processing within the Middle Snake River Subbasin. Pollutants such as sediment, mercury, and nutrients tend to accumulate behind these structures. Concentrations of nutrient and organic loads in impoundments may result in nuisance algae growth and dissolved oxygen depletion (Ecovista and IDFG 2004).

Document continues on next page.

Western grebe on nest
Addison Mohler, USFWS

Chapter 4 Biological Environment

Chapter 4 Biological Environment

This chapter addresses the biological resources and habitats found on the Refuge. However, it is not an exhaustive review of all species and habitats.

The chapter begins with a discussion of biological integrity (historical conditions and ecosystem function), as required under the Refuge Administration Act (16 U.S.C. 668dd-668ee, et seq.). The bulk of the chapter is then focused on the presentation of pertinent background information for habitats used by each of the priority resources of concern and other benefitting species designated under the CCP. That background information includes descriptions, conditions, habitat trends, and threats (stresses and sources of stress) to the habitats and/or associated resources of concern. This information was used to develop goals and objectives for the CCP.

4.1 Biological Integrity, Diversity, and Environmental Health

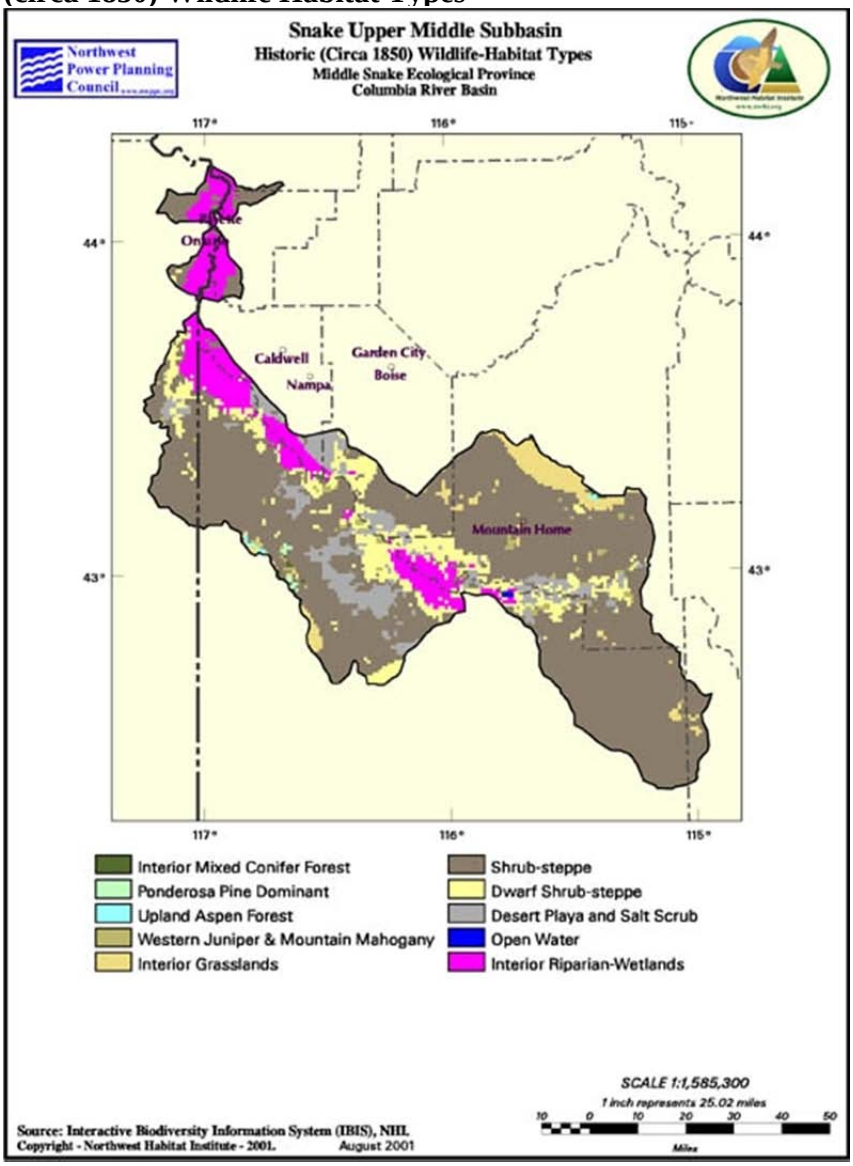
The NWRS Administration Act, as amended, directs the Service to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the NWRS are maintained for the benefit of present and future generations of Americans. Elements of BIDEH are represented by native fish, wildlife, plants, and their habitats, as well as those ecological processes that support them. The Refuge System policy on BIDEH (601 FW 3) also provides guidance on consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and in associated ecosystems that represents BIDEH.

Deer Flat NWR is located within the Columbia Plateau Ecoregion, which is characterized by a broad expanse of sagebrush-covered volcanic plains and valleys, punctuated by isolated mountain ranges and the dramatic river systems of the Snake, Owyhee, Boise, and Columbia. These large rivers contain islands that provide important habitat for migratory waterfowl and other birds. Almost half of the 226 islands downstream of Swan Falls Dam on the Snake River are part of the Snake River Islands Unit of the Refuge (Zoellick et al. 2004a). Historically, the Lake Lowell Unit of the Refuge was a low-lying area of sagebrush grasslands with natural springs, and the Snake River flowed freely through high-walled canyons and broader terraces shaped by the prehistoric Bonneville Flood event. The natural processes that historically maintained the BIDEH of the region included periodic flooding of the Snake River floodplain and lowland areas; seasonal fluctuations in precipitation and water levels, which supported a diversity of native plant communities in wetland and riverine systems; and periodic fires, which supported a diversity of successional stages of native shrub and forested plant communities.

In the early 1900s, settlers in the region sought to have reservoirs built to irrigate their crops. Several Snake River dams were constructed in the first decades of the 1900s, and Reclamation constructed Lake Lowell between 1906 and 1909. Construction of Lake Lowell was an early modification of BIDEH in the area that was later to be established as the Refuge. Construction of the reservoir also enabled further modifications of BIDEH to occur, as it facilitated increased agricultural use of the surrounding area. Current land use of the areas surrounding the Refuge is dominated by irrigated agriculture, pasture and open-range grazing, and residential development. Human settlement of the Snake River Plain has resulted in changes to vegetation communities and hydrologic regimes from historical conditions, which in turn has affected the wildlife populations they can support. Studies of the ecological integrity of the interior Columbia Basin conducted by the U.S. Forest Service (USFS) and BLM have documented that most forests, native grasslands, and shrublands have declined

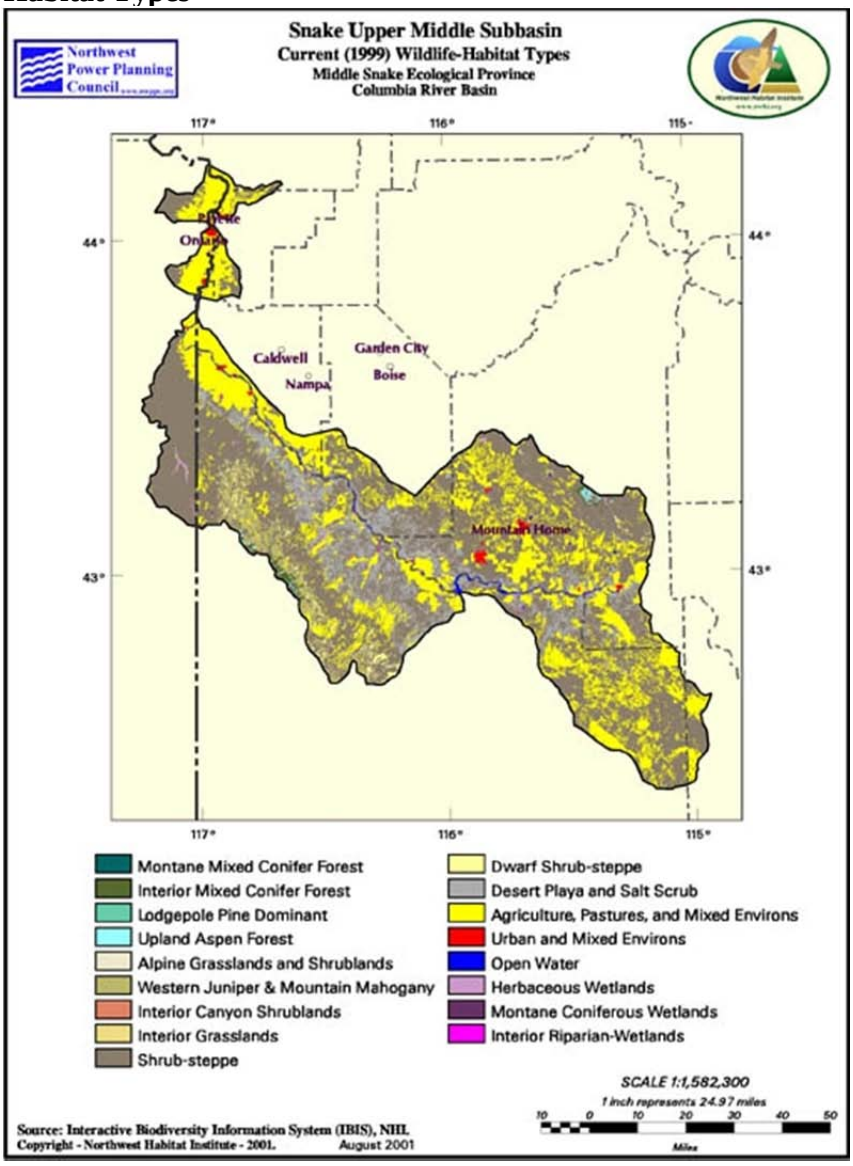
substantially in area, as has connectivity, since the basin was first settled by Euro-Americans. Native grasslands have decreased by 70 percent; native shrublands have decreased by 30 percent; large residual trees and snags have decreased by 20 percent; and old forest structures have decreased by 27 to 60 percent depending on vegetation type (Quigley et al. 1996). Habitat conditions for nearly all species with listing status under the Federal Endangered Species Act were more favorable historically, and the overall likelihood of extirpation has increased from historical to current times (Quigley et al. 1996). The changes in the abundance of wildlife habitat types from historical conditions (circa 1850) to conditions in 1999 are shown in Figures 4-1 and 4-2.

Figure 4-1. Snake River Upper Middle Subbasin Historical (circa 1850) Wildlife Habitat Types



Source: Northwest Habitat Institute (2011).

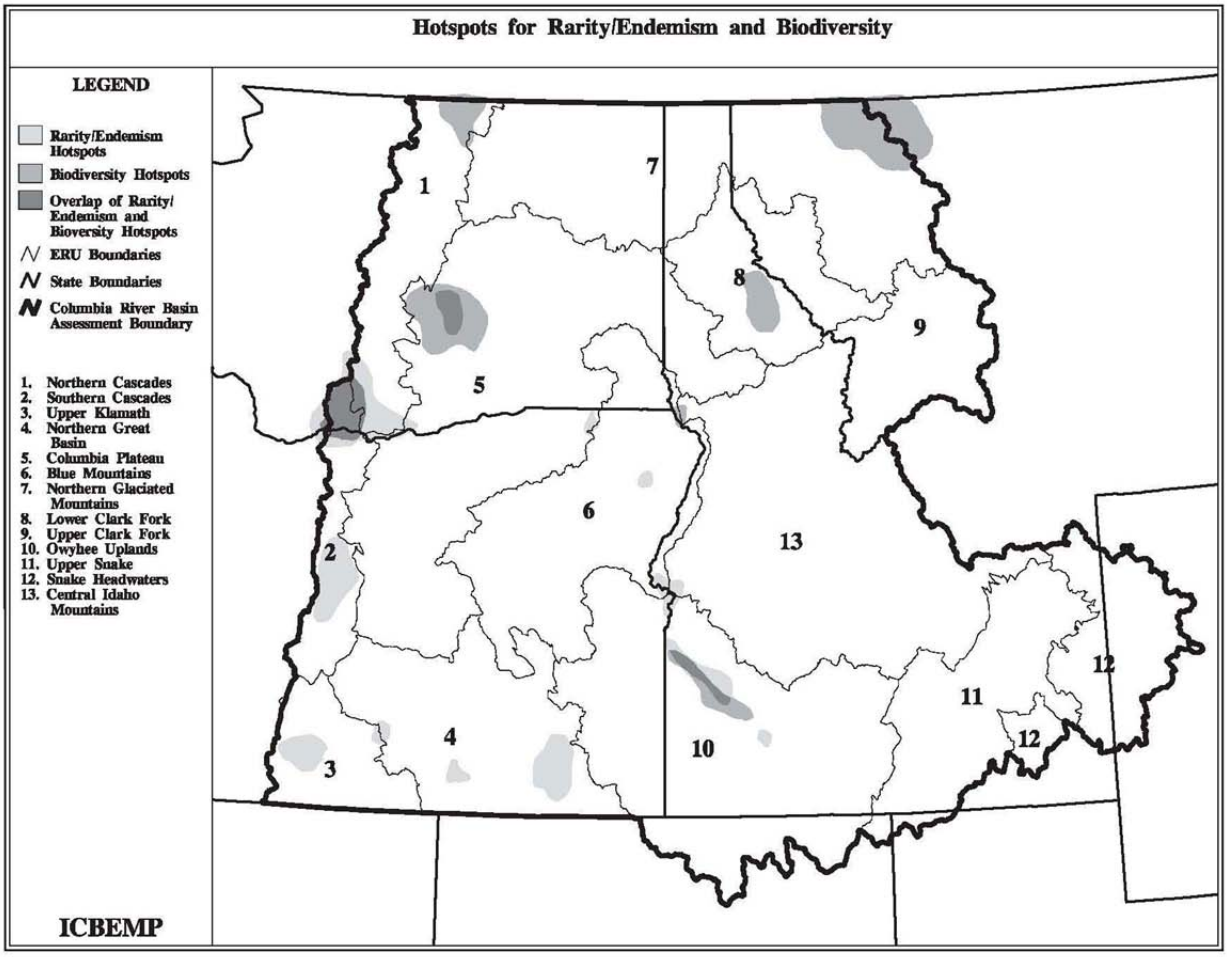
Figure 4-2. Snake River Upper Middle Subbasin 1999 Wildlife Habitat Types



Source: Northwest Habitat Institute (2011).

Despite the effects of human settlement on wildlife habitats, the Snake River in the vicinity of the Refuge was identified in 1996 as one of 12 hotspots of species rarity and endemism and one of seven hotspots of high species biodiversity, as shown in Figure 4-3 (Quigley et al. 1996). Endemic species are those that are found only in a given region or location. An understanding of the importance of the Snake River in providing habitat for rare and endemic species and the biodiversity currently present in Snake River habitats is integral to managing the Refuge to continue providing habitat for these rare and diverse species assemblages.

Figure 4-3. Hotspots for Rarity/Endemism and Biodiversity in the Columbia Interior Basin



Source: Quigley et al. (1996).

The BIDEH table prepared by Refuge staff, which explores key aspects and alterations to the biological integrity and diversity of the natural environment encompassed by the Refuge, is included in Appendix E. Several limiting factors have been identified that affect the integrity of habitats on the Lake Lowell and Snake River Islands Units. Limiting factors include altered riverine hydrology and a nonfunctioning floodplain, loss in perennial species diversity, grazing disturbance and resulting encroachment of invasive species, and altered fire regime.

4.1.1 Snake River Dams and Altered Hydrology

The Snake River system upstream and downstream of the Refuge has undergone major modifications since the early 1900s, due to the construction of dams. The Snake River Islands Unit is located along the longest free-flowing stretch of the Snake River, an approximately 51-mile section beginning at Swan Falls Dam upstream of the Refuge and continuing downstream to Brownlee Reservoir. The Swan Falls Dam was completed in 1918 and is the oldest dam on the Snake River (Dixon and Johnson 1999). The hydrologic flow record suggests an increase in annual minimum flows on this reach of the Snake River from 1914 until the 1950s, after which annual minimum flows decreased compared to historical flows. This decrease coincided with the completion of the Palisades Reservoir in eastern Idaho in 1957 (Dixon and Johnson 1999). Annual peak flows also appear to have declined

from the pre-dam to early post-dam period, with the four highest annual peak flows all occurring in the first 8 years of record (1914, 1917, 1919, and 1921) prior to the completion of the American Falls Reservoir in 1927 (Brennan et al. 1996).

Minimum flows in the mainstem Snake River, from C.J. Strike Dam to Brownlee Dam, have been identified for protecting aquatic, wildlife, and vegetation resources (Ecovista and IDFG 2004). These minimum flows are often not met during the irrigation season (Ecovista and IDFG 2004). In addition to concerns about low flows, episodic high flows are necessary to maintain riparian and wetland vegetation dependent on periodic flooding.

4.1.1.1 Vegetation Changes

The dams on the Snake River have resulted in decreased scouring and flood disturbance, decreasing the frequency and duration of inundation in the floodplain and decreasing soil moisture from the water's edge to the top of the bank profile (Dixon and Johnson 1999). Decreased peak flows reduce tree mortality due to scouring, and low minimum flows have likely increased plant recruitment in the channel. Plant recruitment may also be heightened at the mouths of reservoirs where sediments fall out and create deltas.

4.1.1.2 Waterfowl Habitat

Historically, large flocks of migrating and wintering waterfowl have used the Pacific Flyway as they have migrated from breeding grounds in Canada, Alaska, and the northern continental United States to wintering areas farther south. The Snake River islands and Great Basin wetland habitats have provided migratory connectivity along the Pacific Flyway as well as critical breeding and wintering areas for waterfowl. Prior to construction of dams on the Snake River, periodic flooding of the Snake River floodplain and lowland areas provided additional areas used seasonally by waterfowl for refuge and forage. Modifications to the river hydrology due to dams reduced the amount of seasonally flooded waterfowl habitat but, overall, human-induced changes to hydrology appear to have been beneficial for waterfowl. For example, the construction of dams and reservoirs, including Lake Lowell, has increased the amount of open-water habitat available for migrating and wintering waterfowl.

4.1.2 Influx of Invasive Species

Invasive species are a major issue on public lands throughout the United States. In the last 100 years, exotic plant species have expanded throughout native forests and rangelands, especially in areas that were once dry native grasslands and shrublands (Quigley et al. 1996). The spread of invasive species across the West can be attributed to changes in land use. Grazing and agriculture alter vegetation communities and create soil disturbance, thereby providing opportunities for invasive species to become established. When shrub-steppe habitats are intensively grazed, native perennial grasses are eliminated and the shrubs, such as big sagebrush, tend to form dense monotypic stands. By 1890, the native perennial grasses, for all practical purposes, were no longer present on southern Idaho range. Soil erosion became a critical problem on Idaho rangelands. Part, but not all, of the void was filled by ever-denser stands of big sagebrush. Continued grazing pressure and an increase in abandoned croplands, set the stage for the invasion of exotic annuals (Yensen 1982).

The Refuge as a whole has been colonized by a variety of noxious weeds and invasive plant species. Several of the more common invasive species on the Refuge, including cheatgrass, Canada thistle,

pepperweed, poison hemlock, and purple loosestrife are also common throughout the region. Invasive woody trees and shrubs on the Refuge include Russian olive, tamarisk, and false indigo bush. Refuge management activities such as fire control have inadvertently contributed to the spread of invasive herbaceous species. For many years, fire breaks have been maintained on the Refuge to prevent the spread of a fire both within the Refuge and from the Refuge onto private land, and fire breaks have been colonized by invasive species such as reed canarygrass, Canada thistle, purple loosestrife, and pepperweed (USFWS 2008).

4.1.3 Altered Fire Regime

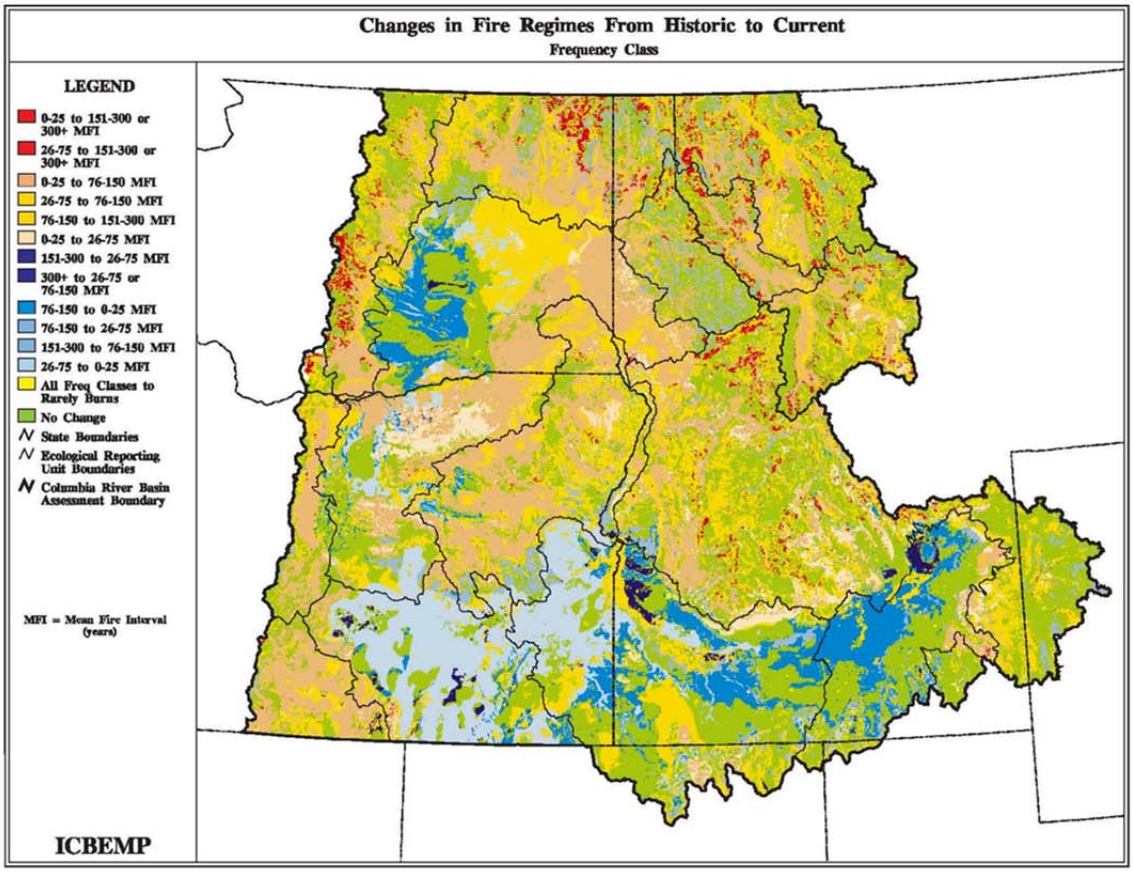
In prehistory and in the first half of the 1900s, fires were endemic to the Snake River Basin, burning sometimes in one basin and at other times in another, until the fall rains extinguished them. The result was a mosaic of early-seral and mid- to late-seral plant communities (Idaho Power 2003). Biological integrity was maintained historically by natural processes such as lightning strikes or by intentional burning by Native Americans. Periodic fire kept underbrush from accumulating, so that when fires did occur, they burned with lower intensity than fires now, due to large accumulations of fuels in the understory.

The fire regime throughout the Snake River Basin has been modified greatly from prehistoric conditions. As a result of diligent fire suppression activities throughout the Snake River Basin over the last 100 years, higher fuel loads have developed than would exist if wildfires of the prehistoric period and early 1800s had continued (Idaho Power 2003). On lands administered by the USFS and BLM in the interior Columbia Basin, fire severity has generally increased, with lethal fires involving firefighter fatalities increasing by approximately 17 percent.

In the Great Basin, which adjoins the Snake River Basin to the south, expansion of cheatgrass into disturbed rangelands has resulted in an increase in the frequency and extent of wildfires (Pellant et al. 2004). The increased frequency of wildfires in cheatgrass dominated rangelands is attributed to the early maturation of cheatgrass compared to native species which provides easily ignited fuels that promote a rapid rate of spreading fire.

The primary cause of fire regime changes throughout the West are fire prevention and suppression strategies, selection and regeneration cutting, domestic livestock grazing, and the introduction of exotic plants (Quigley et al. 1996). Fire suppression has resulted in a decrease in the abundance of early-seral communities and an increase in mid-seral communities (Quigley et al. 1996). In addition, the decline in fire frequency has resulted in an expansion of western juniper woodlands during the last 100 years (Quigley et al. 1996). The change in fire regime from the historical period to the current period is shown in Figure 4-4. Fire frequency is categorized in 25-year frequency classes.

Figure 4-4. Changes in Fire Regimes in the Columbia Interior Basin



Source: Quigley et al. (1996).

4.2 Selection of Priority Resources of Concern

4.2.1 Analysis of Priority Resources of Concerns

Wildlife and habitat goals and objectives were designed directly around the habitat requirements of species designated as *priority resources of concern*. (Resources of concern are called conservation targets or focal species in conservation planning methodologies used by other agencies and organizations.) As defined in the Service's Policy on Habitat Management Plans (620 FW 1), resources of concern are:

> all plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, state, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect "migrating waterfowl and shorebirds." Federal or State threatened and endangered

> species on that same refuge are also a resource of concern under terms of the respective endangered species acts. (620 FW 1.4G)
>
> Habitats or plant communities are resources of concern when they are specifically identified in refuge purposes, when they support species or species groups identified in refuge purposes, when they support NWRS resources of concern, and/or when they are important in the maintenance or restoration of biological integrity, diversity, and environmental health.

Therefore, resources of concern for a refuge may be a species or species group, or the habitat/plant community that supports a priority species or species group. In the CCP process, the Service reviewed the Refuge's establishment history (Section 1.7.2 and Appendix I) and a variety of plans (Section 1.8) to compile an initial list of these resources. This initial list, known as the list of comprehensive resources of concern, is available in Appendix E.

This list was then pared down to develop a more targeted assemblage, which comprises the priority resources of concern. In developing its list of priority resources of concern, the planning team selected not only species mentioned in establishing documents for the Refuge, but also species that captured the ecological attributes of habitats required by larger suites of species.

The priority resources of concern are listed in Table 4-1 and consist of nine focal species that were selected as representatives or indicators for the overall condition of important Refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources. Several different conservation focal species may be identified for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species using the habitat will generally be expected to benefit as a result of management for the focal species.

The main criteria for selecting priority resources of concern included the following requirements:

- The resource must be reflective of the Refuge's establishing purposes and the Refuge System mission;
- The resource must include the main natural habitat types found at the Refuge;
- The resource must be recommended as a conservation priority in the wildlife and habitat management review; and/or
- The resource must be federally or state-listed as a candidate for listing, or a species of concern.

Other criteria that were considered in the selection of the resources of concern included the following:

- Species groups and/or Refuge features of special management concern;
- Species contributing to the BIDEH of the ecosystem; and
- Species where it is feasible to estimate population size (needed for future monitoring and adaptive management).

In developing objectives, the team followed the process outlined in the Service's draft *Identifying Resources of Concern and Management Priorities for a Refuge: A Handbook* (USFWS 2009b). This

process designs objectives around the needs of priority resources of concern, and sets habitat attributes around the habitat structure, composition, and connectivity required by priority resources.

Table 4-1. Priority Resources of Concern at the Refuge

Priority Resources	Focal Species	Other Benefitting Species
Riparian Forests: Lake Lowell and River Islands	Yellow warbler	Bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, mule deer, red fox
	Song sparrow	White-crowned sparrow, California quail, western tanager, calliope hummingbird, black-throated sparrow, gray flycatcher, vesper sparrow, savannah sparrow, common yellowthroat, western terrestrial garter snake
Marsh wetlands	Mallard	Wood duck, great blue heron, American wigeon, black-crowned night heron, marsh wren, red-winged blackbird, yellow-headed blackbird, western meadowlark, mourning dove, barn owl, pied-billed grebe, sora, American kestrel, painted turtle
Emergent vegetation: Lake Lowell	Western grebe	Pied-billed grebe, Clark's grebe, eared grebe, canvasback, American coot
	Canada goose	Tundra swan, double-crested cormorant, Caspian tern, black tern, Bonaparte's gull, glaucous gull, Franklin's gull, Sabine's gull
	Mallard	Blue-winged teal, canvasback, ruddy duck, American wigeon, gadwall, green-winged teal, northern shoveler, redhead, common merganser, northern pintail, northern leopard frog
Shoreline mudflats: Lake Lowell	Long-billed dowitcher	American avocet, Virginia rail, sora, Baird's sandpiper, American bittern, great blue heron, killdeer, common snipe, greater yellowlegs, lesser yellowlegs, willet, least bittern, western sandpiper, semi-palmated plover, black-bellied plover, cattle egret, white-faced ibis, great egret, solitary sandpiper, Wilson's phalarope
Open water: Lake Lowell	American white pelican	Osprey, bald eagle, common loon, Clark's grebe, common merganser, double-crested cormorant, Canada goose, mallard, California gull, Caspian tern, ring-billed gull, black tern, common tern, tundra swan
	Western grebe	
Shrub-steppe: Lake Lowell and River Islands	Sage thrasher	Swainson's hawk, northern harrier, ferruginous hawk, prairie falcon, long-billed curlew, killdeer, gray flycatcher, western meadowlark, sage sparrow, brewer's sparrow, green-tailed towhee, rock wren, vesper sparrow, horned lark, grasshopper sparrow, black-tailed jackrabbit, badger, yellow-bellied marmot, mountain cottontail
	Loggerhead shrike	
	Canada goose	Black rosy-finch, gray rosy-finch, green-tailed towhee, yellow-breasted chat, rock wren, canyon wren, vesper sparrow, cliff swallow, chukar, red-tailed hawk, golden eagle, bank swallow, white-throated swift, raccoon, mink
	Mallard	
Agricultural	Canada goose	Greater white-fronted goose, Ross's goose, common goldeneye, great blue heron, American wigeon, barn owl, short-eared owl, Swainson's hawk, red-tailed hawk, coyote, montane vole, mule deer, red fox, mountain cottontail
	Mallard	

The comprehensive list of resources of concern in Appendix E includes species and species groups found on the Refuge, whether they nest on the Refuge, their Federal and State listing status, and whether species are covered by management plans prepared by Federal, State, or conservation organizations.

4.3 Habitat Types

Habitat types on the Snake River Islands Unit of the Refuge consist of riparian forest, shrub-steppe, and seasonally flooded gravel bars. The Lake Lowell Unit contains emergent wetlands, shoreline mudflats, open water, riparian forest, shrub-steppe, and agricultural croplands and pastures. Acreages for each habitat type on the Refuge are summarized in Table 4-2. Map 12 shows habitats at the Lake Lowell Unit, and Map 13 shows habitats at the Snake River Islands Unit. Habitat mapping was produced using heads up digitizing techniques on National Agriculture Imagery Program (NAIP) orthophotos that were taken on July 21, 2009. Seasonal flooding, rounding of numbers, and digitizing limitations can produce discrepancies in these estimated acreages. These numbers are considered "geographic information system (GIS) acreages" and are provided here for general reference. These acreages have not been formally surveyed.

Table 4-2. Acreages of Habitat Types at the Refuge

Habitat Types	Acres on Snake River Islands Unit	Acres on Lake Lowell Unit
Emergent wetlands (lacustrine)	0	850
Emergent wetlands (palustrine)	0	85
Shoreline mudflats	0	90
Open water	0	6,430
Riparian forest	630	1,910
Shrub-steppe	550	830
Agricultural crops and pastures	0	260
Seasonally flooded gravel bars	25	0

4.3.1 Emergent Wetlands

4.3.1.1 Overview

Emergent wetlands on the Refuge are found in lacustrine, palustrine, and riverine systems. Emergent wetlands are defined in the Cowardin classification system (Cowardin et al. 1979) as being characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Vegetation is present for most of the growing season in most years and can be either persistent or nonpersistent. Persistent emergent wetlands are dominated by species that normally remain standing at least until the beginning of the next growing season. In contrast, nonpersistent wetlands are dominated by plants that fall to the surface of the substrate or below the surface of the water at the end of the growing season, so that during certain seasons of the year there is no obvious sign of emergent vegetation. Extensive lacustrine emergent wetlands occur along the southern shoreline of Lake Lowell and varied expanses exist on the northern, western, and eastern shorelines. There are approximately 850 acres of lacustrine emergent wetlands surrounding the lake when the water level is low. There are approximately 85 acres of palustrine emergent wetlands adjacent to Lake Lowell. These emergent wetlands include Upper Dam Marsh (25 acres), Rambo Pond (3 acres), and Leavitt (57 acres). Riverine emergent wetlands occur on the lower elevations of the islands in the Snake River.

Hydrology sources for emergent wetlands on the Refuge include Lake Lowell, natural springs, and surface water runoff. Most of the Refuge wetlands are seasonal or semipermanent and are variably flooded with cycles of seasonal inundation and drying each year. Seasonal inundation occurs in some wetlands from October through April, whereas semipermanent inundation occurs from October

through August in other areas. The largest emergent wetland on the Refuge (Upper Dam Marsh) is inundated year-round.

A diverse assemblage of hydrophytic vegetation is present in the Refuge's emergent wetland communities. Emergent wetlands in the no-wake zone on the east end of Lake Lowell and on the south side of the lake are dominated by smartweed, which provides habitat for nesting grebes and foraging habitat for pelicans and cormorants. Emergent wetland communities also include sedges, rushes, reeds, mannagrass, rough bentgrass, stinging nettle, common cattail, water plantain, milkweed, yellowcress, and goldenrod. Some scrub-shrub cover may also occur in emergent wetlands, and shrub species include smooth sumac, Woods' rose, and peachleaf willow.

4.3.1.2 Regional Distribution, Conditions, and Trends

In Idaho, an estimated 386,000 acres of wetland habitat (56 percent) were lost from 1780 to 1980 (Dahl 1990). This statistic includes multiple habitat types (emergent, scrub-shrub, forested, aquatic bed). Emergent wetlands constitute 17 percent of the wetland habitats along the middle and western Snake River (Jankovsky-Jones 2001). The long-term trends in distribution of freshwater wetlands show that freshwater emergent wetlands have declined by the greatest percentage of all wetland types, with nearly 24 percent lost since the 1950s (Dahl 2000). This is due in large part to Euro-American settlement, which typically started along river channels and expanded outward. Wetlands were regarded as having little economic value, and government programs that encouraged the development of wetlands were enacted. Historically, most wetland losses were due to drainage, land clearing, and conversion to cropland. As populations continue to increase and economies switch from agricultural-based to service-based, losses due to development, including road construction, home building, and flood control, are likely to exceed losses to agriculture (Jankovsky-Jones 2001).

Many of the wetlands that remain today have been degraded due to hydrologic alteration, agricultural activities, and urbanization, which have reduced wetland functions. Human activities, including livestock grazing, ground disturbance, and recreational activities, may introduce exotic plant species, create suitable conditions for the increase of less-desirable native species, eliminate woody tree and shrub cover, and compact wetland soils (Jankovsky-Jones 2001).

Along the middle and western Snake River and the lower reaches of its major tributaries from Milner Dam to the confluence with the Payette River, approximately 34 percent of the wetland and deepwater habitat is within areas with special management such as wildlife management areas or national wildlife refuges (Jankovsky-Jones 2001). Palustrine emergent wetlands constitute only 12 percent of all wetland communities in the wetland habitat in the Middle Snake River hydrologic unit code. Most of these wetlands have been affected by past land use activities, and the Jankovsky-Jones report describing the wetland conservation strategy for the Middle and Western Snake River concluded that maintaining existing wetland functions should be a high priority throughout the survey area (2001).

According to the Refuge's BIDEH analysis, invasive species documented as occurring in riverine and palustrine emergent wetland habitats on the Refuge include purple loosestrife, poison hemlock, white bryony, Russian olive, and tamarisk. Invasive species are discussed further in Section 4.6.

4.3.1.3 Key Species Supported

Emergent wetlands provide nesting, foraging, and loafing habitat for dozens of species of waterfowl, shorebirds, and aquatic migratory birds. Focal species on the Refuge dependent upon emergent wetland habitat include western grebe, Canada goose, and mallard. Other species using emergent wetland habitat on the Refuge include cinnamon teal, northern pintail, lesser scaup, white pelican, tundra swan, red-necked phalarope, American bittern, long-billed curlew, violet-green swallow, marsh wren, and snowy egret. Emergent wetlands also provide habitat for a diverse assemblage of wetland-dependent wildlife (e.g., amphibians, such as the northern leopard frog) as well as important rearing habitat for fish.

Emergent wetland plants are a valuable food source for migrating waterfowl during fall and spring. The smartweed emergent community, in the no-wake zone on the east end and on the south side of the lake, provides habitat for nesting grebes and foraging habitat for pelicans and cormorants. Western and Clark's grebes have nested in emergent vegetation in years when water levels remained high enough to provide nesting conditions. Grebes have at least two nesting colonies on Lake Lowell and raise young on the lake.

4.3.1.4 Refuge Management Activities

The hydrology of existing lacustrine emergent plant beds surrounding Lake Lowell is controlled by water-level management that is under the jurisdiction of Reclamation and managed by the Board of Control. The acreages and extent of emergent plant beds vary seasonally and annually based upon the volume of water withdrawn from the reservoir for irrigation use. Reclamation and the Board of Control manage lake levels solely for irrigation and not for wildlife habitat, so there is no minimum pool level. However, the water levels in the lake have been sufficient to provide habitat for wildlife, including nesting and migrating waterbirds, for the majority of its history.

The hydrology of the palustrine emergent wetland marshes at Upper Dam Marsh, the Leavitt Tract, and Rambo Pond is artificial and is provided by a variety of human activities. Prior to 1991, the Upper Dam Marsh was supported by water seeping from the Upper Dam before a dam safety project conducted by Reclamation altered the hydrology. Currently, wetland hydrology is provided by Reclamation during the irrigation season, April through early October. The marsh was completely dry in the winter of 2007-2008, and Reclamation is currently evaluating options to provide year-round hydrology to the Upper Dam Marsh. Hydrology for the marsh at Leavitt Tract is provided by irrigation runoff and irrigation return, which occur during the irrigation season from April to early October. The marsh can also receive backwater hydrology from Lake Lowell; however, lake levels need to be high for this to occur. Rambo Pond was created in 2005 by installing a water-control structure and diverting water pumped from the adjacent gravel pit. Pumping from the gravel pit needs to be continuous to maintain hydrology to the wetland. It is unknown how long the gravel pit will remain in operation, and at some point this source of hydrology for Rambo Pond may not be available. It may be possible for backwater to reach the marsh when Lake Lowell is at full pool.

Management activities consist primarily of invasive vegetation species control. Over the past several years, biological controls have been used to control purple loosestrife, which has substantially reduced the infestation.

4.3.2 Shoreline Mudflats: Lake Lowell

4.3.2.1 Overview

Mudflats are exposed along the shoreline of Lake Lowell in low-water years when the water level drops below the emergent wetland zone. Water levels in the lake decline as irrigation demands increase through the growing season, with the lake reaching a low point in late August (see Figure 3-4). Acreage of mudflats varies annually depending upon the volume of water withdrawn from the reservoir. Hydrology of mudflats ranges from soils that are saturated at the surface to dry soils.

4.3.2.2 Regional Distribution, Conditions, and Trends

Lacustrine and palustrine aquatic bed habitats, which include shoreline mudflat habitats, constitute only 2.6 percent of all wetland communities in the wetland habitat in the Middle Snake River hydrologic unit code (Jankovsky-Jones 2001). During high-water years on the Refuge, minimal mudflat habitat is available for shorebirds during fall migration. The drawdown zones of the Snake River reservoirs evaluated in the Jankovsky-Jones study frequently supported nonnative plant species such as lesser burdock, marshpepper knotweed, curlytop knotweed, and annual rabbitsfoot grass. On the Refuge, the main invasive species occurring on the shoreline mudflats of Lake Lowell is purple loosestrife.

4.3.2.3 Key Species Supported

Shoreline mudflat habitats with a gradual shoreline dropoff and water conditions conducive to large invertebrate populations attract moderate to substantial numbers of shorebirds. Lake Lowell is a notable example of a reservoir important for fall migrants (Oring et al. 2000). In the latter part of the summer, as the lake is drawn down for irrigation, shorebirds, including least sandpipers, godwits, yellowlegs, and plovers, come to feed on the exposed mudflats. A focal species on the Refuge that is dependent upon shoreline mudflat habitat is the long-billed dowitcher. Mudflats support macroinvertebrates (e.g., chironomids) that provide forage for migratory birds. These exposed mudflats attract large numbers of shorebirds and resident flocks of ducks and Canada geese.

4.3.2.4 Refuge Management Activities

Management activities are similar to those conducted in emergent wetlands and consist primarily of purple loosestrife control.

4.3.3 Open Water: Lake Lowell

4.3.3.1 Overview

Open-water habitat at Lake Lowell is in the lacustrine wetland system. Water depth generally ranges from 2 to 40 feet. Acreage of open-water habitat at Lake Lowell is approximately 6,430 acres at full pool, the vast majority of all Refuge acres. This habitat type does not have vegetation extending above the water surface; however, it does include submergent plant beds (e.g., pondweeds), which occur in shallow water areas where light penetration supports the growth of these species.

4.3.3.2 Regional Distribution, Conditions, and Trends

The construction of dams and reservoirs along the Snake River has resulted in type changes of wetlands along the Snake River. Type changes occur when a wetland is converted from one vegetation type to another. Water development projects have increased water levels at reservoirs, in turn causing riverine and spring-fed wetlands to be replaced with open-water habitat (Jankovsky-Jones 2001). The national trend among all types of wetlands indicates that the open-water category has gained the most area since the 1950s. In 1997, there were 5.5 million acres of open water across the United States, which is more than twice the area of open water reported in the mid-1950s (Dahl 2000). Of the wetland and deepwater habitat within special management areas along the Middle and Western Snake River, the majority (65 percent) is deepwater habitat within lacustrine systems. Much of this is artificially created deepwater habitat, created by impoundments including Lake Lowell and the C.J. Strike Reservoir (Jankovsky-Jones 2001).

Water development projects on the Snake River have resulted in deeper water levels, and many riverine and spring-fed wetlands have been replaced with open-water habitat. In addition to increases in open-water habitat due to water development projects, open-water habitat has likely increased in the vicinity of Boise due to the numerous former gravel pits that are filled with water (Jankovsky-Jones 2001).

4.3.3.3 Key Species Supported

Open-water habitat at Lake Lowell provides loafing and foraging habitat for migratory birds (e.g., gulls, grebes, pelicans) during the spring and summer and provides loafing and foraging habitat for ducks and geese during the fall through spring, depending upon the extent of freeze-up. Focal species on the Refuge that depend upon open-water habitat include American white pelican and western grebe. As colder weather drives migrating ducks and geese south, some birds stop over temporarily and others remain for the winter. By mid-November, the goose population peaks at about 12,000. Duck populations peak in mid-December, with up to 120,000 on Lake Lowell (USFWS 2008). Their activity keeps patches of water open, delaying ice formation.

Aside from the abundance of invasive carp, game fish in Lake Lowell include largemouth bass, smallmouth bass, yellow perch, black crappie, bluegill, rainbow trout, Lahontan cutthroat trout, channel catfish, and brown bullhead.

4.3.3.4 Refuge Management Activities

A no-wake zone for boating on Lake Lowell was instituted at the east end of the lake in 1990 to reduce disturbance to nesting bald eagles. The no-wake zone also minimizes disturbance to breeding, migrating, and wintering waterfowl and waterbirds.

Carp removal has occurred intermittently for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell. Through a special use permit (SUP) from the Refuge, a commercial fisherman uses a beach seine to harvest carp and suckers. Seining is usually conducted during the fall and winter because the fish slow down and congregate in the cooler water, making them easier to catch. Current seining operations, which remove an estimated 50 to 125 tons of biomass annually (Cunningham 2012), likely do not remove enough carp (estimated at 4,800 tons of biomass) to result in significant water quality improvements or promote submergent plant growth. However, there have

been no studies that have determined the appropriate threshold of biomass removal to achieve habitat improvements.

4.3.4 Riparian Forests: Lake Lowell and Snake River Islands

4.3.4.1 Overview

Construction of Lake Lowell resulted in hydrologic conditions that allowed the establishment of riparian/wetland forested habitat around the edges of the lake; such a habitat would not have been supported by site conditions present in this location prior to construction of the reservoir. The Refuge contains approximately 1,910 acres of riparian forest on the Lake Lowell Unit. Riparian forest is also present in a band around the perimeter of most islands on the Snake River Islands Unit.

The riparian forests on the Refuge are dominated by invasive and nonnative plants with little representation of species native to riparian habitats in the region (e.g., willows). Upper canopy is characterized by cottonwood with an understory dominated by Russian olive, false indigo bush, and some tamarisk, with a small native component of willows (e.g., coyote willow, peachleaf willow), wild rose, golden currant, elderberry, and skunkbush sumac. The herbaceous layer is dominated by invasive species such as reed canarygrass, Canada thistle, perennial pepperweed, and purple loosestrife.

The Refuge islands have a relatively higher quality riparian forest than that surrounding Lake Lowell, as indicated by fewer invasive species issues. Island riparian habitats are characterized by an overstory of native willows (e.g., coyote willow, peachleaf willow) and an understory of native shrubs (e.g., golden currant, skunkbush sumac). Some islands (Feral and Gosling) have cottonwood gallery forests with rookeries inhabited by colonial waterbirds (e.g., egrets, great blue herons, double-crested cormorants).

4.3.4.2 Regional Distribution, Conditions, and Trends

The operation of dams has a significant impact on riparian habitats in Idaho (Jankovsky-Jones 2001). Below Swan Falls Dam, located upstream of the Refuge, the area of riparian woodlands on the Snake River has quadrupled since 1939 (Jankovsky-Jones 2001). Several factors may be responsible for the increase in riparian habitats from historical conditions. Decreased peak flows reduce tree mortality by altering historical hydrology patterns and eliminating scouring, a historical cause of tree mortality. Riparian plant recruitment is also facilitated by reduced minimum flows, which cause river margins to become exposed for longer periods during the growing season, allowing for riparian vegetation to become established on previously unvegetated surfaces in the channel. Over time, due to natural succession, these alterations in riverine hydrology have led to an expansion of the area of mature woodland (Dixon and Johnson 1999).

Despite the increase in riparian habitat from historical conditions, the abundance of riparian habitat is limited on the middle and western reaches of the Snake River. Riparian habitat is generally characterized as a narrow band of vegetation along the river channel and on islands due to steep canyons and rocky shores with minimal soil development, which limit the area available for colonization by riparian species (Jankovsky-Jones 2001). Impacts to the riparian corridor of the Snake River due to urbanization are mostly limited to lower reaches where valleys are wider. Human activities, including livestock grazing, ground disturbance, and recreational activities, introduce exotic plant species, create suitable conditions for the increase of less desirable native species,

eliminate woody tree and shrub cover, and compact soils. Several invasive weeds are well established in riparian areas throughout the middle and western reaches of the Snake River, including musk thistle, Canada thistle, poison hemlock, common teasel, kochia, perennial pepperweed, broadleaved pepperweed, purple loosestrife, and Scotch thistle (Jankovsky-Jones 2001).

4.3.4.3 Key Species Supported

Riparian habitats constitute less than 1 percent of western landscapes but harbor the most species-rich avifaunas found in arid and semiarid portions of the western United States (Knopf et al. 1988). In Idaho, of the 242 naturally occurring bird species, 112 (46 percent) use riparian habitat as their primary nesting habitat. Many of the other 54 percent also use riparian habitat as a source of water, as migratory corridors, or for other purposes (Idaho Partners in Flight 1998).

Riparian forest benefits migratory birds (e.g., focal species such as yellow warbler and song sparrow) and a diverse assemblage of other riparian-dependent species by providing nesting, foraging, and migrating habitat for bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, a variety of songbirds, mule deer, red fox, and western terrestrial garter snake. Downed and standing dead trees provide nesting and foraging habitat for both resident and migratory birds (e.g., Lewis's woodpecker, wood duck). Riparian habitat also provides cover from predators for a variety of tree-dependent species. Riparian habitat on the Snake River Islands Unit supports Canada geese and ducks (mallards and teal), which nest in riparian shrubs along the interface of the riparian border and shrub-steppe habitat. Studies during the mid-1990s (Zoellick et al. 2004a) indicated that smaller islands that are isolated from the mainland had lower predation rates of waterfowl nests than larger islands, where isolation was a function of channel width, water depth, and water flow. The riparian habitat on Refuge islands provides habitat for nesting landbirds (e.g., yellow warblers, song sparrows, black-headed grosbeaks, willow flycatchers) and other riparian-dependent species. Nests on the Snake River islands are most frequently depredated by raccoons, coyotes, badgers, and mink (Zoellick et al. 2004a). Cowbird parasitism was also identified as a factor affecting nesting success of landbirds on islands (USFWS 2008).

4.3.4.4 Refuge Management Activities

The Refuge manages riparian forests for migratory landbirds and other riparian-dependent species including mammals and herptiles. For many years, fire breaks have been maintained along the boundary of the Lake Lowell Unit and extending into the riparian forest. These fire breaks were established to prevent the spread of a fire both within the Refuge and from the Refuge onto private land; they have had the unintended consequence of facilitating establishment of invasive species in these areas. Additionally, some mechanical removal of Russian olive has been undertaken to reduce ladder fuels that could lead to a running crown fire that would destroy the riparian habitat. These practices have fragmented the riparian forest, and some of the Russian olive removal has resulted in loss of subcanopy for forest landbirds.

The Refuge staff works closely with Canyon County Noxious Weed Control to address noxious weeds on the Refuge. Mechanical removal, application of herbicides, and biological controls are used to control invasive plants at the Lake Lowell Unit with varying degrees of success. Because of the logistical difficulties, limited control efforts have been conducted on the Snake River islands. When manual or chemical weed control has occurred, it has often resulted in the colonization of a different weedy species occurring where the initial weedy species was removed.

4.3.5 Shrub-steppe: Lake Lowell and Snake River Islands

4.3.5.1 Overview

The Refuge contains approximately 830 acres of shrub-steppe habitat on the Lake Lowell Unit (USFWS 2008). The existing upland shrub habitat at the Lake Lowell Unit is relatively isolated as a result of agricultural and urban development surrounding the Refuge. An extensive infestation of cheatgrass is present in the understory of the shrub-steppe habitat around the lake, which has led to an increased frequency and size of wildland fires around the lake compared to historical levels (USFWS 2008). This trend is consistent with the trend observed in cheatgrass dominated rangelands in the Great Basin (Pellant et al. 2004). The overstory canopy cover of sagebrush in this community is variable depending upon the fire history. Habitat is characteristic of Great Basin shrub-steppe habitat, and shrub species typically include sagebrush, bitterbrush, fourwing saltbush, gray/green rabbitbrush, greasewood, spiny horsebrush, and spiny hopsage.

The Snake River Islands Unit contains approximately 550 acres of shrub-steppe habitat (USFWS 2008). The upstream-most islands are predominantly shrub-steppe with little riparian forest. In contrast, downriver islands are bordered with a riparian band with interior uplands characterized by shrub-steppe habitat. Island shrub-steppe habitat is characterized by native bunchgrasses (Great Basin wildrye, beardless wildrye, saltgrass) interspersed with sagebrush and greasewood. As is the case with riparian forest, the Refuge islands have a relatively higher quality shrub-steppe, as indicated by fewer invasive species, than the surrounding mainland. Invasive species on Refuge islands include cheatgrass, Scotch thistle, teasel, Russian olive, and tamarisk.

4.3.5.2 Regional Distribution, Conditions, and Trends

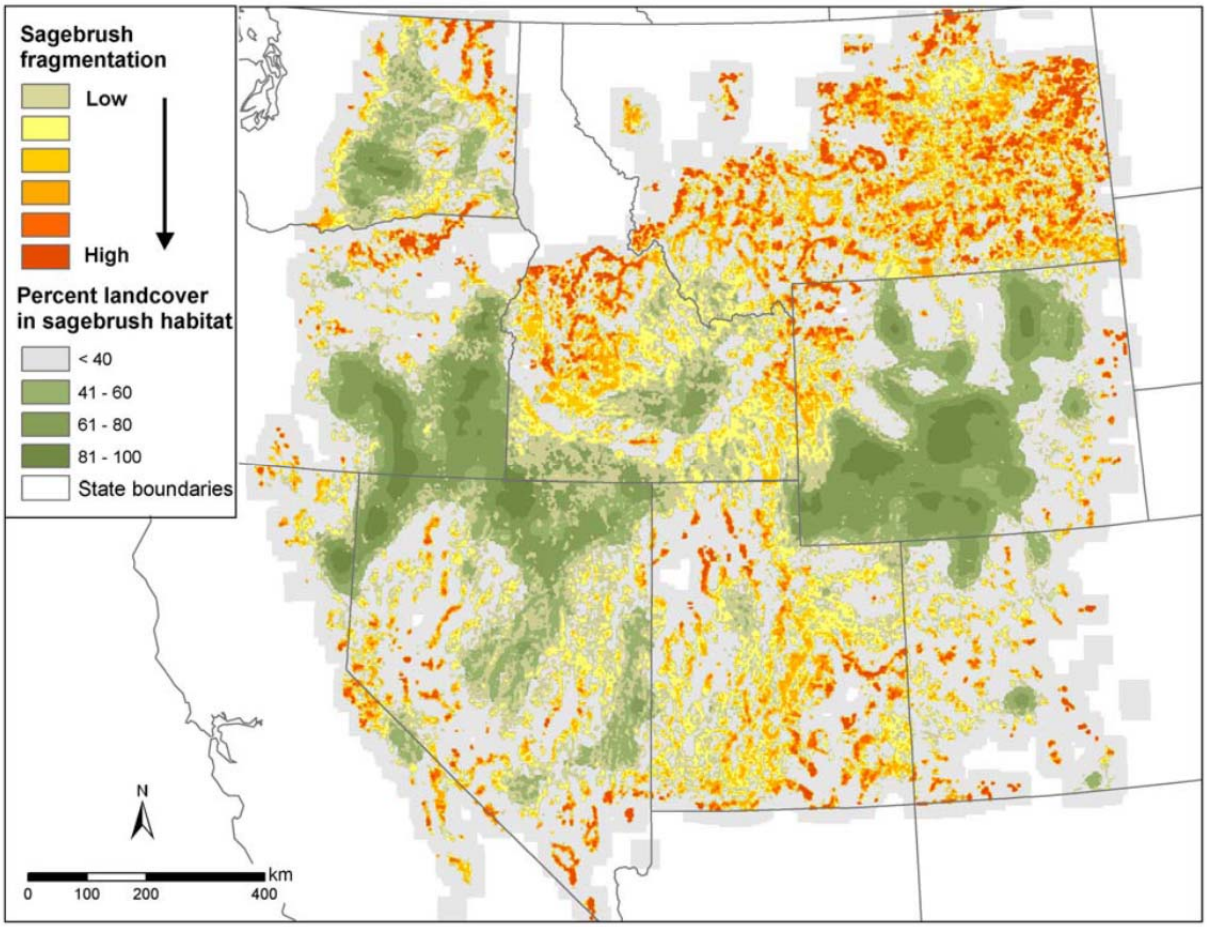
Shrub-steppe habitat once covered approximately 156,000,000 acres of the western United States; however, very little now exists undisturbed or unaltered from its condition prior to Euro-American settlement (Knick et al. 2003). Shrub-steppe habitat has been lost or degraded as a result of a number of factors including agricultural conversion, overgrazing by livestock, invasive species (e.g., cheatgrass), expansion of pinyon and juniper woodlands, uncharacteristic wildfires, and fragmentation (Rich et al. 2005). This habitat loss has led to an increasing number of special-status species, including 630 plant and animal species of conservation concern (Rich et al. 2005). As shown in Figure 4-5, conversion of the Snake River Plain to agriculture has disconnected regions north of the Snake River from sagebrush habitat in southern Idaho and northern Nevada.

Virtually all sagebrush lands are managed principally for livestock grazing (Knick et al. 2003). In 2010, over 15,000 permits were issued for more than 8.7 million animal unit months of forage consumption on lands managed by the BLM (BLM 2010). Livestock grazing can change the habitat features that directly influence its suitability as habitat for birds by reducing plant species diversity and biomass.

Euro-American settlement changed the composition of many native plant communities in the Great Basin, most notably that of shrub-steppe habitat. Introduction of livestock in the late 1800s resulted in the loss of herbaceous understory species, and these areas were quickly colonized by cheatgrass. A significant impact of cheatgrass on shrub-steppe habitats is its role in increasing the frequency and extent of wildfires in the Great Basin (Hull and Pechanec 1947). In the Great Basin, wildfires and associated invasive plant species have caused ecological degradation on a large scale. Extensive wildfires in the summer of 1999 burned nearly 1,700,000 acres of public land. This record fire year

was followed by another large fire year in 2000, with approximately 990,000 acres of public land burned (Pellant et al. 2004). The complex interaction of cheatgrass, wildfires, and invasive weeds is the greatest concern of the Great Basin's largest land manager, the BLM (Pellant et al. 2004).

Figure 4-5. Sagebrush Fragmentation in the Western United States



Source: Knick et al. (2003).

4.3.5.3 Key Species Supported

Shrubland and grassland bird populations are declining faster than any other group of species in North America (Dobkin 1994; Knopf 1994; Saab and Rich 1997; Vickery and Herkert 1999). These species represent an important component of the biodiversity of the western United States but have seen little conservation action until recently. Now, Brewer's sparrow, sage sparrow, and sage thrasher, the three primary passerine species of sagebrush habitats, receive special conservation status in one or more western states (Knick and Rotenberry 2002).

Focal species on the Refuge that depend upon shrub-steppe habitat include sage thrasher and loggerhead shrike on shrub-steppe habitat adjacent to Lake Lowell and Canada goose and mallard on shrub-steppe habitat on the Snake River Islands Unit. Other species dependent upon shrub-steppe habitat include a variety of raptors, sparrows, horned lark, and western meadowlark.

4.3.5.4 Refuge Management Activities

Control of invasive species and restoration of native bunchgrass and forb communities under a sagebrush-shrub canopy is a priority management activity at the Refuge. Chemical control of cheatgrass followed by reseeding of a mix of native shrubs and grasses has been successful on the Refuge. After recent fires, rehabilitation work has included chemical control and reseeding with native species. Although cheatgrass reinvades after several years, this approach has resulted in the establishment of a population of native shrubs and grasses in areas previously dominated by cheatgrass. There is a biological control agent for cheatgrass (the soil fungus *Pyrenophora semeniperda*) that may be considered for future management of cheatgrass in shrub-steppe habitat, should it be approved for use.

4.3.6 Agricultural Pastures and Croplands

4.3.6.1 Overview

For nearly 70 years, Refuge staff and cooperative farmers have planted agricultural crops to provide forage for migratory waterfowl and resident wildlife. On the Refuge, a rotation of five crops has been grown in recent times including corn, beans, peas, wheat (winter and spring), and alfalfa. At one time, approximately 400 acres were farmed on the Refuge. In 2011, two cooperators farmed approximately 260 acres, which comprised approximately 65 acres in alfalfa, 65 acres in corn, 40 acres in beans, and 90 acres in wheat.

4.3.6.2 Regional Distribution, Conditions, and Trends

The transformation of parts of the Snake River Plain from sagebrush desert to agricultural lands began in the mid-1800s and was made possible through irrigation (Dixon and Johnson 1999). As indicated in Figure 4-1, approximately 15 percent, or 1,298,189 acres, of the Middle Snake River Subbasin is used for agricultural purposes (Ecovista and IDFG 2004). Agriculture use in the subbasin is concentrated in areas of flat terrain adjacent to the Snake River, with irrigation water coming from the Snake River or its tributaries.

Substantial changes in agricultural practices in recent years have been noted on lands surrounding the Refuge. These changes include growing higher-valued specialty crops such as seed alfalfa, onions, and mint; using more efficient harvesting equipment so little waste grain remains in the field; and fall plowing and tilling often by mid-November, which is prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue in the future, on-refuge cropland management will be essential for waterfowl management in future years.

4.3.6.3 Key Species Supported

The key species supported at the Refuge by agricultural pastures and croplands are migratory birds (e.g., focal species such as Canada geese and mallard) and other resident wildlife (e.g., deer, pheasant, and quail).

4.3.6.4 Refuge Management Activities

Special conditions related to agricultural crop management include restrictions on pesticide use, limits to the types of crops grown, preventing alfalfa harvesting from May 1 through June 15 to reduce the risk of destroying nests of ground-nesting birds, and a requirement to have 6 inches of green browse by October 1.

4.4 Major Species Groups

4.4.1 Fish

Game fish in Lake Lowell include largemouth bass, smallmouth bass, yellow perch, black crappie, bluegill, rainbow trout, Lahontan cutthroat trout, channel catfish, and brown bullhead. The IDFG conducts fisheries management activities such as regulating harvest, fish population monitoring, and fish stocking at Lake Lowell. Lake Lowell is managed under general regulations, except for largemouth bass, which are managed under a no-harvest regulation from January 1 through June 30 and a two-fish limit, with none between 12 and 16 inches, from July 1 through December 31 (IDFG 2009b).

Due to its proximity to Idaho's population center, Lake Lowell receives substantial fishing pressure, with largemouth bass being of primary interest to recreational and tournament anglers (IDFG 2009b). The lake has been stocked by IDFG with species both nonnative (i.e., channel catfish) and native (i.e., Lahontan cutthroat from a hatchery source) to Idaho in recent years. The current practice of stocking nonnative fish is inconsistent with USFWS policies (7 RM 10 and 601 FW 3). Because Lake Lowell is an artificially created reservoir, there were no fish that were originally native to its waters. Fish native to Idaho and historically stocked (i.e., naturalized) species come as close to meeting the policy as possible given the human-made quality of the lake. Since 2003, approximately 6,000 to 9,000 fingerling channel catfish have been planted annually. Additionally, recent plants of Lahontan cutthroat trout fingerlings have ranged from 40,000 to 103,000 annually (IDFG 2009b). Panfish (black crappie, bluegill, and yellow perch) are also popular despite widely fluctuating populations that have led to inconsistent use.

Fish population surveys conducted in 2008 (IDFG 2009b) indicate that the Lake Lowell fish community has become dominated by carp and sucker. Carp represented 58 percent of the catch by number, followed by channel catfish at 27 percent and black crappie at 6 percent. Yellow perch, bluegill, largemouth bass, smallmouth bass, largescale sucker, and northern pikeminnow, represented cumulatively 8 percent of the catch (IDFG 2009b). Results further indicated that Lake Lowell supports few prey-size fish. Younger age classes of panfish, especially black crappie and yellow perch, were nearly absent. In other systems, carp are known to degrade water quality, alter food webs, and negatively impact native or recreationally important fish populations (Jackson et al. 2010 and Zambrano et al. 2001 as cited in IDFG 2010a:61). Carp control has intermittently occurred for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell.

4.4.2 Birds

The Refuge provides habitat for over 215 bird species including waterfowl, waterbirds, shorebirds, raptors, and passerines. The Refuge is an important resting and wintering area for birds migrating along the Pacific Flyway. Because of its value to birds, the Refuge has been declared a State

Important Bird Area by the National Audubon Society. The Lower Snake River, including the Refuge, has been identified as a bird habitat conservation area in the *Coordinated Implementation Plan for Bird Conservation in Idaho* (Intermountain West Joint Venture 2005). A complete list of all birds documented on the Refuge is included in Appendix E.

4.4.2.1 Waterbirds

The Intermountain West's dispersed lakes, marshes, playas, rivers, streams, riparian zones, and freshwater and brackish wetlands host about 40 waterbird species. The region supports approximately 500,000 breeding waterbirds and a few million migrants, including many or most of the world's California gulls, eared grebes, white-faced ibises, and American white pelicans (Ivey and Herziger 2006). Waterbirds are a diverse group of species and include cranes, rails, coots, gulls, terns, grebes, cormorants, herons, egrets, bitterns, ibises, pelicans, loons, and others—essentially, all aquatic bird species except waterfowl (i.e., ducks, geese, and swans) and shorebirds (e.g., sandpipers and plovers). To complete portions of their life cycles, waterbirds are dependent on aquatic habitats, which, in the arid Intermountain West, include wetlands that are susceptible to natural cycles of droughts and floods.

The competing demands for water in support of human uses such as agriculture, development, and recreation pose the greatest threats to regional waterbird populations (Ivey and Herziger 2006). Because of the erratic water regime in the arid Intermountain West, wetland habitats are often insufficient to support waterbirds during drought periods (Ivey and Herziger 2006). Human-made reservoirs have a primary purpose of water delivery for irrigation and/or power generation, but they also have a secondary benefit to waterbirds and waterfowl by providing nesting habitat. Water levels of reservoirs are not managed for waterbird habitat, and as a result water-level management activities can impact nesting areas. This management practice can cause productivity problems for waterbirds as a result of the loss or abandonment of eggs or young due to flooding or stranding. On the Refuge, western and Clark's grebe nesting colonies have been surveyed in the smartweed emergent wetland community in the no-wake zone on the east end and on the south side of the lake. This area also provides foraging habitat for pelicans and cormorants. Wakes created by motorized boats can inundate grebe nests, contribute to shoreline erosion, and degrade smartweed and emergent vegetation, making these habitats less suitable for waterbird nesting and foraging. Invasive exotic plants also pose a threat to many waterbird habitats in the region by replacing native vegetation and reducing wetland habitat quality for waterbirds.

4.4.2.2 Waterfowl

Numbers of wintering waterfowl on the Refuge peaked in the early 1960s between 500,000 and 750,000 birds (USFWS 2008). Refuge estimates of current wintering waterfowl populations at Lake Lowell are approximately 15,000 geese in mid-November and up to 150,000 ducks in mid-December. The Snake River also provides wintering waterfowl habitat for a variety of species including goldeneyes, scaup, mergansers, buffleheads, wood ducks, green-winged teal, and a large number of mallards. The conversion of large areas of local grasslands and wetlands to intensive farming, which has occurred since the 1960s, and changes in agricultural practices (as described in Section 4.3.6) have reduced the amount of local habitat available for waterfowl and may explain the reduction in waterfowl populations using the Refuge.

Waterfowl breeding population surveys of the Snake River are conducted annually by IDFG from Guffey Bridge to Farewell Bend, Oregon, and on the Payette River from its mouth to Emmett, Idaho.

The three-year average from 2007 through 2009 of 692 breeding pairs of all species of geese is below the minimum goal of 900 breeding pairs identified in the IDFG 1991-1995 waterfowl management plan (Connelly and Wackenhut 1990 as cited in IDFG 2009a). A total of 1,584 Canada geese and 664 breeding pairs were observed in 2009, in addition to large flocks of white-fronted geese (14,154 birds), snow geese (13,395), and sandhill cranes (1,100) (IDFG 2009a).

The population index for the Pacific population of Canada goose in 2011 was 166,300, 15 percent higher than in 2010 (USFWS 2011c). These indices increased by 4 percent per year over the past 10 years. The index for the western Central Flyway population of snow and Ross's geese was a count of 196,100, 18 percent fewer than in 2010. These populations have increased 10 percent per year from 2002 through 2011. For the second year in a row, major swan areas could not be surveyed during the USFWS waterfowl population survey, which likely accounts for the low counts of the past few years. Despite variation in survey coverage, population estimates have shown no trend over the last 10 years (USFWS 2011c). Numbers of tundra swans on breeding grounds increased in 2011 from 2010, and the nest index was 40 percent greater than the 10-year average. However, the total bird index for tundra swans was 28 percent lower than in 2010 (USFWS 2011c). The total population estimate for all duck species was approximately 45.6 million birds, which represents an 11 percent increase over the 2010 estimate and was 35 percent above the long-term average from 1955 through 2010 (USFWS 2011c).

4.4.2.3 Shorebirds

The Intermountain West provides breeding habitat for 11 species of shorebirds and stopover habitat for an additional 23 species during their annual migration (Oring et al. 2000). Perhaps a million shorebirds breed in the Intermountain West, and millions of additional shorebirds migrate annually through the area (Oring et al. 2000). The Great Basin is one of six bird conservation regions in the Intermountain West, and it stands out as enormously important for both breeding and migrating shorebirds (Oring et al. 2000).

The Refuge is included on the list of managed shorebird sites in the *Intermountain West Shorebird Plan*. Shorebirds that breed on the Refuge include American avocet, black-necked stilt, killdeer, spotted sandpiper, and Wilson's snipe. Shorebirds that stop over at the Refuge include Wilson's phalarope, red-necked phalarope, long-billed dowitcher, marbled godwit, western sandpiper, and least sandpiper. Lake Lowell is documented as having peak shorebird numbers ranging from 10,000 to 20,000 (Oring et al. 2000).

4.4.2.4 Raptors

The Snake River Birds of Prey Conservation Area, encompassing 485,000 acres along 81 miles of the Snake River, contains the highest concentration of noncolonial-nesting raptors of any location in the world (Kochert and Pellant 1986). This area provides habitat for approximately 800 pairs of falcons, eagles, hawks, and owls to breed and raise their young from mid-March through June (Visit Idaho 2011).

Raptors documented as breeding on the Refuge include osprey, bald eagle, northern harrier, Cooper's hawk, Swainson's hawk, red-tailed hawk, and American kestrel. Results from autumn raptor migration counts conducted at Boise Ridge, Idaho, from 1993 through 2005 suggest an increasing trend in the numbers of turkey vulture, osprey, Cooper's hawk, red-tailed hawk, and merlin. A decreasing trend in the numbers of northern goshawk, Swainson's hawk, and American kestrel was

observed, and counts of northern harrier, sharp-shinned hawk, and golden eagle were relatively stable (Smith et al. 2008).

4.4.2.5 Passerines

Passerine populations have declined throughout the Intermountain West due to conversion of shrub and grassland habitats to agriculture, habitat fragmentation, and degradation of riparian habitats due to grazing. In a recent study of the distribution and abundance of bird populations dependent upon shrub-steppe habitats in the Intermountain West, significant declining population trends were found for 16 of the 25 upland bird species examined (Dobkin and Sauder 2004). Many of the species with declining populations were passerines including horned lark, green-tailed towhee, chipping sparrow, Brewer's sparrow, lark sparrow, black-throated sparrow, sage sparrow, grasshopper sparrow, white-crowned sparrow, western meadowlark, and Brewer's blackbird.

Many neotropical migratory landbirds that occur on the Refuge are dependent upon riparian habitat as their primary nesting habitat. Dobkin and Sauder (2004) found populations of many riparian-dependent species to be in decline in the Intermountain West, including willow flycatcher, orange-crowned warbler, Wilson's warbler, song sparrow, and Bullock's oriole.

4.4.3 Mammals

Over 25 species of mammals have been observed on the Refuge. The Refuge supports a population of mule deer; however, the herd size is unknown. White-tailed deer and elk also occur on the Refuge but are far less common. As deer habitat adjacent to the Lake Lowell Unit has been lost to urbanization, deer have become more concentrated on the Refuge and remaining adjacent rural lands. This concentration has resulted in conflicts with the surrounding community, due to depredation on agricultural lands (including orchards) and increases in collisions with vehicles. Deer cross major roads (e.g., Lake Shore Drive, Orchard Avenue) as they travel from the cover and shelter on the Refuge to forage areas in adjacent agricultural fields and orchards.

Statewide, mule deer populations have declined since the 1950s and 1960s, and the long-term outlook for mule deer is that of slowly diminishing habitat quantity and quality over time (IDFG 2010b). The Refuge is located in the IDFG Snake River Population Management Unit (PMU). According to the IDFG report, the deer population has probably changed very little since historical times in this PMU, and accounts of trappers through this area in the mid-1800s indicated that buffalo, elk, pronghorn, and bighorn sheep were far more common than mule deer. Given the low densities of deer and low priority for deer in this PMU, little data are available to indicate what population trends have occurred over time (IDFG 2010b).

Other commonly occurring species on the Refuge include North American river otter, coyote, red fox, striped skunk, raccoon, long-tailed weasel, mink, yellow-bellied marmot, fox squirrel, northern pocket gopher, North American beaver, mountain cottontail, and various mice.

A complete list of all mammals documented on the Refuge is included in Appendix E.

4.4.4 Reptiles and Amphibians

Reptiles documented on the Refuge include western terrestrial garter snake, gopher snake, racer, striped whipsnake, western rattlesnake, and painted turtle.

Amphibians documented on the Refuge include bullfrog, Pacific tree frog, and Great Basin spadefoot toad.

A complete list of all reptiles and amphibians documented or potentially occurring on the Refuge is included in Appendix E.

4.4.5 Invertebrates

Invertebrate surveys conducted on the Refuge in 2010 and 2011 documented 13 scientific orders, consisting of the following: beetles (Coleoptera); earwigs (Dermaptera); flies (Diptera); true bugs (Hemiptera); aphids and relatives (Homoptera); bees, wasps, and ants (Hymenoptera); butterflies and moths (Lepidoptera); nerve-winged insects (Neuroptera); grasshoppers and relatives (Orthoptera); springtails (Collembola); dragonflies and damselflies (Odonata); thrips (Thysanoptera); and caddisflies (Trichoptera) (Castrovillo 2010). Other orders have been found on the Refuge and are listed in Table E-5 in Appendix E.

Mosquito control using aerial application of the larvicide *Bacillus thuringiensis israelensis* (Bti) was begun in 2004. Applications begin in the spring as soon as the identified thresholds of six larvae per dip are found. Applications are site specific to areas with high larval levels. Areas treated with Bti have been primarily along the south edge of Lake Lowell, Upper Dam Marsh, and a few other wetland areas. Most treatments occur in water less than 18 inches deep. In some years, more than 250 acres have been treated at one time, with several applications over the course of the spring and summer.

A complete list of all invertebrates documented on the Refuge is included in Appendix E.

4.5 Threatened, Endangered, and Sensitive Species

One goal of the Refuge System is "to conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered." In the policy clarifying the mission of the Refuge System (601 FW 1), it is stated that "we protect and manage candidate and proposed species to enhance their status and help preclude the need for listing." In accordance with this policy, the CCP planning team considered species with Federal or State status and other special-status species in the planning process.

Table 4-3 includes special-status species that are known to occur or are likely to occur at the Refuge. "Special status" in this discussion includes species that are federally or state-listed, candidates for Federal listing, or species of concern at the State or Federal level.

Table 4-3. Federally and State-listed Species Potentially Occurring on the Refuge

Species	Federal Status[a]	Idaho Status[b]	Breeds on Refuge[c]
Birds			
American avocet		G5/S5B	X
American white pelican		G3/S1B	
Bald eagle		G4/S3B,S4N	X
Black-crowned night heron		G5/S2B	X
Black rosy-finch		G4/S3	
Black tern		G4/S1B	X
Black-necked stilt		G5/S3B	X

Species	Federal Status[a]	Idaho Status[b]	Breeds on Refuge[c]
Brewer's sparrow		G5/S3B	
Burrowing owl	SOC	G4/S2B	
California gull		G5/S2B, S3N	X
Caspian tern		G5/S2B	X
Cattle egret		G5/S2B	
Clark's grebe		G5/S2B	X
Common loon		G5/S1B, S2N	X
Ferrugionous hawk		G4/S3B	
Flammulated owl		G4/S3B	
Forester's tern		G5/S1B	
Franklin's gull		G4G5/S2B	
Grasshopper sparrow		G5/S2B	
Great egret		G5/S1B	X
Greater sage-grouse	Candidate	G4/S2	
Harlequin duck		G4/S1B	
Hooded merganser		G5/S2B, S3N	
Lesser scaup		G5/S3	
Lewis's woodpecker		G4/S3B	
Loggerhead shrike	SOC		X
Long-billed curlew	SOC	G5/S2B	
Merlin		G5/S2B, S2N	
Northern goshawk	SOC		
Northern pintail		G5/S5B, S2N	X
Peregrine falcon		G4T3/S2B	
Sandhill crane		G5/S3B	
Short-eared owl		G5/S4	
Snowy egret		G5/S2B	X
Swainson's hawk		G5/S3B	X
Trumpeter swan	SOC	G4/S1B,S2N	
Western grebe		G5/S2B	X
White-faced ibis	SOC	G5/S2B	
Wilson's phalarope		G5/S3B	
Yellow-billed cuckoo	Candidate	G5/S2B	
Fish			
Bull trout	T (CH)	G3/S3	
Lahontan cutthroat trout	T		
Herptiles			
Columbia spotted frog	Candidate	G4,T2,T3/S2	
Northern leopard frog	SOC	G5/S2	
Western toad	SOC		
Mammals			
Gray wolf	Recovery	G4/S3	
North American wolverine	Candidate	G4,T4/S2	
Northern Idaho ground squirrel	T	G2,T2/S1	
Southern Idaho ground squirrel	Candidate	G2,T2/S1	
Mollusks			
Bruneau hot springsnail	E	G1/S1	
Snake River physa snail	E	G1/S1	
Plants			
Howell's spectacular thelypody	T	G5,T4Q/S2	
Packard's milkvetch	Candidate	G5,T1/S1	
Slickspot peppergrass	T (PCH)	G2/S2	

Species	Federal Status[a]	Idaho Status[b]	Breeds on Refuge[c]
Whitebark pine	Candidate	G3,G4/S3	

[a] Federal Status: T = Threatened; E = Endangered; Candidate = Candidate; SOC = Species of Concern; (CH) = Designated critical habitat; (PCH) = Proposed critical habitat.
[b] Idaho Status: G1 or S1 = Critically imperiled: at high risk because of extreme rarity (often five or fewer occurrences), rapidly declining numbers, or other factors that make it particularly vulnerable to rangewide extinction or extirpation; G2 or S2 = Imperiled: at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to rangewide extinction or extirpation; G3 or S3 = Vulnerable: at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to rangewide extinction or extirpation; G4 or S4 = Apparently secure: uncommon but not rare; some cause for long-term concern due to declines or other factors; G5 or S5 = Secure: common, widespread, and abundant; Q = Questionable taxonomy: taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower conservation priority.
[c] Nests on Refuge: X = Known to nest on Refuge on either Lake Lowell or Snake River Islands Units.

Some of the species in the table above are listed as special status species that occur in counties that contain or are adjacent to Deer Flat NWR. Those species are discussed in further detail below.

Yellow-billed Cuckoo (*Coccyzus americanus*): Taylor (2000) published the following "Status of the Yellow-Billed Cuckoo in Idaho":

> In southwestern Idaho the Yellow-billed Cuckoo has historically been considered a "rare summer visitor and breeder, perhaps erratic, in the western part of the Snake River Valley" (Larrison et al. 1967). Sites of records in the last quarter century include Battle Creek and Crane Creek Reservoir, Owyhee Co. (Svingen 1996, T. Rich pers. comm.), an island in the Snake River, Fort Boise Wildlife Management Area (W.M.A.), and Lake Lowell, Canyon Co. (Rogers 1978, Taylor and Trost 1987, J. Gatchette pers. comm., G. Kaltenecker pers. comm.), Prairie, Elmore Co. (Rogers 1979), Swan Falls Dam, Ada Co. (Rogers 1985), Hayspur Fish Hatchery, Blaine Co. (Svingen 1997), and the Twin Falls area, Twin Falls Co. (Rogers 1984). Yellow-billed Cuckoos have not been recorded more than once at any of these locations, except for the single records from the 1970s, 1980s, and 1990s at Lake Lowell.
>
> There are probably not more than a few dozen pairs breeding annually in the state, and quite possibly fewer than ten pairs. The Yellow-billed Cuckoo should be considered one of the most endangered bird species in Idaho. It could easily become extirpated from the state in the near future. In Idaho, Yellow-billed Cuckoo occupy riparian areas with a well-developed understory. Little ecological research has been conducted on the riparian vegetation of the Snake and other rivers in Idaho, but much of this vegetation has undergone modification and deterioration (Dixon and Johnson 1999). Restoration of large areas of riparian cottonwood with a thick understory, particularly willow (Marshall et al. 1996), would probably benefit the Yellow-billed Cuckoo in Idaho greatly.

Bull trout (*Salvelinus confluentus*): Historically, bull trout used the Snake River for foraging, migration, and overwintering habitat; the Snake River currently plays an important role in providing a corridor for exchange of bull trout among populations in its tributaries (USFWS 2010a). Critical habitat for bull trout in the Snake River is located from the mouth upstream to Brownlee Dam (50 C.F.R. 17), approximately 55 miles downstream from the lower end of the Refuge. No bull trout have

been documented in the mainstem Snake River above Brownlee Dam since 1959 (USFWS 2005). Bull trout do not occur in Lake Lowell.

Bull trout can exhibit either a resident or migratory life history strategy. Resident bull trout complete their entire life cycle in the streams and tributaries where they spawn and rear. Migratory bull trout spawn and rear in streams for one to four years before migrating to a lake (adfluvial) or river (fluvial) seasonally, and then returning to the stream to spawn. Bull trout are found primarily in colder streams, although individual fish are found in larger river systems throughout the Columbia River Basin (USFWS 2007a). All life history stages are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (USFWS 2007a).

On the mainstem Snake River, the downstream-most islands in the Refuge (Fenzl Island and Darrows Islands/Rapids #1 and #2) are within the upstream-most end of Brownlee Reservoir. The Powder River Basin, which contains designated critical habitat for bull trout, flows into Brownlee Reservoir approximately 45 miles downstream of the Refuge. Brownlee Reservoir contains potential foraging, migration, and overwintering habitat for fluvial populations of bull trout in the Powder River Basin (USFWS 2010a), although most bull trout in the Powder River are currently believed to exhibit resident life histories (USFWS 2002b). It is also likely that bull trout would use the reservoir if migratory individuals become re-established in the drainage of the Weiser River (USFWS 2005), which enters the Snake River at RM 352. This is within the Refuge, but the extent and nature of use and quality of habitat provided are not well understood (USFWS 2005). To function as migratory and overwintering habitat, the mainstem Snake River and reservoirs must provide holding water with adequate temperature, depth, and cover to ensure successful bull trout movement, as well as provide sufficient foraging opportunity (USFWS 2005).

Other tributaries that flow into the Snake River either within, downstream, or upstream of the Refuge also contain or have the potential to support bull trout (e.g., Indian Creek, Payette River, Malheur River, and Boise River). However, bull trout populations in most of these basins are extremely low and/or isolated in headwater areas due to impassable barriers and poor water quality in lower reaches. As bull trout populations increase and restoration actions continue in these basins, the mainstem Snake River will provide an important migratory corridor between upstream and downstream populations of bull trout.

Lahontan cutthroat trout: Although native Lahontan cutthroat trout occur within Malheur County in southeastern Oregon, they are not known to occur in the Snake River or Lake Lowell (USFWS 2010a). IDFG has historically stocked Lahontan cutthroat trout in Lake Lowell; however, these fish are of hatchery origin and not considered part of the federally protected species.

Columbia spotted frog (*Rana luteiventris*): Spotted frogs inhabit spring seeps, meadows, marshes, ponds, streams, and other areas where there is abundant vegetation. They often migrate along riparian corridors between habitats used for spring breeding, summer foraging and winter hibernation. The largest known threat to spotted frogs is habitat alteration and loss, specifically loss of wetlands used for feeding, breeding, hibernating, and migrating. Other threats to this species include development, disease, and predation by nonnative species (USFWS 2011f).

Columbia spotted frogs range from extreme southeast Alaska south through British Columbia and Alberta, Canada, western Montana and Wyoming, Idaho, northeastern Oregon, and eastern Washington. Under the Endangered Species Act, there are currently four recognized Distinct Population Segments (DPS) of Columbia spotted frogs: Northern, Great Basin, Wasatch, and West

Desert. Columbia spotted frogs in the Nevada, southwestern Idaho, and southeastern Oregon portion of the Great Basin are geographically separate from the remainder of the species and are considered to be the Great Basin DPS. Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and southeastern Oregon (Malheur and Harney Counties) but local populations tend to be small (USFWS 2011f). Occupied habitat in for the Great Basin population is characterized by sagebrush with stream and pond environments. Columbia spotted frogs in Nevada have been reported from elevations between 5,600 and 8,700 feet, but elevations vary between populations (USFWS 2011f).

Although there is suitable habitat for this species on the Refuge, there are no known populations of this species on the Refuge and this species was not documented during amphibian surveys conducted in 2005 and 2006. Additionally, the Refuge is at a lower elevation than nearby populations.

Southern Idaho ground squirrel (*Urocitellus brunneus endemicus*): The southern Idaho ground squirrel occurs in native shrub-steppe habitat containing big sagebrush, bitterbrush, and a variety of native forbs and grasses. Areas of localized abundance are typically associated with human-altered landscapes such as golf courses and row crop or farmed fields (particularly alfalfa and clover). Adult ground squirrels are active from late January or early February to late June or early July when they return to their burrows for hibernation. Threats to the southern Idaho ground squirrel include exotic grasses and weeds, altered fire regime resulting from nonnative grass invasions, habitat fragmentation, competition with the Columbian ground squirrel (*Spermophilus columbianus*), direct killing from shooting, trapping or poisoning, and predation (USFWS 2011d).

Idaho ground squirrels occur in a 38-square-mile area in Idaho that extends from Emmett northwest to Weiser and the surrounding area of Squaw Butte, Midvale Hill, and over to the Henley Basin in Gem, Payette, and Washington Counties (Yensen 1991). The range of the southern Idaho ground squirrel is bounded on the south by the Payette River, on the west by the Snake River and on the northeast by lava flows with little soil. Within the Refuge, the northern portion of the Snake River Unit lies along the western boundary of its range. The Lake Lowell Unit is located to south of the known range of this species.

Snake River physa snail (*Haitia [Physa] natricina*): This species occurs on the underside of large cobble- to boulder-sized substrate in swift currents in the mainstem Snake River, generally in the deepest parts of the river at the margins of rapids (USFWS 2005). Historically, this species has been known to occur from RM 487 to RM 673.5, but currently it is only known to be present from RM 666 (tailwaters of the Milner Pool) to RM 673.5 (Minidoka Dam) (USFWS 2005). There is potential for the species to be present downstream to RM 553, but no live specimens have been collected in this area since 1981 (USFWS 2005). The Refuge extends upstream to approximately RM 448.5; therefore, it is not within the known range of Snake River physa snail distribution. It is not known if the portions of the Snake River within the Refuge historically supported populations of the Snake River physa snail.

Bruneau hot springsnail (*Pyrgulopsis bruneauensis*): This species is endemic to thermal springs and seeps that occur along 5 miles of the Bruneau River in southwest Idaho (USFWS 2007b), located entirely outside of the Refuge. The Bruneau River enters the Snake River at RM 495, approximately 46.5 miles upstream of the Refuge.

Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*): Howell's spectacular thelypody occurs in wet alkaline meadows in valley bottoms, usually in and around woody shrubs

that dominate the habitat on the knolls and along the edge of the wet meadow habitat between the knolls. Associated species include greasewood, saltgrass, giant wildrye, and alkali cordgrass bluegrass (ORBIC 2010). All known remaining populations occur within or directly adjacent to agricultural fields or urban areas. The plants are threatened by habitat modification such as grazing during spring and early summer, trampling, urban development, and competition from nonnative plants (Federal Register 1998).

Howell's spectacular thelypody is known to occur on fewer than 12 small sites located within 100 acres of private lands near North Powder and Haines in eastern Oregon (Baker and Union Counties). It formerly also occurred in the Willow Creek Valley in Malheur County (Federal Register 1998). The Refuge is not located within the known range of this species.

Packard's milkvetch (*Astragalus cusickii var. packardiae*): Packard's milkvetch is a narrow endemic plant that occurs in habitat characterized by rolling uplands and steep slopes that descend to terraced at elevations ranging from 2,600 to 3,000 feet. This species occurs on sedimentary outcrops which are largely devoid of other native shrubs, grasses, and forbs (Mancuso 1999). It is associated with vegetation dominated by Wyoming sagebrush and native bunchgrasses including bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. However, due to habitat impacts from a century of wildfires, livestock use, and invasive nonnative plant species, much of its historical habitat has been converted to annual grassland dominated by cheatgrass and medusahead (USFWS 2011e). Primary threats to this species and its associated habitat include off-road recreational vehicle use, invasive nonnative grasses, wildfire, and livestock.

This species is only known to occur in the northeastern corner of Payette County, about 15 miles north of the town of Emmett and approximately 15 miles east of the town of Payette, in southwestern Idaho. Its entire known range, which lies between Big Willow Creek to the south and Little Willow Creek to the north, is only approximately 10 square miles (USFWS 2011e). The Refuge is not located within the known range of this species.

Slickspot peppergrass (*Lepidium papilliferum*): Slickspot peppergrass is associated with slickspots, distinct small habitat patches with a clay subsurface soil horizon within the sagebrush-steppe ecosystem. Slickspots are visually distinct openings in the sagebrush-steppe community characterized by soils with high sodium content and distinct clay layers that appear to have formed during the Pleistocene epoch. It occurs in relatively intact habitat dominated by Wyoming sagebrush and native bunchgrasses including bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. Threats to this species in southwest Idaho include the invasion of nonnative annual grasses including cheatgrass, increased fire frequency, development or destruction of slickspot microsites, habitat fragmentation, and livestock.

Slickspot peppergrass is known to occur only in the Snake River Plain and its adjacent northern foothills in Ada, Canyon, Elmore, Gem, Owyhee, and Payette Counties, Idaho; critical habitat has been designated to protect known populations (Federal Register 2011). The Refuge is not located within the known range of this species.

Whitebark pine (*Pinus albicaulis*): Whitebark pine is typically found in cold, windy, high-elevation or high-latitude sites found at or slightly lower than alpine timberline in the upper montane zone in western North America (Tomback et al. 2001). Whitebark pine is ecologically very significant in maintaining snowpack and regulating runoff, initiating succession after fire or other disturbance events, and providing seeds that are a high-energy food source for many species of wildlife. Threats

to this species include climate change, white pine blister rust, and mountain pine beetles, or the combination of effects from some or all of these threats.

The species is distributed in Coastal Mountain Ranges (from British Columbia, Washington, Oregon, down to east-central California) and Rocky Mountain Ranges (from northern British Columbia and Alberta to Idaho, Montana, Wyoming, and Nevada) (Tomback et al. 2001). Subalpine habitats likely to support this species do not occur on the Refuge.

4.6 Invasive and Nuisance Species

Both the Lake Lowell and Snake River Islands Units of the Refuge have been colonized by invasive plants and animals. Invasive plant species displace native vegetation, altering the composition and structure of vegetation communities, affecting food webs, and modifying ecosystem processes, thus resulting in considerable impacts to native wildlife.

4.6.1 Plants

Refuge habitats have been colonized by a variety of noxious weeds and invasive plant species, including cheatgrass, Canada thistle, Scotch thistle, rush skeletonweed, perennial pepperweed, purple loosestrife, puncturevine, tamarisk, and Russian olive. Invasive plant species occurring on the Refuge are included in Table E-5 as part of the current wildlife and plants occurring on the Refuge (Appendix E). Currently, a combination of hand removal, mechanical removal, herbicide application, and biological controls are used to help control invasive plants at the Lake Lowell Unit with varying degrees of success. Efforts around the lake have focused on Russian olive, perennial pepperweed, Scotch thistle, Canada thistle, white bryony, and poison hemlock. False indigo bush is the predominant understory species in riparian areas. Its dense growth form and vigorous resprouting prevent any other understory species from establishing. Little work has been done specifically to reduce this species. In upland area, cheatgrass chokes out native and desirable species and is so prevalent that only broad application of a control method (e.g., herbicide, biological control, prescribed fire) would work to reduce this species.

The lake edges in some locations and the Upper Dam Marsh have been invaded by purple loosestrife. Over the past several years, biological controls have substantially reduced the infestation. A biological control agent for Canada thistle was released many years ago with unknown results. A biological control agent is being considered for tamarisk. There also is a potential biological control agent, a soil fungus (*Pyrenophora semeniperda*), for cheatgrass that is being considered for shrub-steppe habitat on the Refuge, should it be approved for use.

Because of the logistical difficulties, limited control efforts have been conducted on the Snake River Islands Unit. When manual or chemical weed control has occurred, it has often resulted in the removed weedy species being replaced by another weedy species.

Many weeds are best controlled by injection, spot spraying, or painted application of herbicide. These applications are time consuming and are most effective when several people work together.

Despite the Refuge's application of considerable resources to controlling invasive species, existing budgets and staffing levels do not allow as many acres to be treated for weeds as would be desirable.

As a result, weeds are kept in check on areas of the Refuge that receive treatment, but they are spreading elsewhere.

4.6.2 Animals

Several species of nonnative mammals, fish, amphibians, and invertebrates are present within the Lake Lowell and Snake River Islands Units of the Refuge. IDFG has historically stocked Lake Lowell with nonnative channel catfish, black crappie, and Lahontan cutthroat trout, among other species. Carp populations are described in Section 4.4.1. Invasive species present on the Refuge include bullfrog, New Zealand mudsnail, common carp, oriental weatherfish, and feral cats and dogs. Zebra and quagga mussels have not established in the Snake River or Lake Lowell to date; however, these species have been found in neighboring states (Utah and California) and are at risk of becoming established on the Refuge in the future.

Bullfrog: This species is an invasive amphibian that occurs in very warm and sunny ponds, marshes, slow-moving streams and rivers, and ponds (Corkran and Thoms 1996). The range of this species in North America is east of the Rocky Mountains. It was introduced into the West in the 1900s as a source of food (frog legs) and has since spread to other continents. It has also been introduced for sport, for pest control, and accidentally through trout stocking. This species tolerates a wide range of water temperatures and consequently has become invasive across a wide range of aquatic habitats. Control measures include the removal of individuals, introduction of predator species (e.g., largemouth bass), and egg collection. The removal of bullfrogs is unlikely to be a viable management option due to the difficulty of removing all bullfrog eggs, tadpoles, and adults, and preventing surrounding bullfrogs from invading a water body. However, this may be feasible in smaller water bodies isolated from other sources of bullfrog invasions.

Many factors have contributed to the successful invasion of bullfrogs and their negative impacts to native wildlife in North America and elsewhere. In a single season, bullfrogs lay up to 20,000 eggs, while native species lay far fewer eggs. This has led to direct competition with native species for food and habitat. Bullfrogs are opportunistic predators, and prey on any animal smaller than themselves. Their diet consists of fish, reptiles, small mammals, birds, amphibians, and insects. They are also cannibalistic. Bullfrog tadpoles mostly graze on aquatic plants (Bruening 2002). Bullfrogs and Columbia spotted frogs rarely co-occur, but these findings could be the result of competitive exclusion or predation, and it is suspected that bullfrogs likely have contributed to the decline of this species (Tait 2007). Additionally, bullfrogs are thought to be carriers of the pathogenic fungus *Batrachochytrium dendrobatidis* (chytrid), which causes the lethal disease chytridiomycosis. This is a fungal disease that has caused mass mortalities and population declines in North America and Europe, and as the cause of at least one, and possibly several, species extinctions (Daszak et al. 2004).

Large numbers of bullfrogs were collected at Lake Lowell during amphibian monitoring in 2005 and 2006 (Burch and Koch 2006; Smithers 2006).

New Zealand mudsnail: This species was first found in the Snake River in 1987 and within two years became the dominant snail in the area (EPA 2011). The mudsnail flourishes in degraded water quality and reproduces quickly, impacting native invertebrate populations by competing for food and habitat. The mudsnail has a detrimental impact on fish populations, vegetation, and other native biota (ODFW 2010). They have become established in most large river systems, and educating the public

on proper decontamination of equipment after use in infested waterways will help prevent the spread into new habitats.

Common carp: This species has been present in the United States since 1877 and in Lake Lowell since at least the 1950s (Kozfkay 2011; USFWS 2010b). Unlike the Asian carps that have been introduced in Oregon and Idaho to control aquatic vegetation in lakes and ponds, common carp are naturally reproducing in most waterways of the northwest.

Common carp directly compete with other species for food (aquatic invertebrates and plankton), while their feeding behavior can cause significant changes in the composition of macrophyte, phytoplankton, and invertebrate communities, altering the food web and trophic structure of aquatic systems (USFWS 2010b). As carp root around in muddy substrates while feeding, they stir up the sediment and damage roots, causing otherwise clear waters to become muddy (Kozfkay 2011). Sediment and organic material suspended in the water column causes subsurface sunlight needed for plant growth to be reduced or eliminated, and photosynthetic plant production and oxygen levels decrease. This results in a decrease of aquatic vegetation and plankton that serve as food and habitat for migratory birds, aquatic invertebrates, and other fish species (Kozfkay 2011; USFWS 2010b).

Fishery managers realized the negative impact carp were having on other fish populations and the aquatic ecosystem of Lake Lowell and began trying to remove the carp, ultimately treating the lake with rotenone in the 1960s (Kozfkay 2011). Carp populations remained low enough for other game and panfish numbers to rebuild, until the 1990s, when a severe drought caused a decline in panfish numbers and an explosion in the carp population (Kozfkay 2011). After several years of poor fishing, IDFG began studying ways to improve the fishery at the lake and by 2010 concluded that the carp population was so high that the only way to remove them was to treat the lake with rotenone (Kozfkay 2011). Due to the large size of Lake Lowell, treating with rotenone would be expensive and would kill all of the fish in the lake, not just the unwanted carp. To reduce the amount of rotenone needed and to increase the efficiency of the treatment, the lake would need to be drawn down to extremely low levels, either by extended drought or planned drawdowns (Kozfkay 2011). This could result in temporary negative impacts to birds and wildlife, recreational users, and irrigation districts. Rotenone has been historically used at the Malheur Refuge to control carp populations with varying success, because the treatments have failed to completely eradicate the entire carp population due to the complex network of waterways (USFWS 2010b). If successful at removing carp from Lake Lowell, the rotenone treatment would have a positive long-term benefit to birds and wildlife, game and panfish species, and recreational users of the lake. IDFG, Refuge personnel, and other groups are in the initial stages of determining whether a rotenone treatment is desirable or achievable (Kozfkay 2011). Refuge managers will continue to work with Malheur Refuge personnel who are experienced in carp management to develop and implement a carp management strategy for Lake Lowell. Currently, carp are being removed through commercial fishing activities. The amount of carp being removed by these activities is not enough to create any appreciable decrease to the carp population. IDFG is working with other commercial fisherman to increase the number of carp being removed, but as of yet IDFG has not been able to begin a larger removal effort.

Oriental weatherfish: This species is common and widespread in the Snake River Basin. Large numbers of Oriental weatherfish were collected at Lake Lowell during amphibian monitoring in 2006 (Smithers 2006). This species competes with native species for food and habitat, has the potential to transmit disease to other organisms, and preys on native benthic invertebrates (ODFW 2011).

Educating the public on proper identification and potential impacts to the ecosystem will help prevent the spread of these fish into new habitats.

Feral cats and dogs: Feral populations of domestic dogs and cats form when people either release their animals or they run away. Feral cats and dogs survive and breed in the wild without any support from humans and depend on native wildlife as their primary food source. Feral animals are not uncommon in rural or urbanized areas and are of conservation concern because of their effects on native prey (Crooks and Soule 1999). Exact numbers are unknown, but scientists estimate that, nationwide, cats kill millions of birds and over a billion small mammals, such as rabbits, squirrels, and chipmunks, each year (Coleman et al. 1997). Feral dogs have also been witnessed chasing large mammals (deer) and feeding on small mammals (Causey and Cude 1980). In addition to preying upon wildlife, feral animal populations may also disturb wildlife that may be feeding or nesting nearby.

The occurrence of feral animals on Deer Flat NWR has not been studied and is not known at this time; however, it is anticipated that the numbers are high. Feral animals such as cats and dogs are regularly seen within the Refuge boundaries. Staff and Refuge visitors frequently pick up and/or call in stray dogs and cats that have been dumped on the Refuge by folks who presumably cannot care for the animals any longer and assume that they will be cared for here. The proximity of the Refuge to the urban interface makes it vulnerable not only to feral animals seeking resources but pets that are uncontrolled and allowed to wander freely. Deer Flat is also a popular place for locals to exercise with dogs, and even though there are regulations requiring visitors to keep pets on leash, the incidence of this rule being violated is very high. Dogs allowed to roam at large even within range of a voice command from an owner can kill or injure wildlife.

4.7 Wildlife and Habitat Research, Inventory, and Monitoring

The Refuge lacked a biologist on staff from 1996 through 2009. Thus, compared with other refuges, there has been little inventory and monitoring data collected. Data that do exist are focused on waterfowl. For wintering waterfowl, there are long-term data from the mid-winter waterfowl survey and weekly ground counts. Refuge staff and volunteers survey waterfowl populations throughout the year to monitor the health of the regional population and help IDFG set hunting limits. Each winter, waterfowl are surveyed weekly at Lake Lowell. Each spring, goose nests are surveyed on the Snake River islands. Each fall, migratory ducks are caught and banded.

A pilot grebe nesting survey was initiated in 2010 to capture the characteristics of nesting grebe population on the Lake Lowell Unit of Deer Flat NWR. The survey includes a pre-nesting inventory, a nesting survey, and a brood count.

In order to inventory the deer population on the Lake Lowell Unit, a deer spotlight survey has been implemented to capture population dynamics.

The Refuge conducted amphibian monitoring at Lake Lowell in 2005 and 2006 as part of the nationwide malformed amphibian survey project. The objective of the survey project was to learn more about declining amphibian populations and determine the prevalence of malformed amphibians in frog populations on national wildlife refuges.

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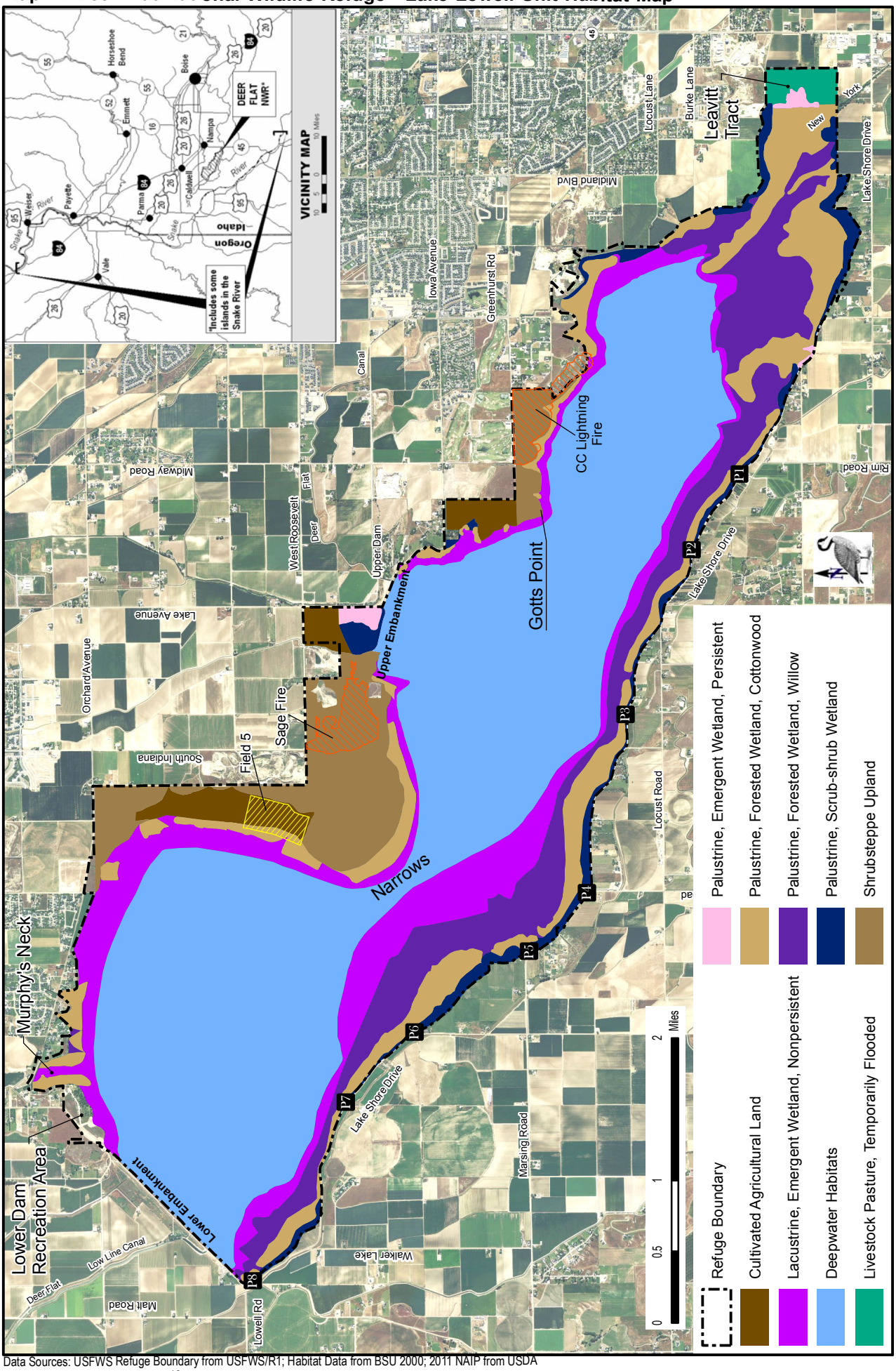
Map 12 Deer Flat National Wildlife Refuge - Lake Lowell Unit Habitat Map



Data Sources: USFWS Refuge Boundary from USFWS/R1; Habitat Data from BSU 2000; 2011 NAIP from USDA
File: 12-005-6 Map Date: 05/14/2012

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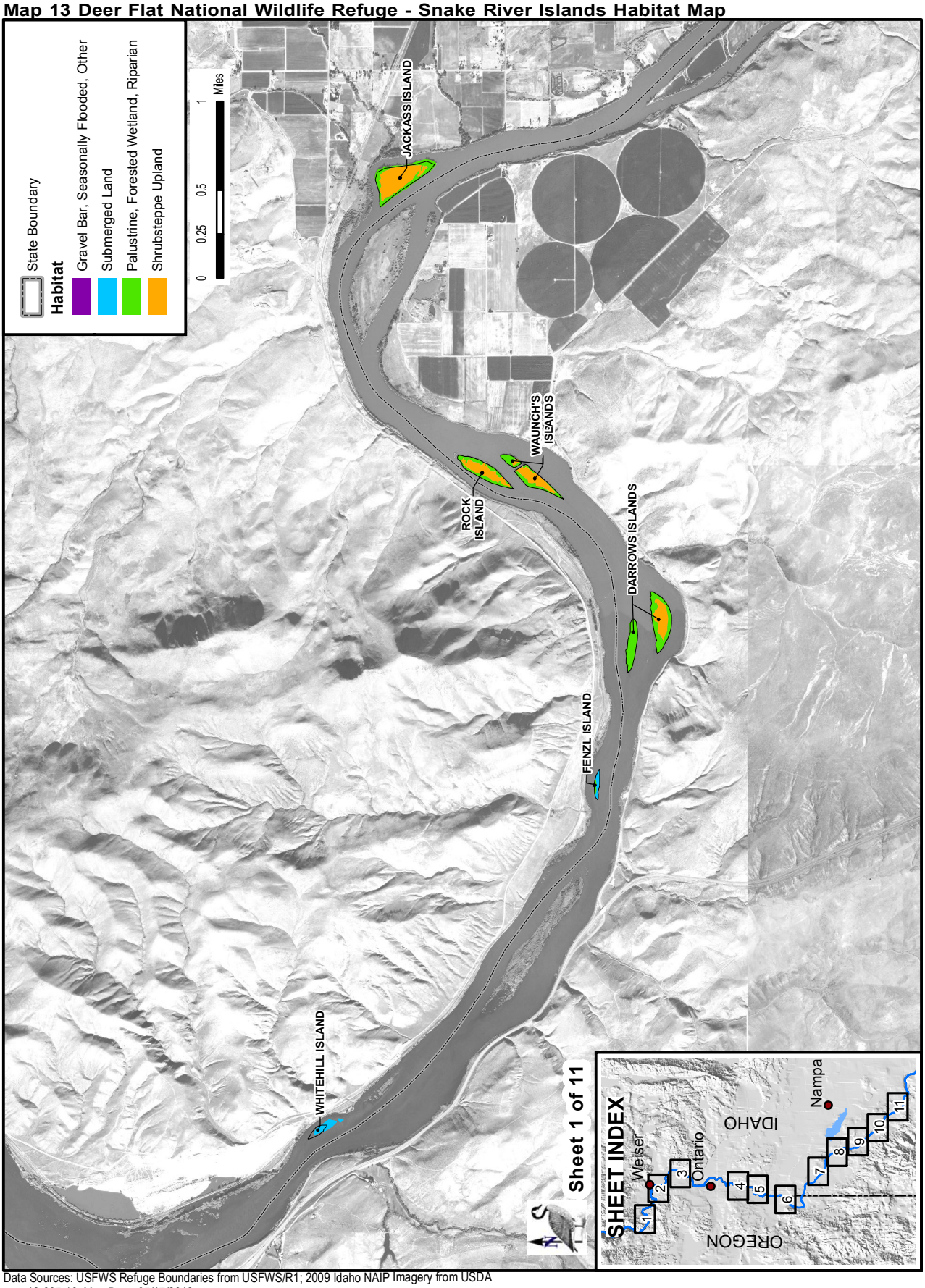
Map 13 Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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Mule deer fawn
Addison Mohler, USFWS

Chapter 5 Human Environment

Chapter 5 Human Environment

5.1 Cultural Resources

Archaeological and other cultural resources are important components of our nation's heritage. The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. Protection of cultural resources is legally mandated under numerous Federal laws and regulations. Foremost among these are the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.); the American Antiquities Act (16 U.S.C. 431-433); the Historic Sites Act (16 U.S.C. 461-467); the Archaeological Resources Protection Act, as amended (16 U.S.C. 470aa-mm); and the Native American Graves Protection and Repatriation Act (104 Stat. 3048, Public Law 101-601). The Service's Native American Policy (USFWS 1994) articulates the general principles guiding the Service's relationships with Tribal governments in the conservation of fish and wildlife resources. Additionally, the Refuge seeks to maintain a working relationship and consult on a regular basis with the Tribes that are or were traditionally tied to lands and waters within the Refuge.

5.1.1 Native American Cultural Landscape

The ethnographic and historical record is abundant with references to the Shoshone of western Idaho living in small and widely scattered groups in southwestern Idaho. The archaeological record documents a long tradition of residential use and intensive harvest of plant and animal resources focused on the river environment (Raymond 2002). Each year, the population would reach its greatest annual concentration along the Lower Snake River, including the islands. In 1843, Theodore Talbot, who accompanied John C. Fremont's mapping expedition, described numerous islands in the Snake River occupied by small huts "surrounded by high platforms covered with drying salmon" (Talbot 1931:54).

Fish, especially the anadromous type, were a primary food source for the Shoshone. Runs of salmon during the late spring and fall brought larger groups together to efficiently harvest and process this staple. Other principal resources found along the river include mussels, small game, waterfowl, and various vegetable materials. The riverine villages, consisting of several extended families, would disperse during warmer months as smaller groups sought resources from higher elevations (Steward 1938:165-172), such as camas bulbs and biscuit root gathered from the foothills of the mountains. By late summer, berries and pinenuts would also be procured. Land fowl, such as sage hen, were hunted off the river and in the desert areas. Big game, such as deer or antelope, might be hunted but was not a major food source. For the cold winter months, people returned to the river and subsisted mostly on the stored foods gathered throughout the year. Caches for food storage have been found along the cliffs and crags of the Snake River.

5.1.2 Historic Landscape

Arrival of European explorers and fur traders to the area started in the first decades of the nineteenth century, bringing the seeds of dramatic landscape changes we see today.

5.1.2.1 Hudson's Bay Company

The fur trade here was conducted in part by the North West Company and was dominated by Hudson's Bay Company. The first Fort Boise was built of adobe in 1834 at a spot just downstream of the confluence of the Snake and Boise Rivers. This is the same location as John Reid's fur-trapping camp during the winter 1813. Fort Boise originally served Hudson's Bay Company as a fur-trading post. As the supply of furs declined, emphasis switched to salmon fishing (Idaho State Historical Society [ISHS] 1970:2). At the same time, company policy declared each post should be self-sufficient as possible, including agricultural production. In 1846, Fort Boise reported 2 tilled acres, 27 head of cattle, and 17 horses (Beckham 1995:13). Floods in 1853 and 1862 obliterated visible evidence of the fort's location (ISHS 1970:2). With the advent of Idaho's gold rush of the 1860s, a second Fort Boise was built by the U.S. Army near the modern city of Boise.

5.1.2.2 Oregon Trail

By the mid-1840s what had been a trickle of fur trappers, missionaries, and a few pioneers became a flood of settlers emigrating on the Oregon Trail. Seeking the fertile lands of the Pacific Northwest, most hurried through the seemingly inhospitable desert of the Snake River Plain (Beckham 1995:32-33). Save for a few choke points, the trail is not a singular track, rather a network of routes. One southern alternative route follows the west bank of the Snake River portion of the Refuge from Guffey Butte to the town of Homedale. The main Oregon Trail passed to the north of Lake Lowell to cross the Snake River at the original Fort Boise. As the fur trade declined, Fort Boise transformed into a convenient point on the Oregon Trail for emigrants to replenish supplies and cross the Snake River. Ferry boat operations began in earnest by 1852 (ISHS 1982:2). The site remained an important ferry crossing during the last half of the nineteenth century.

5.1.2.3 Farming and Ranching

As demonstrated by the modest livestock of the Hudson's Bay Company forts and the large herds of horses cultivated by the Shoshone, the area was eventually seen to sustain some productivity. Promoting settlement were the various federal land acquisition laws such as the Donation Land Claim Act, the Homestead Act, and the increasing presence of the U.S. military. Discovery of gold in the area in 1860s brought miners to the region, providing a ready local market for livestock and produce.

5.1.2.4 Reclamation

As the first waves of emigrants had noted, and later farmers discovered, the area had limited agricultural potential unless abundant and steady supply of water could be applied to the parched landscape. Initial attempts at irrigation had been undertaken by private parties, but economic forces and lack of coordination kept the cultivated acreage in the low thousands of acres. Recognizing a problem and seizing upon a solution, Senator Francis G. Newlands proposed legislation that passed in 1902 as the Newlands Reclamation Act. This act of Congress set up a public-private partnership through which the Federal government would design and build large-scale irrigation projects that would eventually be turned over to local control.

One of the earliest federal reclamation projects under the Newlands Reclamation Act, the Boise-Payette Project, assisted or subsumed the various private irrigation schemes, to provide a steady and

coherent irrigation source. Deer Flat Reservoir, now called Lake Lowell, was the first reservoir completed for the Boise Project. The successful completion of the Boise Project succeeded in its goal of bringing tens of thousands of acres into agricultural production.

Lake Lowell was created by impounding water from the New York Canal behind the Upper and Lower embankments. Two minor structures were also constructed at the same time to control overflow events. The Middle (or Forest) embankment was to act as a spillway. It now serves as a road bed. The purpose of the fourth structure, the East Dike, is not known. The lake water level has never risen to the East Dike's elevation. The structures are listed on the National Register of Historic Places (NRHP) for their role in early federal reclamation activity, and also as an example of the work done by the Civilian Conservation Corps (CCC) and the Works Project Administration (WPA) during the Great Depression.

5.1.3 Archaeological Sites and Surveys

5.1.3.1 Sites within the Refuge Boundaries

Seven cultural resource sites have been recorded within the authorized boundary of Deer Flat Refuge (Table 5-1) and are described below.

Table 5-1. Previously Recorded Cultural Resources Sites within Deer Flat Refuge

Site Number	Era	Site Name	Description
10CN11	Prehistoric and historic	*Name withheld	Island in river with lithic scatter and historic features and scatter; ceramic, retouched flake, biface, cobble tools, fire-cracked rock, shell, flakes; dugout-like feature, earth depressions, metal, can, wire
10CN97	Historic		historic landfill; glass, metal, ceramic, leather
10CN98	Historic		Historic scatter; cans, glass
27-17688	Historic	Deer Flat Embankments (4)	Historic American Engineering Record entry
27-782	Historic	Fort Boise	Four-sided concrete structure (cistern), foundations
10CN122	Historic	Oregon Trail	A linear feature with no visible expression in this location
27-802	Historic	Deer Flat Nat'l Wildlife Refuge [*sic*]	"An early Idaho conservation site"

*Site location information is confidential and not for public distribution. In this document, where the site name may reveal its location, the name has been withheld.

Site 10CN11 in the Snake River at the southern end of the Refuge's approved boundary is a prehistoric occupation site that also has a historic component. Artifacts of both eras appear concentrated in the island's center; items are seen throughout the island.

In the northwest quarter of the Refuge surrounding Lake Lowell are two sites composed of disposed historic detritus. One of these (10CN97) is described as a formal landfill covering about 10 acres. One-third of this site is located north of the Refuge boundary; the rest is within the Refuge.

On Lake Lowell there are four structures listed together on the NRHP (27-17688); the Upper and Lower Embankment, the Forest (Middle) embankment and the East Dike. Included in the NRHP nomination, but outside the Refuge, are the Boise Diversion Dam on the Snake River and the rubble-lined structure on the New York Canal where it discharges into Lake Lowell. The Upper and Lower Embankments were thoroughly documented through the Historic American Engineering Record (HAER) process. The HAER documentation was undertaken by Reclamation to facilitate needed modifications to those two structures. These early twentieth century structures are emblematic of large irrigation projects that propelled agricultural development in the region. During the Great Depression, workers with the WPA and the CCC modified the dams.

The Fort Boise site (27-782), as recorded, covers private, State, and Service land. This is the location of the early Hudson's Bay Company factory situated near the confluence of the Boise and Snake Rivers. The trading post was destroyed during the 1853 flood, but the location remained a convenient ford for travelers on the Oregon Trail (10CN122).

Information provided by the ISHS identifies a point of interest (27-802) within the Fort Boise historic site as "Deer Flat Nat'l Wildlife Refuge" for its role in early twentieth century conservation efforts. No further information was provided about this designation. We surmise that this point is a reminder to record the Refuge landscape for its historic importance for Idaho conservation activities.

There are other CCC/WPA-era structures such as the entrance pillars and some of the original headquarters compound (located in the current maintenance area) for which formal site forms have not been completed.

5.1.3.2 Linear Features

There are 11 linear features recorded partially in or within 1 mile of the Refuge's authorized boundaries (Table 5-2). Linear features are those cultural resources of long length but relatively narrow width. All 11 of these linear features date to the historic era and include water delivery systems, two routes of the Oregon Trail, and a wagon or stagecoach road.

Table 5-2. Linear Features Recorded within 1-mile Radius of Deer Flat Refuge

Site Number	Era	Site Name	Description
10CN120	20th century	Mora Canal	
27-18962	20th century	Ridenbaugh Canal	
73-17954	20th century	B Line Canal	
73-17955	20th century	C Line Canal	
27-19224	20th century	Deer Flat Low Line Canal	
87-17353	20th century	Galloway Canal	
27-956	20th century	New York Canal	
75-14853	20th century	Washoe Canal	
10CN125	19th century	Boise City-Silver City Road	Wagon and stage road
10CN122	19th century	Oregon Trail	
10OE6025	19th century	South Alternate Oregon Trail	

Two of the recorded linear features are within the Refuge authorized boundary. Both extend beyond the boundary. The Deer Flat Low Line Canal starts in the Lower Embankment and heads in a westerly direction. Feeding the reservoir at the east side of Lake Lowell, the New York Canal traverses at least 1.5 miles into the Refuge.

5.1.3.3 Sites within 1 Mile of the Refuge Authorized Boundaries

A review of cultural resource sites records for sites that occur within 1 mile of the Refuge boundary was conducted to help characterize the types of sites that may be found on the Refuge and to better evaluate the effects that Refuge activities may have on resources outside its current boundary. There are 195 sites and isolates found within 1 mile of the Refuge (Table 5-3). Of these, 112 are prehistoric. Of the prehistoric sites, there are two burial locations, 11 rock art areas, five rockshelters, four isolates, 89 open-type sites (e.g., campsite, lithic scatter), and one unknown site type.

Of the 73 historic sites and isolates, 12 are buildings, three are isolates, 24 are identified only as general locations (known to be significant but with no physical evidence; mostly ferry locations), 23 are open-type sites, 10 are structures (mostly bridges), and one is unknown.

Ten sites have both prehistoric and historic components. All are of the open type.

Table 5-3. Sites within 1 Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
10AA2/3	Prehistoric		Open
10AA169/2	Both		Open
10AA175/3	Prehistoric		Open
10AA176/4	Both		Open
10AA306	Both	Midden Site	Open
10AA445	Historic		Isolate
10CN1	Both		Open
10CN2	Prehistoric		Open
10CN3	Both		Open
10CN4	Both		Open
10CN5	Prehistoric		Open
10CN6	Prehistoric		Open
10CN9	Prehistoric		Rock art
10CN10	Prehistoric		Open
10CN12	Prehistoric	*Name withheld	Rock art
10CN13	Prehistoric	*Name withheld	Rock art
10CN14	Prehistoric	*Name withheld	Rock art
10CN15	Prehistoric	*Name withheld	Rock art
10CN16	Prehistoric	*Name withheld	Rock art
10CN17	Prehistoric	*Name withheld	Rock art
10CN20	Prehistoric		Open
10CN21	Prehistoric		Open
10CN41	Prehistoric		Open
10CN42	Prehistoric		Open
10CN43	Prehistoric		Open
10CN44	Historic	Guffey Bridge	Location
10CN45	Prehistoric		Open
10CN46	Prehistoric		Open
10CN47	Prehistoric		Open
10CN48	Prehistoric		Open
10CN49	Prehistoric		Open
10CN50	Prehistoric		Open
10CN51	Prehistoric		Open
10CN52	Historic	Walters Ferry	Location
10CN53	Prehistoric		Open

Site Number	Era	Site Name	Description
10CN55	Prehistoric		Open
10CN56	Historic		Open
10CN57	Prehistoric		Rock art
10CN58	Prehistoric		Open
10CN59	Prehistoric		Open
10CN60	Prehistoric		Rock art
10CN61	Prehistoric		Open
10CN62	Prehistoric		Open
10CN63	Prehistoric		Open
10CN64	Prehistoric		Open
10CN65	Prehistoric		Isolate
10CN70	Prehistoric		Open
10CN71	Historic	Old Fort Boise	Location
10CN80	Prehistoric		Open
10CN83	Prehistoric	Kill/Butcher	Open
10CN87	Historic		Isolate
10CN88	Historic		Open
10CN89	Prehistoric		Open
10CN95	Prehistoric		Open
10CN126	Prehistoric		Open
10CN135	Historic		Isolate
10OE1	Prehistoric		Open
10OE2	Prehistoric		Open
10OE5	Prehistoric		Open
10OE15	Prehistoric		Open
10OE16	Prehistoric		Isolate
10OE20	Prehistoric		Open
10OE48	Prehistoric		Open
10OE49	Prehistoric		Open
10OE58	Prehistoric		Open
10OE59	Prehistoric		Open
10OE60	Prehistoric		Open
10OE66	Prehistoric		Open
10OE72	Prehistoric		Open
10OE128	Prehistoric		Burial
10OE129	Prehistoric		Open
10OE241	Prehistoric		Open
10OE242	Prehistoric		Rockshelter
10OE243	Prehistoric		Open
10OE244	Both	*Name withheld	Open
10OE245	Prehistoric		Open
10OE521	Prehistoric		Open
10OE522	Prehistoric		Open
10OE524	Prehistoric		Rockshelter
10OE526	Prehistoric		Rockshelter
10OE536	Prehistoric		Open
10OE542	Prehistoric		Open
10OE559	Prehistoric		Rockshelter
10OE563	Prehistoric	*Name withheld (petroglyphs)	Open
10OE865	Prehistoric		Open
10OE1169	Prehistoric		Open
10OE1690	Prehistoric		Open

Site Number	Era	Site Name	Description
10OE1692	Historic	Warm Springs Ferry, Enterprise Post Office	Open
10OE1990	Prehistoric		Open
10OE1991	Prehistoric		Open
10OE1992	Prehistoric		Open
10OE1993	Both		Open
10OE1994	Historic	Guffey Bridge	Structure
10OE1995	Prehistoric		Open
10OE1996	Both		Open
10OE1997	Prehistoric		Rock art
10OE2031	Prehistoric		Open
10OE2032	Historic		Open
10OE2792	Prehistoric		Open
10OE2793	Prehistoric		Open
10OE2794	Prehistoric		Open
10OE2795	Prehistoric		Open
10OE2796	Prehistoric		Open
10OE2798	Prehistoric		Open
10OE2889	Prehistoric		Open
10OE3802	Prehistoric		Open
10OE6759	Historic	Boise, Nampa, and Owyhee Railroad	Open
10OE9445	Prehistoric	*Name withheld	Open
10OE9646	Historic		Open
10OE9647	Prehistoric		Rock art
10OE10371	Historic		Building
10PE3	Prehistoric		Open
10PE4	Prehistoric		Open
10PE8	Prehistoric		Open
10PE10	Prehistoric		Open
10PE20	Prehistoric		Burial
10PE21	Prehistoric		Isolate
10PE22	Prehistoric		Open
10PE30	Prehistoric		Open
10WN97	Prehistoric		Open
10WN452	Prehistoric		Open
10WN456	Prehistoric		Open
10WN559	Historic		Open
10WN560	Historic		Open
10WN792	Prehistoric		Isolate
10WN798	Historic		Open
10WN799	Prehistoric		Open
10WN800	Both		Open
10WN801	Prehistoric		Open
10WN802	Prehistoric		Open
10WN817	Prehistoric		Isolate
27-28	Historic	Unknown Ferry	Open
27-5037	Historic	Riverside Ferry	Open
27-9648	Historic	Ross Camp	Location
27-9649	Historic	Ross Camp	Location
27-13487	Historic		Open
27-16967	Historic		Location
27-18060	Historic	Henderson Ferry	Structure
27-18061	Historic	Hot Springs Ferry	Location

Site Number	Era	Site Name	Description
27-18062	Historic	Bernard's Ferry	Location
27-18064	Historic	Monahan's Ferry	Location
27-18952	Historic	Locker Ave. House	Building
27-19022	Historic	Wilder Armory	Location
35ML00000	Historic	03-08397-01	Open
35ML00006	Prehistoric		Open
35ML01380	Prehistoric		Open
35ML01381	Prehistoric		Open
35ML01383	Prehistoric		Open
35ML01384	Prehistoric		Open
35ML01519	Prehistoric		Open
35ML01520	Prehistoric		Open
35ML01522	Prehistoric		Open
73-4908	Historic	Guffey RR Bridge	Open
73-652	Historic	Walters Ferry	Location
73-659	Historic	Bernard's Ferry	Open
73-4911	Historic	Walter's Ferry Bridge	Structure
73-5027	Historic	Monahan' Ferry	Open
73-5031	Historic	Warm Springs Ferry	Open
73-5032	Historic	Walker's Ferry	Open
73-5033	Historic	Henderson Ferry	Location
73-5034	Historic	Froman Ferry	Location
73-5035	Historic	Mussell Ferry	Location
73-6074	Historic	Cattle pen	Open
73-6075	Historic	Cattle pen	Location
73-6101	Historic	Pasture fence	Open
73-6103	Historic	Cattle pen	Open
73-6119	Historic	Cattle and sheep pen	Open
73-6151	Historic	Sheep camp fence	Location
73-6172	Historic	Hay Backstop	Open
75-131	Historic	Gray's Ferry	Location
75-596	Historic	Emison Brothers Ferry	Location
75-5038	Historic		Structure
75-5039	Historic		Structure
75-5040	Historic	Washoe Ferry	Location
87-264	Historic	Gaylord and Hunt Ferry	Location
87-4336	Historic	Arch Larsen House	Structure
87-5041	Historic	Weiser Ferry	Location
87-13759	Historic	Porters Ferry	Location
87-13769	Historic	Al Keil House	Structure
87-13770	Historic	Larsen Ranch Hand House	Structure
87-13771	Historic	Robert's House	Structure
87-13781	Historic	West Ridge Irrigation	Building
87-13783	Historic	Japanese Labor Camp	Location
87-16074	Historic	Weiser-Oregon RR	Building
87-17066	Historic	George Davis House	Structure
87-17137	Historic	Charlie Webb Place	Building
87-17138	Historic		Building
87-17139	Historic		Building
87-17140	Historic	WWII Relocation Center	Building
87-17141	Historic	Weiser-Oregon RR	Building
87-17142	Historic	Nash House	Building

Site Number	Era	Site Name	Description
87-17143	Historic	Unknown	Building
87-17144	Historic	Unknown	Building
87-17313	Historic	Brad Laird House	Building
87-17344	Historic	Snake River Bridge	Location

*Site location information is confidential and not for public distribution. In this document, where the site name may reveal its location, the name has been withheld.

5.1.3.4 Observations

In part because of Federal undertakings for the Morley Nelson Snake River Birds of Prey National Conservation Area, several cultural resource surveys have occurred on both sides of the river in the southern end of the Refuge. There are many recorded prehistoric occupation sites, rock art sites, historic structures, and historic debris. This plethora of surveys creates a bias as to the density of sites in that stretch compared to the rest of the river. With that noted, the landscape does provide numerous locations ideal for rock art. The density of sites along the river banks in this location is genuinely high.

Few of the islands in Snake River have been systematically surveyed. One that has been surveyed is Sand Island in the Birds of Prey area. No formal archaeological surveys have been conducted on the islands adjacent to Sand Island (i.e., Guffey and Rail Islands. These islands are highly likely to contain significant cultural resources.

5.1.3.5 Early and Named Islands

Few islands appear on the General Land Office (GLO) maps from the mid- to late nineteenth century (Table 5-4). Of those that do, some were created or enlarged through accretion of silt derived from gold mining of the period. Some islands are ephemeral in nature, appearing and disappearing over the decades. For the purposes of cultural resource management, we need to consider any site or structure greater than 50 years of age. An island with the enough longevity, market value, or other significance will likely have obtained a name.

Table 5-4. Early Islands Shown on General Land Office Maps

Name	Date of Map Island First Appears On (GLO/BLM)	Comment*
Noble	1870	
Foglers	2010; island formed prior to 1890	
Rippee	1920	
Ware	1937	
Patch	1874 (pencil note in margin)	May have been originally mainland
Unnamed	1874	
Duncan	1874	
Morton	1874 (?) pencil lines	
Gamble	1874 (?) pencil lines	
Prati	1874	
Unnamed	1875	T11N R6W Sec. 36 BM and T11N R5W Sec. 31 BM
Unnamed	1875	T9N R5W Sec. 2 BM
Unnamed	1875	T6N R6W Sec. 26 BM
Williams	2010 consent decree	

* BM: Boise Meridian.

5.1.4 Threats to Cultural Resources

A variety of natural and human-caused activities can threaten cultural resources, including:

- Fire, both naturally occurring and prescribed for habitat restoration, can cause significant damage to historic structures and archaeological sites, as can the activities to suppress and manage fire (e.g., creating fuel breaks);
- Erosion, whether the byproduct of fire, wind, waves, or another natural or human-made agent;
- Habitat restoration and other land management activities; and
- Vandalism or "pot" hunting.

Any activity identified in the alternatives being considered, including wetland restoration, construction of new facilities, or changes in public use could have a potential impact to cultural resources. The greatest threats may be posed by earthmoving, removal of structures or alteration of the current erosion patterns occurring during habitat restoration, construction, or other land management activities.

Regardless of the alternative chosen, the Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. As discussed in Section 5.1, Federal laws and Service policy guide all Refuge actions regarding cultural resources, along with the Refuge's relationships with relevant Tribes.

5.2 Refuge Facilities

5.2.1 Fences and Signs

5.2.1.1 Lake Lowell Unit

The Refuge's boundary for this unit is fenced and posted with boundary signs. It is surrounded primarily by private lands. Signs reading "Area Closed," "Hunting Area," and "Nontoxic Shot" are also posted around the boundary as appropriate.

There are standard Refuge entrance signs at the Visitor Center entrance road, the Lower Dam Recreation Area, and between Parking Lot 8 and the Lower Dam. There are nonstandard entrance signs at the Visitor Center, near the east Upper Dam boat launch, at the Lower Dam Recreation Area, and east of Parking Lot 1 in the South Side Recreation Area. There are "Welcome to Your NWRS" signs at the east Upper Dam boat launch and at the entrance to Gotts Point. There are signs about regulations at the Visitor Center entrance road and at all parking areas except the two along the curves of Iowa Avenue.

5.2.1.2 Snake River Islands Unit

All of the Snake River islands are posted with boundary signs. Kiosks at the eight primary boat launches that access Refuge islands (Walter's Ferry, Marsing, Homedale, Fort Boise Wildlife

Management Area, Nyssa, Centennial Park in Payette, Roberts Landing, and Farewell Bend State Park) provide interpretive, regulatory, and orientation information. The maps on the kiosks indicate Refuge and Refuge islands along that particular stretch of river.

5.2.2 Roads, Parking Areas, and Access Points

5.2.2.1 Lake Lowell Unit Roads

There are five roads on the Refuge. The North Side Recreation Area is accessed via a half-mile paved entrance road that opened in December 2007 and provides access to the Visitor Center. The road is opened by an automatic gate during public use hours (dawn to dusk). A small parking lot outside the gate can be accessed at all times.

The entrance road provides access to a 3.25-mile loop of unpaved road west of the Visitor Center that is used primarily as a trail (Observation Hill Trail). This road is closed to vehicles, with the exception of occasional permitted access to the ADA-accessible wildlife viewing platform and administrative access. (The road accesses Refuge agricultural field that are closed to the public.) A firebreak that leads from this trail system to the parking lot at the top of the entrance road is often used as a trail by visitors.

There is a 1-mile, unpaved road east of the Tio Lane entrance that is closed to vehicles, with the exception of administrative access. This road serves as a trail (East Dike Trail) for visitors.

There is a 3.75-mile unpaved road from the Tio Lane entrance northwest to the Greenhurst Road entrance. It is closed to vehicles, with the exception of administrative access, but serves as a trail for visitors (Kingfisher Trail). The road travels to the west from the Greenhurst Road entrance and terminates at a gate just past Gotts Point that separates the public area from Refuge maintenance areas and farm fields. This 0.75-mile section of the road is also closed to vehicles, with the exception of administrative access, and serves as a trail for visitors (Gotts Point Trail). Gotts Point Trail is closed from October 1 through January 31 to provide an undisturbed wintering wildlife area. It is gated but open for foot, bicycle, and horse travel from October 1 through April 14.

There is a 0.5-mile, unpaved road leading to Gotts Point from the Greenhurst Road Entrance that parallels the administrative road described above. This road is currently gated at a parking lot and is closed to vehicles. The road from the parking area to Gotts Point (0.33-mile) is gated but open for foot, bicycle, and horse travel from October 1 through April 14. It is closed October 1 through January 31 to provide an undisturbed wintering wildlife area. The closure of this area to vehicles was enacted in late summer of 2006 due to extreme vandalism and concerns for public safety (see Section 5.6.6). There are two small parking lots adjacent to the lake on the closed portion and an outhouse at the end of the road.

Kingfisher Trail, Gotts Point Trail, and Gotts Point Road were all graded in anticipation of graveling in the summer of 2011. Due to unforeseen budget issues, the project was postponed. Graveling of Kingfisher Trail was completed in fall 2011, with graveling of the Gotts Point Trail and Road to occur later in 2012.

A major County road (with traffic of 2,817 vehicles per day, according to the Canyon Highway District [2009]) runs across the Lower Dam. Paved County roads encircle the Refuge and provide public access to most Refuge parking lots and access points.

5.2.2.2 Lake Lowell Unit Parking Areas and Access Points

There are 19 parking areas around the lake. All parking areas are paved except the picnic and swimming beach lots at the Lower Dam Recreation Area and the parking lot at Gotts Point. Parking lots at the Visitor Center entrance road, the Visitor Center, the east and west ends of the Upper Dam, the curves along Iowa Avenue, Tio Lane entrance, and Parking Lot 8 are open all year. The lots at Gotts Point and the Lower Dam Recreation Area are open during the boating season (April 15 to September 30). Parking Lots 1, 2, 3, 7, and 8 are usually open April 15 through the end of waterfowl hunting season (middle or late January). Parking Lots 4, 5, and 6 are open only during hunting season (September to middle or late January).

There are two walk-through access areas at the Lake Lowell Unit that do not have parking facilities associated with them. One walk-through is located at Murphy's Neck, and the other is located several hundred yards east of the west end of Greenhurst Road. The Murphy's Neck access is used mostly by anglers, while the access on Greenhurst Road is used mostly by upland game hunters. Users of these access points must park on the shoulders of County roads (Orchard Avenue and Greenhurst Road respectively).

5.2.2.3 Snake River Islands Unit

There are no roads or parking areas on Refuge islands. Refuge islands are accessed from eight major and five minor boat launches owned and managed by various City, County, State, and Federal agencies.

5.2.3 Trails

5.2.3.1 Lake Lowell Unit

There are six trails that are open to pedestrians, (dogs must be kept on leash), bicyclists, and equestrians. In winter, they are occasionally used for cross-country skiing and snowshoeing. Refuge trails include:

- Nature Trail, a 0.5-mile, unpaved, self-guided loop near the Visitor Center. There is an adjacent wildlife-viewing blind.
- Observation Hill Trail, a 3.25-mile loop internal Refuge road that serves as a trail west of the Visitor Center. There is an adjacent wildlife-viewing platform.
- East Dike Trail, a 1-mile internal Refuge road that serves as a trail east of the Tio Lane entrance.
- Kingfisher Trail, a 3.75-mile internal Refuge road that serves as a trail from Tio Lane entrance to Greenhurst Road entrance.
- Gotts Point Trail, a 0.75-mile internal Refuge road that serves as a trail from Greenhurst Road entrance to a gate just north of Gotts Point.
- Centennial Trail, a 1.2-mile ADA-accessible historical interpretive trail from the Visitor Center to the viewing platform at the west end of the Upper Dam and then across the historic Upper Dam.

5.2.3.2 Snake River Islands Unit

There are no trails on Refuge islands.

5.2.4 Other Facilities Listed by Refuge Area

There are no facilities on the Snake River Islands Unit. Facilities at the Lake Lowell Unit are discussed below by location. Map 14 shows Lake Lowell Unit public use facilities.

5.2.4.1 North Side Recreation Area

The Visitor Center includes the Refuge administrative offices and over 2,600 square feet of public exhibit space, including a KidSpace activity area, a small wildlife-viewing room, a 900-square-foot auditorium with a seating capacity of about 75, and public restrooms. The Visitor Center is open year-round from 8 AM to 4 PM weekdays and 10 AM to 4 PM Saturdays, except on Federal holidays. According to a recent survey, 36 percent of visitors indicated that they had gone to the Refuge Visitor Center during their visit (Sexton et al. 2012). However, only 22 percent of visitors were actually contacted at the Refuge Visitor Center during the survey effort. Of those visitors who were contacted at other locations during the survey effort (n=162), only 23 percent indicated that they did "go to a Visitor Center at the Refuge" (pers. comm., A. Dietsch 2011).

Due to overcrowding in Refuge offices and the desire to find room on the Refuge for Service employees currently working in leased space, in 2011 additional administrative space was added to the building, and the parking area was repaved and enlarged. The Visitor Center parking lot provides 42 parking spaces (including two ADA-accessible spaces) but provides no parking identified for buses, RVs, or vehicles with trailers.

Other facilities in the North Side Recreation Area include ADA-accessible wildlife-viewing platforms near the west Upper Dam boat ramp and on the Observation Hill Trail west of the Visitor Center, a wildlife-viewing blind along the Nature Trail, an ADA-accessible fishing dock at the west end of the Upper Dam (available mid-April to early October), a paved boat ramp with two docks, and an outhouse at the boat launch parking area. The parking lot has 88 designated parking spaces (36 trailer spaces, 44 car spaces, two ADA-accessible trailer spaces, and six ADA-accessible car spaces). The launch closes at relatively high water levels (i.e., a water level elevation of 2,519 feet or more) when it becomes unsafe to launch boats. All facilities are in good condition.

5.2.4.2 East Upper Dam Boat Launch

Facilities at the east Upper Dam boat ramp include a paved boat ramp with two docks, a swimming beach designated by docks and a buoy line, and two picnic tables. The Refuge parking lot has 38 parking spaces (23 trailer spaces, 13 car spaces, and two ADA-accessible spaces).

The Canyon County park across the street provides 56 parking spaces (12 trailer spaces, 42 car spaces, and two ADA-accessible spaces), bathrooms with flush toilets, picnic tables, and grills. Several hundred yards east of the boat ramp, in the curves of Iowa Avenue, there are two paved Refuge parking lots with approximately seven and nine undesignated parking spots. There are no walkways or crosswalks providing pedestrian access to the Refuge, so visitors parking in these lots must walk on the road surface. There are also no Refuge access points immediately across from these

parking areas. It is around a 0.25-mile walk from the farthest parking area to the boat launch on the east side of the Upper Dam. Several hundred yards west of the boat ramp, there is a de facto overflow parking lot in a graveled area along the road. The lake side of this graveled area is part of the Reclamation Zone, and the north side is private property, including a small personal watercraft rental kiosk that has operated since 2007. Since 2010, a refreshment stand is also operated on the private property. Refuge users park on both the Reclamation property and the private property.

In recent years, this area has been increasingly crowded. On busy summer days, vehicles waiting to launch can cause gridlock on the public road leading into the area, causing potential safety issues if emergency vehicles need to pass or if drivers decide to pass the gridlocked vehicles by driving into oncoming traffic.

5.2.4.3 Lower Dam Recreation Area

Facilities at the Lower Dam Recreation Area include a paved boat ramp with three docks (one is ADA-accessible), a park-like picnic area that is sprinkler-irrigated with a covered picnic shelter and scattered picnic tables, and three outhouses. The boat ramp closes at relatively high water levels (i.e., when water level elevation is 2,519 feet or more) when it becomes unsafe to launch boats.

Parking spots near the boat launch are not designated. On a June 2008 Sunday afternoon, there were 161 vehicles parked in this area, 107 with boat trailers. There are 143 parking spaces (141 car spaces and two ADA-accessible spaces) near the undesignated swimming beach. Near the picnic area is one outhouse and a dumpster. Parking spots in this area are not designated because the area is a gravel road. On a June 2008 Sunday afternoon, there were 134 vehicles parked in this area, well beyond capacity and nearly blocking the road in some areas. Overcrowding during the summer has reached a point where, on occasion, it has been extremely difficult for emergency responders to reach patients.

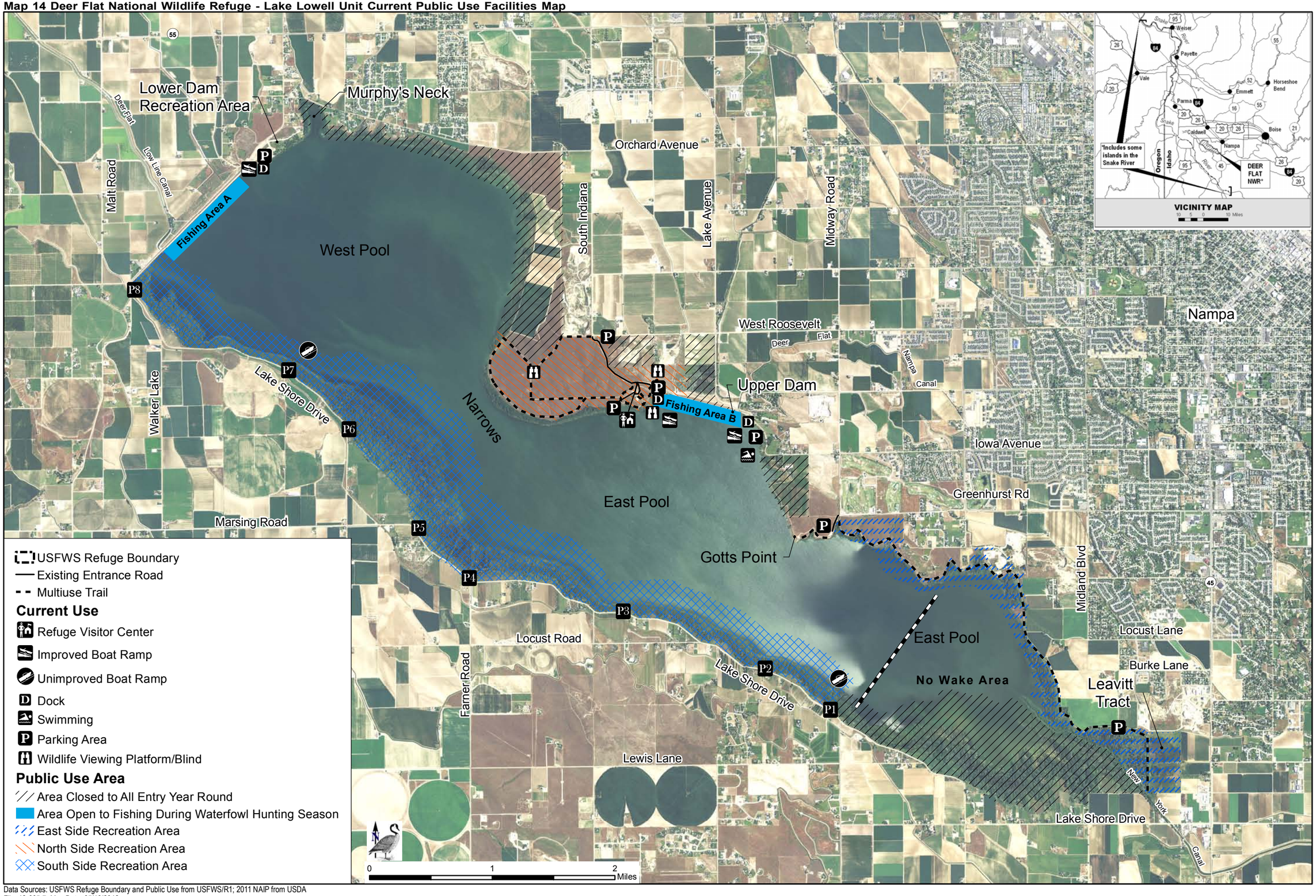
In a fenced portion at the north end of the Lower Dam Recreation Area is the Environmental Education Building, which provides opportunities for self-service environmental education activities for groups, mostly Scouts. The EE Building can be rented from April 15 to September 30. It includes two restrooms, a large meeting space, a kitchen, and a covered, screened patio. The grounds include a tended lawn with several picnic tables and four grills. Water is supplied by a well that pumps 65 gallons per minute; the Service has a water right for this well. In recent years, the water tests have shown unacceptable levels of coliform in the water used in this building. Alterations to the well head in 2011 have hopefully resolved this issue. The building does not have heat or air conditioning.

5.2.4.4 South Side Recreation Area

Parking Lot 1 has a small, paved boat launch. Parking Lot 7 has water access for small boats via a gravel boat launch. Both launches close at relatively high water levels (approximately 2518-2519 feet) when it becomes unsafe to launch boats. Most users of these launches have small watercraft—primarily johnboats, canoes, kayaks, and float tubes. Both launches are used during the spring and summer boating season as well as during the waterfowl hunting season. Due to a lack of signage, nonboating users sometimes park on the boat launch at Parking Lot 7, making launching more difficult.

Parking Lot 3 is used as a launch site by wind-sports enthusiasts even though the unmaintained path from the parking area to the water is blocked by a cable.

Map 14 Deer Flat National Wildlife Refuge - Lake Lowell Unit Current Public Use Facilities Map



Data Sources: USFWS Refuge Boundary and Public Use from USFWS/R1; 2011 NAIP from USDA
File: 12-005-7 Map Date: 05/16/2012

Document continues on next page.

5.2.4.5 East Side Recreation Area

There are no facilities in the East Side Recreation Area.

5.2.4.6 Gotts Point

An outhouse is provided at the end of the 0.33-mile road/trail and is accessible by foot, bike, and horse.

5.2.4.7 Maintenance Area

The maintenance area includes the main shop, a boat house, an oil house, and a few other outbuildings. There is also the original Refuge administration building, two residences (including one listed on the NRHP), one detached garage, and a historic boat house. An additional equipment storage facility was built in 2011 to accommodate equipment needed by Service employees using the administrative office addition.

5.3 Public Use Overview

5.3.1 Legal Mandates Involving Public Uses on Refuges

All public activities on a refuge are considered closed unless officially open. To officially open a use or extend an existing use, a refuge must first complete a compatibility determination. The following summary of Congressional acts gives a brief explanation of how and when public uses are legally allowed on Refuges.

In 1962, the Refuge Recreation Act (76 Stat. 653; 16 U.S.C. 460k-460k-4) was passed. Refuges were tasked with ensuring "that any present or future recreational use will be compatible with and will not prevent accomplishment of, the primary purposes for which the said conservation areas were acquired or established." It also says that recreational activities can be appropriate as long as they are not inconsistent with the primary objective of each refuge. If uses do not fit this description the Refuge Recreation Act further states that the refuge will "curtail public recreation use generally or certain types of public recreation use" whenever necessary.

The National Wildlife Refuge System Administration Act of 1966 (Public Law 90-404; 16 U.S.C. 668dd-668ee, et seq.) states that the public could not "enter, use, or otherwise occupy any such area for any purpose" unless such activities were compatible with the major purposes for which the area was established. The Administration Act was further amended by the Refuge System Improvement Act in 1997.

The Refuge System Improvement Act of 1997 (Public Law 105-57) reasserts the need for refuge uses to be compatible and said that compatible wildlife-dependent recreational uses "receive enhanced consideration over other general public uses in planning and management." It also stated that refuges could not "initiate or permit a new use, or expand, renew, or extend an existing use," unless the use has been determined to be compatible and consistent with public safety.

Under the Improvement Act, each refuge is required to complete a compatibility determination for existing uses, which estimate the timeframe, location, manner, and purpose of each use. Refuges are also required to identify the effects of each use on refuge resources and purposes of each refuge. Any use that is found not to be compatible is required to be eliminated or modified to make it compatible. New compatibility determinations are required every 10 to 15 years and with the preparation of the refuge comprehensive conservation plan. The few compatibility determinations that have been previously completed for this Refuge were last approved in 1999. There was little or no mention of possible impacts to Refuge habitat or purpose, and no scientific literature was cited.

5.3.2 General Visitation Information

Deer Flat NWR provides opportunities for all of the wildlife-dependent priority public uses (the "Big Six") listed in the Refuge System Improvement Act of 1997, as amended (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation). In addition to providing the Big Six activities, many nonwildlife-dependent public uses also currently occur on the Refuge, especially at the Lake Lowell Unit. Some of these uses include high-speed boating, windsurfing, jogging, swimming, sunbathing, horseback riding, and special events such as weddings.

Estimating current visitor numbers at the Refuge is challenging because of the dispersed nature of access points. The Lake Lowell Unit includes 15 individual access points distributed around the 27 miles of county road surrounding the lake. The Snake River Islands Unit includes 14 improved and unimproved boat launches that provide access to Refuge islands, but also provide access to nonrefuge sites and activities. Visitation data for the Snake River Islands Unit, and for some low-participation activities at the Lake Lowell Unit (e.g., mourning dove hunting) are still based on best professional judgment.

Until July 2005, visitor counts were based on best professional judgment and may not accurately reflect visitation at the 16 public access points. Formal visitor counts began at Lake Lowell in July 2005, but sufficient evening and weekend surveys were not completed until December 2006, so we do not have good data to reflect visitation trends.

The Refuge uses two complementary sampling methods to estimate visitation at the Lake Lowell Unit. The number of vehicles at dispersed access points is counted on at least two weekdays and one weekend day per month in each of three time slots (morning, afternoon, and evening). Load factors to correct data from the vehicle count for number of people per vehicle and visitor activities are determined through direct observations of visitor use at Refuge access points. The access points are designated as one of five location types (improved ramp, unimproved ramp, parking lots, fishing spots, and parks), and each location type is observed on at least two weekdays and one weekend day in each of three time slots (morning, afternoon, and evening).

Visitation estimates at the Visitor Center are based on data from a door counter on the front door. Because the total on the counter does not directly correspond with the total number of visitors for a variety of reasons (e.g., visitors are separately counted as they enter and as they depart, and when they leave and re-enter during a single visit), counter data are corrected with a factor developed from direct observations of the number of visitors relative to the counts recorded on the door counter. Participants in environmental education programs and special events are based on direct counts of participants.

Refuge visitation over the past four years has fluctuated between approximately 167,000 and 225,000. For a more detailed breakdown of visitation, please see Table 5-5.

Table 5-5. Visitor Counts during Fiscal Years (FY) 2010 and 2011. Visitors may engage in more than one activity per visit.

Activity	FY10 Visitation	FY11 Visitation
Waterfowl hunting	4,100	5,100
Upland game hunting	1,000	1,100
Mourning dove hunting	100	100
Big game hunting	75	75
Shoreline or dock fishing	13,400	18,300
Boat fishing	26,600	27,000
Wildlife watching and photography	17,400	23,900
Environmental education	9,200	11,000
Interpretation (including Visitor Center)	6,100	21,000
Nonwildlife-dependent boating	33,500	49,400
Swimming and other beach activities	28,950	38,700
Walking and Jogging	13,800	16,500
Other Activities (e.g., picnicking)	17,950	11,300
Total	**185,375**	**223,475**

In July 2010, Refuge visitors participated in a national visitor survey conducted by the U.S. Geological Survey (USGS; Sexton et al. 2012). There were three activities in which more than 10 percent of those surveyed had participated during the surveyed visit in July 2010: fishing (22 percent), boating (21 percent), and hiking (15 percent). There were five activities in which more than 25 percent of those surveyed had participated during the previous year: fishing (41 percent), wildlife observation (40 percent), hiking (39 percent), motorized boating (36 percent), and bird watching (35 percent). Visitors that participated in only wildlife-dependent recreation (priority-use visitors) were significantly more likely to participate in wildlife observation, bird watching, and hiking than those who participated in both wildlife-dependent and nonwildlife-dependent activities (mixed-use visitors). Priority-use and mixed-use visitors reported similar levels of participation in other wildlife-dependent activities.

The regional population and Refuge visitation are both increasing. According to the 2010 census (U.S. Census Bureau 2010), the population increased 43.7 percent between 2000 and 2010, increasing to 188,923 (U.S. Census Bureau 2010). The population within the city limits of Nampa increased 57 percent since 2000, with a population of over 81,500. The population of Caldwell increased 78 percent since 2000, with a population of over 46,200. Both Nampa and Caldwell have also expanded their city limits to extend immediately adjacent to or closer to the Refuge boundary. The Refuge is within a one-hour drive from for the more than 600,000 people who live in the Treasure Valley.

Refuge visitors are primarily local. In FY11, 95 percent of surveyed vehicles at Refuge access points had Idaho license plates. Of those, 76 percent had plates issued in Canyon County and 17 percent in neighboring Ada County, home of Boise. According to Sexton et al. (2012), most (96 percent) of the visitors participating in the survey live within 50 miles of the Refuge and travel an average of 11 miles to get to the Refuge. Although most visitors were local, a significantly higher proportion of Priority Use Visitors were from outside the local area than Mixed Use Visitors.

According to Sexton et al. (2012), most visitors (89 percent) had visited the Refuge multiple times in the previous year, visiting on average 21 times. Most visitors also visited during multiple seasons (43 percent) or year-round (27 percent), but some visited during only one season (29 percent). Visitors reported spending an average of four hours at the Refuge during their visit and more than half (58 percent) were part of a group during their visit. Priority Use Visitors spent significantly less time (average about three hours) during their visit than Mixed Use Visitors.

Surveyed visitors were generally satisfied with the Refuge (see Appendix L):

- 90 percent were satisfied with the recreational activities and opportunities.
- 85 percent were satisfied with the information and education about the Refuge and its resources.
- 87 percent were satisfied with the services provided by employees or volunteers.
- 89 percent were satisfied with the Refuge's job of conserving fish, wildlife, and their habitats.

5.3.3 General Access

Visitor access to the Refuge is allowed between sunrise and sunset (i.e., day use only). There are no entrance fees for accessing the Refuge. At the Lake Lowell Unit, 63 percent of the land base is open year-round. Of the remaining 36 percent that constitutes closed areas, 21 percent is closed year-round, 10 percent is closed year-round but used for administrative purposes (e.g., farming, maintenance area, and residences), and 6 percent is closed seasonally (October 1 to January 31) to minimize disturbance to wintering waterfowl. Closed areas, no-wake zones, and seasonal closures that are in place are listed below for each unit.

5.3.3.1 Lake Lowell Unit Closures and Access Points

There are permanent closures in six areas of the Lake Lowell Unit:

- The upland area to the northwest of the North Side Recreation Area and to the east of Murphy's Neck;
- The riparian and upland areas between Parking Lot 1 and the New York Canal;
- Around the osprey-nesting structure that is closest to the Visitor Center;
- Maintenance Area and farm fields to the west of Gotts Point;
- Upper Dam Marsh and farm field on Lake Avenue; and
- Areas surrounding the water control outlets on the Upper and Lower Dams.

There are seasonal closures in five areas of the Lake Lowell Unit:

- Wintering wildlife closure at Gotts Point from October 1 to January 31;
- Wintering wildlife closure at Murphy's Neck from October 1 to January 31;
- Winter closure of the Lower Dam Recreation Area from October 1 to April 15;
- Winter closure of the surface of Lake Lowell from October 1 to April 15, with the exception of a 200-yard fishing area in front of the Upper and Lower Dams and 200-yard hunting area along the south shoreline between Parking Lots 1 and 8; and

- Eagle-nesting closure around the eagle's nest in the North Side Recreation Area.

There are three no-wake zones currently on Lake Lowell:

- The southeast end of Lake Lowell starting at Parking Lot 1;
- The area surrounding Gotts Point; and
- Areas surrounding the boat ramps at the Upper and Lower Dams.

Visitor access to the Lake Lowell Unit is provided through 15 individual access points. These access points are as follows:

- Main Refuge entrance at the corner of Roosevelt and Indiana Avenues;
- Upper Dam East Parking Area on Lake Avenue;
- Gotts Point entrance and parking area at the west end of Greenhurst Road;,
- Tio Lane entrance at the south end of Tio Lane;
- Parking Lots 1 to 8 on Lake Shore Drive;
- Lower Dam Recreation Area on Riverside Road;,
- Murphy's Neck walk-through on the west end of Orchard Avenue; and
- Hunting access walk-through on the west end of Greenhurst Road.

5.3.3.2 Snake River Islands Unit Closures and Access Points

There is one seasonal closure for the Snake River Islands Unit: the waterfowl nesting closure on all islands between February 1 and May 31.

Access to the Snake River Islands Unit is by boat only from several boat launches along the Snake River. These public boat launches are maintained by agencies at different levels of government: City, County, State, and Federal.

5.4 Wildlife-dependent Public Uses

The Refuge System Improvement Act of 1997, as amended, identifies hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation as wildlife-dependent, priority public uses for national wildlife refuges. Deer Flat NWR provides opportunities to enjoy each of these priority public uses. More details on individual wildlife-dependent recreation opportunities are outlined below.

5.4.1 Hunting

Almost one-quarter (21 percent) of the Lake Lowell Unit is open to bird hunting. Bird hunting is allowed on the East Side and South Side Recreation Areas for mourning dove, upland game birds, ducks, and coots. The entire Lake Lowell Unit is inside a goose hunting closure area designated by IDFG. General state seasons and limits apply; no special Refuge permits are required. In past years, SUPs have been issued to disabled bird hunters allowing ATV use to access the lake through the gate east of Parking Lot 8.

The South Side Recreation Area and the area east of Parking Lot 1 to the New York Canal are open to a controlled deer hunt, which includes up to 21 percent of the Lake Lowell Unit (depending on water levels). Hunters must have a controlled deer hunt tag issued by IDFG as well as a Refuge Deer Hunt Permit.

Mourning dove season is during the month of September. Upland game bird seasons are usually mid-October until mid- to late January. While the habitat is not optimal for upland game, hunters seem to appreciate the opportunity, and the area receives steady use.

Waterfowl hunting runs from mid-October until mid- to late January, with a late September or early October youth hunt. In the South Side Recreation Area, human- or electric-powered boats can be used up to 200 yards from the shore. In the East Side Recreation Area, waterfowl hunting is walk-in only. A youth waterfowl hunt is allowed in all designated waterfowl hunt zones in accordance with IDFG regulations. There are no blinds or designated hunting spots. Portable blinds are allowed if they are removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis.

Concerns have been raised about the quality of the waterfowl hunt, with comments about overcrowding and pass shooting. The closest public hunt area for walk-in hunters is at Fort Boise Wildlife Management Area, about 30 miles west, so there is high demand for good hunting closer to population centers. Many hunters with boats go to the Snake River Islands Unit or elsewhere along the Snake River.

All Refuge islands are open to hunting for mourning dove, upland game, waterfowl, coots, and deer. There are no blinds or designated hunting spots. Portable blinds are allowed if removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis. General state seasons and limits apply (see typical seasons above), although spring hunts are not allowed during the nesting closure between February 1 and May 31. In recent years, there have been occasional complaints from neighbors on the shoreline about noise from waterfowl hunting. Complaints may increase as development of shoreline homes continues in certain stretches of the river. There have been occasional requests for guided waterfowl hunts on Refuge islands. Guided waterfowl hunting is illegal in Idaho but allowed in Oregon.

5.4.2 Fishing

The entire lake is open to fishing from boats between April 15 and September 30. Between October 1 and April 14, fishing is allowed from human-powered boats 200 yards in front of the Upper and Lower Dams (Fishing Areas A and B). Boat fishing is popular throughout the boating season, and peaks from April through June.

Shoreline fishing is allowed from open shoreline, with the exception of waterfowl-hunting season, when fishing is allowed only in Fishing Areas A and B, 200 yards in front of the Upper and Lower Dams (about 120 acres). Shoreline fishing is common from April through September and is usually highest in June.

Table 5-6. Lake Lowell Fishing Access by Season

Timeframe	All Open Shoreline Areas	Shoreline in Front of Dams	On Open Areas of Lake Lowell	In Front of Dams from Human-powered Vessels
April 15 to September 30	X	X	X	X
From October 1 to start of waterfowl hunting season	X	X		X
During waterfowl hunting season		X		X
From end of waterfowl hunting season to April 14	X	X		X

During the boating season, there is an ADA-accessible fishing dock at the west Upper Dam boat ramp. This is the only ADA-accessible fishing opportunity at the Refuge and the only designated fishing dock. Anglers frequently request to fish from boat launching and swimming docks, which are posted with signs reading "No fishing from docks." Currently, rules against fishing from boat docks are not enforced when there is minimal boating traffic and anglers do not interfere with launching boats.

The lake has been stocked with channel catfish and Lahontan cutthroat trout in recent years. In the future, IDFG plans to continue stocking channel catfish as funding is available and stocking is necessary (pers. comm., J. Kozfkay 2012). General state seasons and limits apply, with the exception that bass fishing is catch-and-release from January 1 through June 30. A 12- to 16-inch slot limit for bass is in place for the rest of the year.

SUPs (with a $100 fee each) are issued to three to five groups each year for bass tournaments. Tournaments can be launched only from the Lower Dam Recreation Area, which offers the most parking. To provide access for a variety of lake users, fishing tournaments cannot be scheduled on consecutive weekends. Fishing tournaments are also not allowed between May 14 and July 9 to minimize disturbance to breeding and nesting birds.

Tournaments are currently limited to 100 boats. Larger bass tournaments limit access of other lake users to the boat launch. In addition, the Refuge has received complaints from other anglers stating tournament participants crowd them out of prime fishing areas. Because bass tournaments at Lake Lowell collect data for IDFG on bass populations, they are considered "conservation tournaments," which allows them to hold and weigh in bass outside of the normal public regulation. Bass that are caught during tournaments are placed in an IDFG holding tank after being weighed and measured and are returned to the lake at the end of the tournament.

In an attempt to increase the number of youth anglers and family fishing opportunities at the Refuge, Kids Fishing Day was introduced at the west Upper Dam boat launch in 2009. It was moved to Gotts Point in 2010. The number of youth anglers attending Kids Fishing Day has increased each year and reached 190 in 2011. Volunteers and partners from Canyon County Parks and Recreation, the Canyon County Sheriff's Office, and local fly-fishing and bass clubs help make this event a success.

Currently, some ice fishing occurs when the lake freezes. Low temperatures for extended periods are unusual, and it is uncommon for the entire lake to freeze over. Therefore, this activity presents safety concerns. In addition, there are concerns about disturbance to wildlife resting on the ice or in open patches of water. The Refuge does not have any specific regulation addressing ice fishing.

Shoreline fishing is allowed on all islands in the Snake River Islands Unit from June 1 to January 31. Anglers occasionally fish from Refuge islands, but fishing is more common near Refuge islands from boats.

IDEQ has collected fish tissue samples that showed high mercury concentrations (see Section 3.9.1). Subsequently, the Idaho Department of Health and Welfare issued a fish consumption advisory for Lake Lowell in 2003. These advisories are posted at fishing access points around the lake. A statewide fish consumption advisory has recently been issued for bass. No information about this advisory for Refuge islands is currently posted on Refuge river kiosks, but information is provided on the Refuge website.

5.4.3 Wildlife Observation and Photography

There are currently no Refuge signs directing visitors to prime viewing areas, but wildlife observation and photography do occur throughout the Refuge. Some of the best locations are in the North Side Recreation Area west of the Visitor Center and at the Tio Lane entrance. From the Tio Lane entrance, the East Dike Trail gives access to wetlands and the Kingfisher Trail allows access to riparian forests and the lakeshore. Gotts Point is a popular place for photographing sunsets.

Most wildlife-watching and photography facilities are located in the North Side Recreation Area and include the Visitor Center viewing room and spotting scope, an osprey-nesting webcam, trails, two ADA-accessible wildlife-viewing platforms, and a wildlife-viewing blind.

The most recent compatibility determinations allow walking and jogging (with the exception of competitive jogging) on roads, trails, and firebreaks. Currently, the requirement to remain on roads, trails, and firebreaks is not being communicated to the public, and people frequently leave trails for wildlife observation and photography as well as for other recreational activities.

Informal pamphlets describing a 29.5-mile Lake Lowell Unit Bird Tour, a 47-mile Snake River Islands Unit Bird Tour (that guides visitors past 10 Refuge islands) and a 0.5-mile Habitat Hike along the Nature Trail are available in the Visitor Center. The best season for viewing a wide variety of wildlife at the Lake Lowell Unit is from September through December, when there are large concentrations of waterfowl and the raptors they attract. The best season for viewing at the Refuge islands is spring, when there are large concentrations of migrating waterfowl. The islands themselves are closed to public entry from February 1 through May 31 (to provide sanctuary to nesting birds), but wildlife observers and photographers can enjoy wildlife from boats near Refuge islands.

Only one SUP has been issued for wildlife photography, to a Refuge volunteer who makes his photos available for Refuge use. The same volunteer partnered with the Friends of Deer Flat Wildlife Refuge (Friends) to offer an on-refuge photography workshop in June 2008. There are currently no designated photography blinds.

5.4.4 Environmental Education

The Refuge offers EE programs both on- and off-site to help promote an understanding of wildlife and the natural environment, as well as Deer Flat NWR and the NWRS. In 2010, a new EE program was developed and implemented in partnership with Canyon County Department of Parks, Recreation, and Waterways; Northwest Nazarene University; and the Friends of Deer Flat Wildlife

Refuge. The new program, Discover Wildlife Journeys, provides more opportunities for children to explore Refuge lands and focuses on experiential learning.

Both on- and off-site programs have been correlated with state educational standards. Requests for on-site programs usually peak in May, while demand for off-site programs is fairly steady between October and May. Other on-site educational offerings include Reading at the Refuge (a preschool reading program) and Scout Day (a popular monthly program for Boy and Girl Scouts begun in January 2008). The Refuge also hosts occasional hunters' education courses each year put on by IDFG, and has hosted teacher workshops as part of Project WILD and Project Learning Tree.

During FY11, approximately 11,000 people participated in EE programs led by Refuge staff (see Table 5-5); participation was split roughly equally between on-site and off-site programming. Considering recent efforts to more directly connect children with nature, it would be beneficial to increase the proportion of programs offered on-site. Teachers often request classroom programs because their ability to participate in field trips is limited by transportation funds and time. In spring 2011, to increase the amount of on-refuge EE, the Friends began providing full and partial bus scholarships to local schools with more than 50 percent of their students receiving free and reduced lunch.

Participation in both on- and off-site EE programs has been steadily increasing since hiring a full-time, 11-month AmeriCorps volunteer or Friends EE Intern each year since fall 2004. However, some requests for EE programs have been turned down each year since 2008 because the demand cannot be met with current staffing levels. Educators whose requests cannot be accommodated are referred to the 10 Refuge Traveling Trunks that are loaned to educators.

The Environmental Education Building at the Lower Dam Recreation Area is available for rent between April 15 and September 30 by teachers and youth group leaders conducting EE programs. The current rental fee is $20 for the first seven days and $20 each for every additional seven-day period. In 2011, the building was rented by seven Boy Scout groups and used by over 3,600 people, 3,300 of whom attended either a two-week day camp in June or a two-day day camp in July. This is the only Refuge location where camping is allowed; camping is only allowed in conjunction with EE activities. Half of the groups that rented the building in 2011 camped, with a total of about 150 people. We have had occasional requests for other on-site camping and occasional requests for non-EE uses of this facility.

5.4.5 Environmental Interpretation

The Visitor Center includes interpretive displays about Refuge history, local natural history (including wildlife and habitats), Refuge management activities, the role of the reservoir in irrigation and recreation, and the missions of the NWRS and Reclamation. Movies are also provided upon request on topics relating to wildlife biology, the Refuge, the NWRS, and the Service. There is currently no movie focusing on the history and importance of the Refuge.

There is a self-guided Nature Trail brochure about habitat that corresponds with numbered posts along the half-mile Nature Trail. In addition, several interpretive signs that were purchased and installed by the Friends as part of a Preserve America grant can be found along the 1.2-mile Centennial Trail from the Visitor Center to the east end of the historic Upper Dam.

Despite requests from the general public and Friends members, regularly scheduled, staff-led interpretive walks and talks are not currently offered due to limited staff. Volunteer-guided walks have been offered in conjunction with special events in recent years and are usually well attended. The Wild About Life monthly lecture series, begun in January 2007, presents interpretive/educational programs for adults by invited speakers. This popular program is coordinated by our full-time Friends EE Intern.

Many Refuge visitors do not realize that they are at a national wildlife refuge or, if they do, they don't understand the mission of Deer Flat NWR and the NWRS. Although brochures are provided in brochure boxes on regulation signs at all major access points, there are no interpretive signs or maps at the Lake Lowell Unit, with the exception of those along the Centennial Trail. With the exception of the Visitor Center, high-use Refuge areas are not staffed with staff or volunteers. Visitors to the Snake River Islands Unit can find informational signs and maps displayed in kiosks at many of the most-used Snake River boat launches along the 113 river miles of the Snake River Islands Unit.

5.5 Other Refuge Uses

Although not considered priority uses of the National Wildlife Refuge System as defined by the Refuge System Administration Act, as amended, there are currently several types of nonwildlife-dependent recreation activities occurring on the Refuge.

5.5.1 History of Nonwildlife-dependent Uses

In 1909, Reclamation completed construction of Lake Lowell, a reservoir designed to serve as an off-stream irrigation water storage facility as part of the Boise Project. Recognizing that a reservoir located in an arid environment would attract wildlife, President Theodore Roosevelt established Deer Flat NWR in 1909 reserving the reservoir for the purpose of providing a "refuge and breeding grounds for migratory birds and other wildlife."

From 1909 to 1937, there was no Refuge Manager assigned to Deer Flat NWR, and public use activities went unchecked. In 1911, a Service representative noted 30 rowboats and three gasoline-powered launches on the lake. By the time the first Refuge Manager arrived, the Refuge was mostly used for picnicking, swimming, fishing, and boating. Starting in the 1940s, many new uses began to occur on the Refuge including motorboat regattas, waterskiing, ice skating, waterski jumping, retriever meets, a water show, movie filming, and refreshment and motorboat concessions. By 1950, the amount of public use activity at Deer Flat NWR caused the Refuge Manager to state in the annual narrative that "it can be forcibly brought to one's attention here that wildlife and the general public just don't mix well." The number of visitor days in May 1951 through August 1951 was estimated at 25,000, excluding fishermen. Managers continued to voice concerns over the amount of public use on the Refuge in the Refuge's annual narratives for 1955, 1956, 1957, and 1959.

There are several mentions in the 1960s and 1980s of conflicts arising between fishermen and waterskiers/motor boaters. And, in 1969 the Refuge Manager wrote that recreation is a 24-hour-per-day job at Deer Flat. Lifeguards were hired for the swimming areas, and the Upper and Lower Dams were closed at night to reduce vandalism and littering.

By 1974, Refuge Managers were attempting to de-emphasize nonwildlife-dependent recreation, but because the Refuge had been long-used for picnicking, swimming, boating and waterskiing, they

doubted these activities could ever be phased out. A "non-program use evaluation" stated that none of the types of boating currently allowed were essential for any programs and that all activities described were in conflict with the Refuge's purposes.

Upland uses such as jogging, cross-country practice, running meets, horseback riding, cross-country skiing/snowshoeing, and picnicking have taken place on the Refuge. In 1994, compatibility determinations allowing bicycling and jogging were completed with the stipulation that no competitive events would be allowed. At the same time, compatibility determinations also allowed horseback riding, picnicking, and cross-country skiing, with few or no stipulations. Based on the assumption that administrative responsibility for on-water uses rested with Reclamation, no compatibility determinations were developed for on-water recreation at this time. The compatibility determinations for upland uses were extended in 1999.

Between 1980 and the present day, more uses have occurred, including jetskiing, wakeboarding, windsurfing, tubing, and kiteboarding. The Lower Dam Recreation Area is now a popular area for swimming, reunions, weddings, birthday parties, and barbeques. From 2000 to 2007, the average annual visitation has been over 162,000 visitors.

5.5.2 Authorization of Nonwildlife-dependent Recreation

There are no compatibility determinations on file for on-water nonwildlife-dependent recreational uses. These uses have been occurring without Refuge authorization and, therefore, are contrary to the Refuge Recreation Act of 1962, as amended and the National Wildlife Refuge Administration Act of 1966, as amended. Therefore, none of the current on-water Refuge uses can be extended without first completing a compatibility determination.

Some nonwildlife-dependent upland uses (i.e., jogging, walking, horseback riding, picnicking, bicycling, and cross-country skiing) have extremely brief compatibility determinations that were completed in 1994 (extended by signature in 1999). These compatibility determinations do not take into consideration the timeframe of the use or the budget and staffing needed to manage the use, nor do they adequately address potential impacts to wildlife, habitats, and wildlife-dependent users as required by Service policy (603 FW 2). No scientific research was cited in the compatibility determinations, so it is difficult to know what types of information were relied on to make the decisions. As part of the CCP process, the compatibility determinations for all Refuge uses have been reassessed using the best science available at this time to take into consideration impacts to wildlife and habitat as well as wildlife-dependent users (see Appendix B).

5.5.3 Boating and Other Water Sports

Between April 15 and September 30, motorized and nonmotorized boats are allowed on the entire lake. Nonwildlife-dependent boating (including use of personal watercraft) is highest in June and July. Between October 1 and April 14, human-powered boats or boats with electric motors are allowed for waterfowl hunting only in the South Side Recreation Area within 200 yards of the water's edge and human-powered boats are allowed in Fishing Areas A and B.

Improved boat ramps are located at the Lower Dam Recreation Area and the east and west ends of the Upper Dam. Unimproved ramps are available at Parking Lots 1 and 7. Current launching facilities are not adequate for current demand, as indicated by long lines to launch boats and

inadequate parking. All ramps are subject to closure due to low water levels. Nonwildlife-dependent boaters conflict with anglers and wildlife watchers/photographers. Currently, many nonmotorized boaters launch at Parking Lot 1, which is inside the no-wake zone, to avoid the high-speed motorized traffic. Unfortunately, Parking Lot 1 often closes before the end of the boating season because of low water levels and has been seasonally blocked by a beaver dam in recent years. Windsurfers and kiteboarders have commented that Gotts Point and Parking Lot 3 are their most highly used launching sites.

On the east side of the lake is a no-wake zone that encompasses about 12 percent of the lake (based on a water level elevation of 2,518 feet). The no-wake zone was instituted in 1990 to reduce disturbance to nesting bald eagles. Marine deputies with the Canyon County Sheriff's Office patrol the lake and conduct boat safety inspections, but they are currently unable to enforce Refuge-specific regulations like the no-wake zone at the southeast end of the lake. Canyon County Marine Patrol deputies currently maintain the boating and swimming docks. According to the USGS lake use study (see Appendix L), 88 percent of vessels observed in this no-wake zone were in compliance with the no-wake regulation.

Power boats, personal watercraft, sailboats, rowboats, canoes, kayaks, windsurfing boards, and kiteboards are all used on the lake. However, according to an observational survey of visitor use on Lake Lowell conducted in summer 2011 (see Appendix L), most (88 percent) are motorboats and most (86 percent) are 16 to 25 feet long. The survey divided the lake into three areas: the West Pool (west of the Narrows), the Headquarters section of the East Pool (east of the narrows to the line from Gotts Point south to the south shore), and the East section of the East Pool (east of the Headquarters Pool). Boating activities varied slightly between pools. Fishing was the most popular activity on both the West Pool (40 percent of observed boats) and the East section of the East Pool (53 percent of observed boats) and second-most popular on the Headquarters section of the East Pool (27 percent of observed boats). Skiing and tubing was the second-most popular activity overall and was most popular on the Headquarters section of the East Pool (29 percent) and second-most popular on the West Pool (22 percent) and East section of the East Pool (21 percent).

The USGS lake use study (see Appendix L) also found that, consistent with the observation that the most popular activity was fishing, the most common vessel speed (among 47 percent of boats observed) throughout the lake was idling (i.e., the minimum speed that maintains steerage of a vessel, or the speed at which a vessel is normally docked). In addition, consistent with the second-most popular activity being skiing and tubing and other tow-behind activities, the second-most common vessel speed (36 percent of boats observed) was planing (i.e., traveling at sufficient speed to partially raise the bow out of the water).

According to the USGS lake use study (see Appendix L), most boats at Lake Lowell (74 percent) were observed in open water. Boat locations varied by pool. In the West Pool and East section of the East Pool, where fishing was the most popular activity, boats were less likely to be observed on open water (East section of the East Pool, 64 percent; West Pool, 72 percent) than in the Headquarters section of the East pool (83 percent), where skiing and tubing was the most popular activity. As might be expected where more boaters were fishing, boats in the West Pool and East section of the East Pool were more likely to be observed in emergent beds (East section of the East Pool, 15 percent; West Pool, 12 percent) or on the edge of emergent beds (East section of the East Pool, 18 percent; West Pool, 8 percent) than in the Headquarters section of the East Pool (Emergent beds, 3 percent; edge of emergent beds, 6 percent).

The USGS lake use study (see Appendix L) also estimated low and peak numbers of vessels at one time (VAOT) in each pool. The peak number of VAOT in the East Section of the East Pool was 23 during the Fourth of July weekend. In the Headquarters section of the East Pool, peak number of VAOT was 51 on July 10, but this was not consistent with other counts. The next highest number of VAOT, on Labor Day weekend, was 14. The peak number of VAOT in the West Pool was 23 on August 20. Number of boats per acre calculated for these three areas based on the USGS lake use study's (see Appendix L) peak VAOT results do not exceed published optimum boating densities summarized by the Lake Ripley Management District (2003).

SUPs have been issued in recent years to the Southern Idaho Sailing Association to hold sailing regattas at the lake, launching from the Lower Dam Recreation Area. These are reasonably small events, with 17 registered participants in the most recent regatta. The regattas follow a set course demarcated by buoys. Members of the Southern Idaho Sailing Association provide "sail-alongs" for those who are new to sailing and are interested in learning. According to policy, SUPs should be issued in support of one of the priority uses when that use is both appropriate and compatible. Sailors rarely participate in priority uses. Local boat shops also occasionally demonstrate boats at the lake, and commercial wind sports lessons have been advertised without requesting SUPs.

5.5.4 Walking with Pets, Jogging, Biking, and Horseback Riding

A variety of nonwildlife-dependent activities occur at the Refuge in addition to recreational boating. Walking with pets, jogging, bicycling, and horseback riding occur throughout the year, but these activities peak between April and July. Track teams have historically used the Observation Hill Trail for practice sessions, even though a 1994 compatibility determination did not allow competitive jogging. A number of visitors walk dogs, jog, and bike along the entrance road. Although the speed limit is 25 miles per hour, vehicles often travel faster, posing a safety hazard to those recreating on the road.

The most recent compatibility determinations allow walking, bicycling, noncompetitive jogging, and horseback riding on maintained roads, trails, and firebreaks. Currently, the requirement to remain on roads, trails, and firebreaks is not being communicated to the public, and people do leave roads and trails. Horseback riding and bicycling are not very common. Some equestrians and bicyclists go off-trail, thus increasing disturbance to wildlife and habitat. Most use by cyclists, horseback riders, and dog walkers appears to occur on the Kingfisher, Gotts Point, and Observation Hill Trails. Refuge personnel have noticed that when parts of the Observation Hill Trail have been closed for several months during recent years to protect a bald eagle nest from disturbance, there has been an increase in the visibility of deer and other wildlife in the closed area, showing the importance of seasonal closures and on-trail travel

5.5.5 Swimming and Sunbathing

Swimming and other beach activities are popular at Lake Lowell. In FY11, an estimated 38,700 people participated in swimming and other beach activities. The only designated swimming beach on the Refuge is currently located at the east end of the Upper Dam and is marked with docks and buoys. Swimming also occurs along the shoreline to the east and south, including areas accessed via the parking lots along the curved portions of Iowa Avenue, at the Lower Dam Recreation Area, at Gotts Point, and occasionally at other Refuge accesses. Swimming also occurs in conjunction with recreational boating activities. As recently as 2011, swimming fatalities have occurred at the Refuge.

The 2011 fatality occurred outside of the designated swimming area, and emergency response was delayed due to confusion over where the victim was located.

Swimming may occur from Refuge islands, although there are no designated swim beaches. The Refuge does not have management control of lands below the ordinary high water mark and therefore has no control over swimming in the Snake River.

Sunbathing mostly occurs on the docks and beach adjacent to the swimming area at the Upper Dam and on the beach at the Lower Dam Recreation Area. Additional sunbathing occurs in conjunction with swimming at easily accessed shoreline areas around the lake, including Gotts Point and Parking Lot 7. Sunbathing is not known to occur on the Refuge islands.

Lake Lowell has persistent problems with water quality and is on the State's 303(d) list as an impaired water body (see Chapter 3). Nutrient-rich irrigation return flows have combined with shallower depth and high water temperatures during summer to produce dense blue-green algae blooms. Refuge personnel have also received complaints from recreationists about swimmer's itch and ear infections. The Refuge does not monitor for these health concerns and issues no warnings. As far as the Refuge is aware, no agency is monitoring water quality for swimming-related health risks. The Refuge will report large algal blooms and reports of other health concerns to Southwest District Health and work with them to test water quality and assess suitability for water contact. Southwest District Health will issue warnings if they feel that conditions are unsafe.

5.5.6 Geocaching

Geocaching currently occurs on the Refuge. Geocachers use global positioning system (GPS) coordinates to find a small, hidden cache. Geocachers can cause habitat damage by burying caches or placing them in sensitive vegetation. Local geocachers have been notified that caching is not allowed on the Refuge, but caches are now often placed on private land accessed through off-trail travel across Refuge land. The demand for geocaching could potentially be met by providing virtual geocaches—GPS coordinates to legally accessible scenic, historic, or wildlife-related locations—but virtual geocaching is currently not available.

5.5.7 Winter Sports

Ice skating and ice fishing occur occasionally on the Refuge. Both of these ice-dependent sports occur during a time when the lake is closed to public use for wintering wildlife. Ice sports also raise concerns about safety, because there are no trained staff members available to conduct systematic ice evaluations and winter temperatures do not normally provide stable ice conditions. Signs are currently in place to discourage these uses.

Cross-country skiing is currently allowed on roads and trails. Because of the lack of heavy snowfall and/or enduring snow cover in the Treasure Valley, cross-country skiing is an infrequent Refuge use.

There have been requests in the past for ice diving and cross-country skiing on the frozen lake.

5.5.8 Picnicking and Events

The Lower Dam Recreation Area offers both a covered picnic shelter and scattered picnic tables. Visitors often request to reserve the shelter for weddings, birthdays, or other events, but it is currently available on a first-come, first-served basis. There are currently no regulations regarding size of events, sound systems or bands, or large tents or inflatables. Several times a year, visitors erect a giant inflatable "bounce house," and visitors have also installed removable waterslides. Some of these events and event accessories disturb other users and/or wildlife, make it difficult for general visitors to use the Refuge, or present an unnecessary safety hazard.

5.6 Illegal Uses

The Refuge struggles with numerous law enforcement (LE) issues, such as resource violations, trespass into closed areas, theft, gang activity (including "tagging" at most Refuge entrances), alleged sexual abuse of a child, and assaults. Most violations occur at night and on weekends, but with increasing visitation, they can arise any time. Enforcement of regulations has become increasingly important as pressure from increased visitation/public use affects Refuge resources and increases concerns about visitor safety and user conflicts.

In the past, there were at least two dual-function Refuge LE officers. Currently the Refuge does not have any LE staff. LE assistance is provided by the Zone LE officer (who is responsible for eastern Oregon, all of southern Idaho, and northern Nevada). Assistance is also provided by the Canyon County Sheriff's Office, the Canyon County Marine deputies, and IDFG, but these agencies increasingly have other priorities and obligations. These agencies are unable to enforce Refuge-specific regulations, leaving many violators unaccountable for their actions. Violations of Refuge regulations have been catalogued by Refuge staff since 2009 and were also reported to the Refuge by the Canyon County Marine deputies in 2011.

Because of the extent of illegal dumping, littering, and vandalism, some areas of the Refuge have been restricted. The decision to make Gotts Point a walk-in only area and the closure of gates at Parking Lots 1 through 7 during portions of the year were both responses to these types of illegal activities.

5.6.1 North Side Recreation Area

The most common violations in the North Side Recreation Area include walking with off-leash dogs; horseback riding, walking, jogging, and biking off the maintained road, trail, or firebreak; and entering closed areas (e.g., farm fields, osprey and bald eagle nest areas, Upper Dam Marsh). Off-leash dogs can chase, injure, and kill wildlife. Additionally, they can cause other Refuge visitors to be uneasy. Off-trail users have created many social trails. Use of these social trails has increased the sphere of disturbance to wildlife and impacts to wildlife habitat—both upland and riparian habitats. Unscientific observations by Refuge staff have indicated that these activities create disturbances to wildlife.

5.6.2 East Upper Dam Boat Launch

Enforcement issues at this location are associated with heavy public use and include vandalism, litter, and noncompliance with parking restrictions. Other violations include use of fireworks and occasional vehicle trespass on the beach. This area is across from the County park, and the Canyon County Marine deputies are often present conducting boat inspections and other enforcement activities.

5.6.3 Lower Dam Recreation Area

This area receives significant use from visitors primarily for nonwildlife-dependent activities and is plagued with enforcement challenges, including vandalism and litter, use of fireworks and metal detectors, night use, trespass of vehicles on the beach and on the lawn, theft of government and private property, assaults, and other violent crimes. Trespass into this area after October 1 is also quite common and can impact wintering waterfowl using the lawn. Overcrowding during the summer has reached a point where emergency responders have been unable to reach patients.

5.6.4 South Side Recreation Area

Various hunting violations occur in this area, including several poaching cases, use of lead shot, and trespass into closed areas. With the help of officers from IDFG, many hunters responsible for violating State hunting regulations have been caught and held accountable for their actions.

Target shooting, paintballing, and vandalism occur regularly. Dumping is common because the road bordering the Refuge (Lake Shore Drive) is a popular route to the County landfill. During low-water years, off-road vehicles can sometimes reach the shoreline from boat launches and cause habitat damage.

5.6.5 East Side Recreation Area

The Tio Lane entrance is located at the end of a 1-mile County road. With its relative isolation and thick riparian habitat, this location has several enforcement issues. It is a favored location for paintballers. The seclusion of this area draws regular night use. Anglers fishing the New York Canal leave litter, and it is not uncommon to find fire rings. Over 2,500 marijuana plants were discovered in this area in 2005. This area is open to hunting and therefore has some resource violations. The most common violations along the Kingfisher Trail are similar to violations seen at the North Side Recreation Area (e.g., off-leash dogs and horseback riding, walking, jogging, and biking off the maintained road or trail).

5.6.6 Gotts Point

In the years leading up to the 2007 closure of the road at Gotts Point, this fairly isolated location was plagued by law enforcement issues, including vandalism of government property (bathroom, signs, fences, gates, and other facilities), human-caused wildfires, litter, dumping, habitat damage from off-road driving, misuse of the gravel road (leading to disrepair), and a host of other unlawful activities such as drug use and solicitation. The area had been closed several times for extended periods in the past while repair and replacement work were completed.

While enforcement issues are not as pervasive as they once were when the road was open out to the point, there are still problems with off-road driving, litter, and vandalism. These unlawful activities affect both Refuge resources and visitors' experience.

Gotts Point is also a common area to find visitors after sunset in violation of the day use only regulation.

5.6.7 Lake Lowell

Although the airspace is restricted over the Refuge and the use of float planes on national wildlife refuges is not allowed by law (50 C.F.R. 27.34), we get occasional reports that float planes have landed on the lake. A citation was issued in 2005 to someone who landed on the lake. During the growing season it is not unusual to see low-flying crop dusters using the airspace over the Refuge as a turnaround. This low flight can occur over sensitive areas like heron rookeries.

Each season, the County Marine Patrol reports violations of the day use only regulation by Refuge boaters. These violations are a safety concern because of their potential to cause harm to the individual through potential stranding on the Refuge at night, as well as disturbance to wildlife.

There are some violations of the no-wake zone in the southeast end of the lake. According to the USGS lake use study (see Appendix L), 12 percent of vessels observed in this no-wake zone were not in compliance with the no-wake regulation during a lake use study in 2011. Bass fishermen have complained on several occasions about other boaters speeding through the no-wake zone without any repercussions. Access by boat to some closed upland areas has also been documented.

5.6.8 Snake River Islands Unit

Law enforcement coverage has been lacking on the islands because of limited staffing and logistical difficulties. Common law enforcement issues on the islands include litter, fires, camping, and trespass during the waterfowl-nesting season. Hunting violations include use of lead shot for upland game, building permanent hunting blinds, and hunting game that are not open (e.g., raccoons, turkeys).

As with many other Federal lands, the use of Refuge lands for the growing of illegal drugs has become commonplace. Refuge officers work diligently on the Lake Lowell Unit and the Snake River Islands Unit to locate and remove illegal grow sites. In 2011, a small marijuana grow site was located on one of the Refuge Islands. Coordination with State and local law enforcement agencies is important in the effort to locate and eradicate such sites.

5.6.9 General

In the past year, the Refuge has noticed an increase in the number of individuals "camping" in their vehicles in Refuge parking areas. According to County Sheriff's deputies, this is an increasing trend in the local area and may be associated with the poor state of the local economy and the high occurrence of foreclosures.

5.7 Area Outdoor Recreational Opportunities and Trends

Idaho is well known for outdoor recreational opportunities. The State's 2002 Idaho Outdoor Recreation Survey (cited in Idaho Department of Parks and Recreation [IDPR] 2006) found that the top 10 favorite outdoor activities for adults, in order of preference, were walking; hiking; watching wildlife other than birds or fish; swimming in a pond, lake, or river; viewing fish; bird watching; biking; four-wheel driving; golf; and outdoor photography. The top 10 favorite outdoor activities for kids (as reported by adults) were swimming in a pond, lake, or river; hiking; swimming in a public outdoor pool; walking; biking; watching wildlife other than birds or fish; running; waterskiing or other towing water sports; outdoor basketball; and ATV riding.

IDPR operates 30 State parks and manages registration programs for boats, snowmobiles, and off-highway vehicles. IDPR distributes funds from the registrations and other sources to communities and other agencies to develop and maintain trails, facilities, and programs. Some of these funds have been distributed to Canyon County Parks, Recreation, and Waterways for facilities and services at Lake Lowell (e.g., maintenance of paving, purchase of docks and regulatory buoys).

5.7.1 Nearby Recreational Opportunities

Many parks in Canyon and Ada Counties provide local outdoor recreational opportunities. For instance, Canyon County Parks, Recreation, and Waterways administers Idaho's only archaeological park, Celebration Park. Located near Melba, along the Snake River, Celebration Park supports hiking, fishing, boating, picnicking, camping, horseback riding, bird watching, and interpretive programs. Several large reservoirs in southwest Idaho and eastern Oregon offer many of the same recreational opportunities as Lake Lowell (Table 5-7).

Table 5-7. Recreational Opportunities at Other Large Reservoirs in Southwest Idaho and Eastern Oregon

Reservoir	Approximate Distance from Lake Lowell	Managing Agency	Fishing	Hunting	Motorized Boating	Tow-behind Activities	Sailing	Kiteboarding and Windsurfing	Swimming	Picnicking
Lucky Peak	36 miles	U.S. Army Corps of Engineers, IDPR, and IDFG	X	X	X	X	X	X	X	X
Black Canyon	45 miles	Reclamation and IDFG	X	X	X	X	X	X	X	X
Arrowrock	56 miles	Reclamation and Boise National Forest	X	X	X	X	X	X	X	X
C.J. Strike	73 miles	Idaho Power, BLM, and IDFG	X	X	X	X	X	X	X	X
Owyhee	78 miles	Oregon State Parks and Recreation	X	X	X	X	X	X	X	X
Brownlee	98 miles	Idaho Power	X	X	X	X	X	X	X	X
Cascade	104 miles	Reclamation	X	X	X	X	X	X	X	X
Anderson Ranch	106 miles	Reclamation and Boise National Forest	X	X	X	X	X	X	X	X

5.7.2 Outdoor Recreation Rates and Trends

Although the housing boom has slowed in the Treasure Valley and across the nation, population in the surrounding area is likely to continue to grow, and demand for recreational opportunities is likely to increase. The 2006-2010 Statewide Comprehensive Outdoor Recreation Plan (IDPR 2006) measured baseline recreation information from 2002 against data collected in 2004-2005. Even in this short amount of time, there were large changes in participation in many activities. Table 5-8 represents participation rates that changed by 10 percent or more for activities currently found on the Refuge (whether allowed or not).

Table 5-8. Percent Change in Participation by Activity, 2002-2005

Activity	Change
Geocaching	154%
Outdoor photography	44%
Jet boating	30%
Bird watching	29%
Snowshoeing	28%
Canoeing	26%
Walking for exercise	22%
Watching wildlife	21%
Cross-country skiing	15%
Running	-26%

Source: IDPR (2006).

Some reasons that geocaching might top this list are that there was a dramatic change in people's knowledge of the activity between 2002 and 2005 and handheld GPS units may have become more readily available and inexpensive. Given that only 4.8 percent of the population considered themselves regular participants or enthusiasts, it is believed that the number of people participating in geocaching is still small (IDPR 2006). The increased interest in geocaching could create the need for an increased law enforcement response.

The large increase in outdoor photography can likely be attributed to the ability to take high-quality digital pictures fairly inexpensively in comparison to traditional film photography. Digital photography is relatively simple and offers an immediate opportunity to view pictures that film photography cannot provide. Among Idahoans surveyed in 2005, 70 percent participated in outdoor photography and more than half were regular participants or enthusiasts (IDPR 2006). IDPR (2006) surmised that the increase in participation in outdoor photography may partially account for the rise in wildlife viewing and bird watching as well.

IDPR (2006) pointed out that the 30 percent increase in participation in jet boating was much greater than the 5.5 percent increase in registration of all power boats in Idaho from 2001 to 2006. Canoeing also increased by 26 percent in the 2002-2005 timeframe. About 42 percent of Idahoans participate, at least occasionally, in nonmotorized boating. Statewide boater registrations went up 2 percent between 2008 and 2009, from 86,454 to 88,200 registrations (IDPR 2010). In Canyon County, boater registrations increased just under 1 percent in the same period, from 4,664 to 4,707. In Ada County, they decreased 2 percent in the same timeframe, from 7,411 to 7,257 boater registrations. According to Bowker et al. (1999), demand for water-based recreational activities regionally is expected to grow faster than population growth. The IDPR also reports day-use visits at parks increased slightly between 2002 and 2006, from approximately 2,000,000 to 2,100,000 respectively (IDPR 2006).

IDPR (2006:10) noted that "the outdoor recreation professionals on the Task Force also identified emerging issues that are yet to catch the attention of much of the recreation public (i.e., the closing window of opportunity many communities in Idaho have to acquire land for parks, open space, and community pathways, and the growing need for opportunities to increase the physical fitness of residents."

The 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation, a comparison of national participation in wildlife-oriented recreation between 1996 and 2006, showed a significant decline of 7 percent in the number of hunters from 1996 to 2001. Although there was also a decline of 4 percent from 2001 to 2006, the change was not significant. There was also a significant decline of 15 percent in the number of anglers from 1996 to 2006. Finally, although the number of all wildlife watchers (including around-the-home and away-from-home) increased from 1996 to 2006, there was actually a non-significant 3 percent decline in the number of away-from-home wildlife watchers (USFWS and U.S. Census Bureau 2006).

5.8 Social/Economic Environment

The following description of the current social and economic environment was compiled by the Policy Analysis and Science Assistance Branch of the USGS.

5.8.1 Regional Economic Setting

Located southwest of Boise, Idaho, the Refuge offers opportunities for visitors to enjoy a variety of recreational activities; as discussed throughout this CCP, some of these activities depend on the presence of wildlife and others do not. These recreational opportunities attract outside visitors and bring in dollars to the community. Associated visitor activities—such as spending on food, gasoline, and overnight lodging in the area—provide local businesses with supplemental income and increases the local tax base. Management decisions for the Refuge about public use, expansion of services, and habitat improvement may either increase or decrease visitation to the Refuge and thus affect the amount of visitor spending in the local economy.

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30- to 60-mile radius of the impact area (Stynes 1998). Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. After consultation with the Refuge staff, it was decided that only the Lake Lowell Unit would be considered for the economic analysis due to the relatively small amount of visitation to the Snake River Islands Unit. The Lake Lowell Unit lies within Canyon County, Idaho. The city of Boise, located in Ada County, is approximately 28 miles from the Refuge. Most of the economic activity related to the Lake Lowell Unit is located within Canyon and Ada Counties. Therefore, this two-county area constitutes the local economic region (or study area) for this analysis. Idaho's Treasure Valley closely coincides with the two-county study area, and it houses some of Idaho's largest metropolitan areas, including the cities of Boise, Caldwell, and Nampa, which collectively accounted for about 21 percent of the state's 2010 population (U.S. Census Bureau 2012b). The next sections describe the socioeconomic characteristics and trends in the two-county region.

5.8.2 Population and Density

Table 5-9 summarizes the population characteristics of Idaho and the local two-county area. In 2010, the U.S. Census Bureau estimated the total population for the two counties to be 581,288, or 37 percent of Idaho's total population. Ada County was the most heavily populated county in both the study area and the state with 392,365 residents in 2010. Canyon County (188,923 residents) was the second-most populous county of the state in this same year (Idaho Department of Labor 2011a, 2011b; U.S. Census Bureau 2012a). In the years leading up to the economic recession of the late 2000s, the two-county area experienced rapid population growth, with the populations of Ada and Canyon Counties increasing by 24 percent and 36 percent respectively between the years of 2000 and 2008 (U.S. Census Bureau 2012b). The rapid population growth in the study area throughout the majority of the past decade has been motivated by several factors, including a healthy labor market, relatively low real estate prices, ample opportunities for outdoor recreation, and easy access to the Boise metropolitan area (Cauchon 2007; Idaho Department of Labor 2011b).

Table 5-9. Population Estimates for Idaho and the Two Counties near Deer Flat Refuge

Area	Population (2010)[a]	% Change (2000-2010)[a]	Persons per Square Mile (2010)[a]	Expected Population Growth (2010-2030)[b]
Idaho	1,567,582	21.1%	19	31%
Ada County	392,365	30.4%	373	42%
Canyon County	188,923	43.7%	322	34%

Sources: [a] U.S. Census Bureau (2012b) and [b] Church (2003).

In 2009-2010, population growth in the study area slowed due to repercussions of the national economic recession, with the populations of Ada and Canyon Counties averaging only 2.0 and 3.0 percent growth, respectively, during these years (U.S. Census Bureau 2012b). Despite slowed growth from 2008 to 2010, the Treasure Valley and the Boise metropolitan area remained among the fastest growing regions of the state over the past decade (Church 2003; U.S. Census Bureau 2012b).

In 2010, the population densities of both counties in the region were between 300 and 400 persons per square mile, with Ada County being more densely populated (373 persons per square mile) than Canyon County (322 persons per square mile) (U.S. Census Bureau 2012b). Both counties had substantially higher population densities than the state as a whole (19 persons per square mile in 2010). In the case of Ada County, the high population density is largely due to the city of Boise, which accounted for over half (52 percent) of the county's 2010 population (U.S. Census Bureau 2012b). Similarly, the cities of Nampa (81,557 residents) and Caldwell (46,237 residents) collectively accounted for 68 percent of the population of Canyon County in 2010 (U.S. Census Bureau 2012b).

5.8.2.1 Population Projections

Future population projections for the two-county area as well as the state are characterized by in-migration over the next 20 years. The population of Idaho is expected to increase by 31 percent over the course of the next two decades, and, by 2030, it is projected to reach nearly two million (Church 2003). During these years, Idaho is anticipated to be one of the fastest growing states, with growth rate projections consistently among the top 10 in the nation (U.S. Census Bureau 1996). The Treasure Valley and Boise metropolitan area are expected to remain the most populated areas statewide over the next two decades and to continue to be the fastest growing region in the state over

the next 20 years. Valley, Boise, Ada, and Canyon Counties are expected to have an average growth rate of 42 percent over this time horizon. The two counties that make up the study area are expected to remain among the fastest growing counties in the state, with Ada and Canyon Counties projected to be the first and eighth fastest growing counties statewide over the next two decades (Church 2003)

5.8.3 Gender, Age, and Racial Composition

In 2010, the median age of residents in Canyon County (31.6 years) was lower than the state median of 34.6 years and the Ada County median of 34.8 years (U.S. Census Bureau 2012b).

In 2010, the racial demographics of Ada County were very similar to those of the state (Table 5-10). In Canyon County the percentage of Hispanic or Latino residents was approximately 13 percent higher while the percentage of white residents was 6 percent lower than the state average (U.S. Census Bureau 2012b).

Table 5-10. Racial Demographics for the State and Counties near Deer Flat Refuge (2010)

Area	Idaho	Ada County	Canyon County
	% of Total Population		
White alone	89.0%	90.3%	83.0%
Hispanic or Latino	11.2%	7.1%	23.9%
Two or more races	2.5%	2.9%	3.0%
Asian alone	1.2%	2.4%	0.8%
Black or African American alone	0.6%	1.1%	0.6%
American Indian and Alaska Native alone	1.4%	0.7%	1.0%
Native Hawaiian and other Pacific Islander alone	0.2%	0.2%	0.2%

Source: U.S. Census Bureau (2012b).
Note: Percentages may add to more than 100 percent because individuals may report more than one race.

5.8.4 Economic Conditions and Trends

5.8.4.1 Unemployment and Poverty

Since the early 1990s, trends in the unemployment rate in Idaho have generally paralleled the national average. Unemployment trended downward in the early 2000s and remained below the national level from 2002 to 2007 before increasing in the latter half of the same decade (Bureau of Labor Statistics 2011). The period of expansion in the early 2000s may be attributed to several factors, including the growth of several service industries, the continued development of the state's technology sector, and increasing demand for local government and construction services as the state's population continued to grow (Idaho Division of Financial Management 2004). In 2008, Idaho's unemployment rate trended sharply upward as the state began to feel the recessionary effects of a sluggish national economy, with the construction, manufacturing, financial services, administrative and support services, and retail trade industries suffering the greatest job losses in the state (Idaho Department of Labor 2009, 2011c). Since 1990, unemployment in the study area exhibited similar trends as statewide unemployment, with Ada and Canyon Counties averaging unemployment rates of 4.0 and 5.8 percent, respectively, over the past two decades (Bureau of Labor Statistics 2011). Between 2008 and 2010, unemployment in the two-county area saw a sharp increase, particularly in Canyon County where the combined effects of slowed population growth, a struggling housing market, and rising lumber, concrete, and fuel prices decreased the local demand for labor (Idaho Department of Labor 2011a).

Table 5-11 summarizes measures of unemployment, poverty, and income in the two-county area. In 2010, the median household income in Idaho as a whole was $43,490, which was about $6,500 lower than the national median household income of $50,046 (U.S. Census Bureau 2012b). Median household income in the region averaged $46,672, with the median income in Ada County ($50,612) being substantially higher than that in Canyon County ($42,732).

Table 5-11. Unemployment, Poverty, and Household Income for the State and Counties near Deer Flat Refuge

Area	Median Household Income 2010	Unemployment Rate 2010	Net Change in Unemployment Rate 2007-2010	Percent of Persons Below Poverty 2010
Idaho	$43,490	9.5%	+6.5%	25.0%
Ada County	$50,612	8.9%	+6.4%	29.8%
Canyon County	$42,732	11.3%	+7.8%	16.2%

Source: U.S. Census Bureau (2012b).

As shown in Table 5-11, poverty levels in Canyon County (16.2 percent) were below the state average of 25 percent in 2010. In contrast, poverty levels in Ada County (29.8 percent) were greater than the state average in 2010. On average, 23 percent of the population of the two-county area was living below the poverty line in 2010 (U.S. Census Bureau 2012b).

5.8.4.2 Employment and Income by Industry

Table 5-12 summarizes employment by industry for the two-county area. In 2009, total employment in the study area represented 339,730 jobs, with about 77 percent of these jobs located in Ada County. In the study area, 60 percent of the total employment came from five main sectors (Bureau of Economic Analysis 2010): professional, scientific, management, administration, and waste services; educational, health, and social services; retail trade; finance, insurance, real estate, and rental and leasing; and public administration. In 2008, the two largest employers in Ada County were Micron Technology and Hewlett Packard; these companies remain some of the largest local employers in Ada County (Ada County Accounting Department 2008; Idaho Department of Labor 2011b). In Canyon County, the largest local employers in the past decade have been in the education, manufacturing, health care, food processing, and wood processing sectors. These employers currently include the Caldwell and Nampa School Districts, the St. Alphonsus Medical Center, Plexus, the Amalgamated Sugar Company, and Woodgrain Millwork Incorporated (City of Nampa Department of Planning and Zoning 2003; Idaho Department of Labor 2011a).

Table 5-12. Employment by Industry for the Counties near Deer Flat Refuge

	Ada County	Canyon County	Two-county Region
Total Employment (jobs) in 2009	**262,868**	**78,862**	**339,730**
Percent of Employment by Sector			
Professional, scientific, management, administration, and waste services	17%	9%	16%
Educational, health, and social services	13%	13%	13%
Retail trade	11%	13%	11%
Finance, insurance, real estate, and rental & leasing	11%	8%	10%
Public administration	10%	11%	10%
Arts, entertainment, recreation, accommodation, and food services	9%	6%	8%
Manufacturing	6%	10%	7%
Construction	6%	8%	7%

	Ada County	Canyon County	Two-county Region
Other services (except public administration)	5%	6%	5%
Wholesale trade	4%	3%	4%
Transportation and warehousing	2%	4%	3%
Agriculture, forestry, fishing and hunting, and mining	1%	6%	2%
Information services	2%	1%	2%

Source: Bureau of Economic Analysis (2010).

Professional, scientific, management, administration, and waste services accounted for the largest percentage of total employment in the region, with 15.6 percent of total local employment coming from this sector. In the two-county area, most jobs in education, health, and social services (77 percent) and public administration (87 percent) were located in Ada County, which is home to both the state capital and Boise State University. These sectors were the second and fifth largest sectors of the local economy, respectively, and accounted for 13.1 percent and 10.3 percent of total employment in the combined two-county area (Bureau of Economic Analysis 2010).

On the whole, farm employment accounted for a relatively small share (1.5 percent) of total employment in the region. Employment from this sector, however, did account for a larger share of total employment located in Canyon County (4 percent of total in-county employment) than Ada County (less than 1 percent). On the whole, Ada County was much less dependent on farm earnings (less than 1 percent of total in-county farm earnings) than the state as a whole, which had about 4.0 percent of its total earnings coming from farming. Canyon County is more similar to the state as a whole than to Ada County on this point, with 4.7 percent of its total earnings from farming (Bureau of Economic Analysis 2010).

5.8.5 Land Use and Ownership Changes Surrounding Refuge Lands

5.8.5.1 Current Land Use

As of 2006, about 30 percent of the land in the two-county area near the Refuge was federally owned, with the majority of Federal land ownership accounted for by BLM holdings (21 percent of all land in the two-county area). About 65 percent of the land in the study area was privately owned and the remaining 4 percent was State-owned (Conservation Biology Institute 2006; data compiled using the Economic Profile System Human Dimensions Toolkit [EPS-HDT] developed by Headwaters Economics [2006]).

Ada County is largely covered by grassland and shrubland, which account for about 75 percent of all land cover in the county. Mixed cropland is also prevalent, accounting for 17 percent of the land cover (NASA 2006; data compiled using EPS-HDT). As of 2006, urban development accounted for 6 percent of all land cover in the county (NASA 2006; data compiled using EPS-HDT). Land ownership in Ada County in 2006 was 49 percent private, 43 percent Federal, 7 percent State, and 1 percent under other ownership (i.e., Tribal, City, County, or Other) (Conservation Biology Institute 2006; data compiled using EPS-HDT).

Canyon County is less urbanized than Ada County, with about 3 percent of the county's land cover being urban development in 2006. Mixed croplands accounted for about 75 percent of the county's land cover, grassland accounted for 14 percent, and shrubland accounted for 4 percent (NASA 2006; data compiled using EPS-HDT). Water accounted for an additional 2 percent of land cover in

Canyon County, with the majority of this coming from Lake Lowell, which covers a total of 14.5 square miles of the county's land (NASA 2006 [data compiled using EPS-HDT]; Reclamation n.d.). Land ownership in Canyon County in 2006 was 93 percent privately owned, 6 percent federally owned, 5 percent State-owned, and 1 percent under other ownership (i.e., Tribal, City, County, or Other) (Conservation Biology Institute 2006; data compiled using EPS-HDT).

5.8.5.2 Changes in Land Use

As populations grow, the spread of American cities across the rural landscape has several potential environmental impacts including, for example, decreased watershed permeability, increased noise and air pollution, and the loss of arable land and open spaces (McMahan et al. 2002). In addition to these environmental impacts, urban sprawl may have significant economic impacts on local communities through increased costs of public community services such as emergency response, infrastructure, or public works and utilities (Chen 2000; Speir and Stephenson 2002). Population growth in Idaho over the past decades has been cause for the continued conversion of rural lands to urban purposes. Between 1982 and 1997, Idaho ranked thirty-fifth in the nation for the most rural acres converted for urban growth purposes, with 205,000 acres of rural land being converted (Goodwin 2003). About half (45 percent) of this transformation took place between 1992 and 1997, and over 27,000 of these acres were converted in the two-county study area during this five-year period. Land conversion in Ada and Canyon Counties between 1992 and 1997 occurred faster than in any other region in Idaho, with Ada County converting land at a rate of 4,480 acres per year and Canyon County averaging 2,600 acres per year (U.S. Department of Agriculture 2000). Between 1997 and 2007, an additional 130,100 acres of land was developed statewide, resulting in 557,600 total acres of developed land in Idaho and representing a 61 percent increase from 1982 levels (U.S. Department of Agriculture 2009). These trends of urbanization and sprawl are likely to continue in the future as statewide and local area populations are projected to continue growing over the next few decades.

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Chapter 6 Environmental Consequences

Chapter 6 Environmental Consequences

6.1 Introduction to Effects

This chapter presents a summary comparison of the environmental effects of implementing the alternatives described in Chapter 2 on the current state of the physical environment, habitats and wildlife, cultural, and socioeconomic resources (as described in Chapters 3-5). The cumulative impacts associated with implementing Alternatives 1 through 4 are also addressed in this chapter.

The effects of each alternative's actions are measured against the current condition of Refuge habitats, wildlife, facilities, biological programs, and public use programs to determine the effect's magnitude. The effects of all alternatives, including Alternative 1, are based on expected change over the life of the CCP. For example, although Alternative 1 is known as the status quo alternative, it is likely that public use will continue to grow over the next 15 years if no changes to Refuge management are implemented. The effects of this projected growth in visitation on wildlife, habitats, and the quality of public use programs are examined. Table 6-1 summarizes the effects of each alternative when compared to the current condition. At times, comparisons are made between the effects of alternatives (e.g., the effects of Alternative 1 in comparison to the effects of Alternative 2). When this occurs, the alternatives that are being compared are named. If no alternative is explicitly identified, then the comparison is being made against the current Refuge condition.

The information used in this CCP/EIS was obtained from Refuge staff members', CCP planning team and extended team personal knowledge of resources (based on field visits and experience), existing databases and inventories, consultations with other professionals, and relevant scientific literature. The terms identified below were used to describe the scope, scale, and intensity of effects on natural, cultural, and recreational resources.

- **Negligible.** Resources would not be affected, or the effects would be at or near the lowest level of detection. Resource conditions would not change, or the effects would be so slight that there would not be any measurable or perceptible consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource.
- **Minor.** Effects would be detectable but localized, small, and of little consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation, if needed to offset adverse effects, would be easily implemented and successful.
- **Intermediate.** Effects would be readily detectable and localized, with consequences to a population, wildlife, or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation measures would be needed to offset adverse effects and would be extensive, moderately complicated to implement, and probably successful.
- **Significant (major).** Effects would be obvious and would result in substantial consequences to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource within the local area and region. Extensive mitigating measures may be needed to offset adverse effects and would be large-scale in nature, very complicated to implement, and may not have a guaranteed probability of success. In some instances, major effects would include the irretrievable loss of the resource.

Duration of effects has been defined as follows:

- **Short-term or temporary.** An effect that is anticipated to last less than a year or a season.
- **Long-term.** An effect anticipated to change a resource or its condition for longer than a year or a season.

Table 6-1. Summary of Potential Effects of CCP/EIS Alternatives for Deer Flat NWR

	Alternative 1	Alternative 2 (Preferred Alt.)	Alternative 3	Alternative 4
Effects to Wildlife, Habitats, and the Physical Environment				
Hydrology	Negligible. The Refuge has no control over lake levels and river flows. Refuge actions/activities have only an imperceptible influence on water use/quantity.			
Water quality	Negligible long-term negative effects due to increased motorboat use. Water quality in Lake Lowell is poor, due to actions beyond FWS control. Refuge actions and activities have minimal contributions to water quality.	Negligible long-term negative effects due to increased motorboat use. Water quality in Lake Lowell is poor, due to actions beyond FWS control. Refuge actions and activities have minimal contributions to water quality.	Negligible long-term positive effect due to restrictions on motorboat use. Water quality in Lake Lowell is poor, due to actions beyond FWS control. Refuge actions and activities have minimal contributions to water quality.	
Air quality	Negligible long-term negative effects because increase in visitation would result in increased vehicle and motorboat use.	Negligible long-term negative effects because increase in visitation would result in increased vehicle and motorboat use.	Negligible long-term positive effect due to reduction in visitation and restrictions on motorboat use.	
		Minor short-term negative effects related to initiation of prescribed burns.		
Visual quality	Minor long-term negative effect due to increased visitation and no regulations to reduce wildlife disturbance and increase wildlife-viewing opportunities.	Negligible long-term effects. Negative effects of increased signage and construction are balanced out by increased quality of wildlife viewing and increased access to viewing opportunities.		
Open-water wildlife habitats and species	Intermediate to significant long-term negative effects. Wildlife species and habitats are subjected to increased day-time disturbances by high-speed boating and other water sports. Acreage of open water impacted by high-speed boating ≈ 6,400.	Minor long-term positive effects. Positive effects of small increases in no-wake zones would be balanced by negative effects caused by increased visitation. Acreage of open water impacted by high-speed boating ≈ 4,700.	Intermediate long-term positive effects by providing a large no-wake area and areas closed to all use. Acreage of open water impacted by high-speed boating ≈ 2,400.	Significant long-term positive effects due to eliminating high-speed boating on entire lake and reduction in visitation. Acreage of open water impacted by high-speed boating = 0.
Emergent beds and associated species	Significant long-term negative effects to nesting and feeding habitats for waterbirds, waterfowl, and shorebirds due to	Minor long-term positive effects due to providing no-wake zones adjacent to shore areas of highest wildlife use and	Intermediate long-term positive effects due to closures of the southeast end of the lake as well as	Significant long-term positive effects due to the removal of wake-causing activities coupled with the

	Alternative 1	Alternative 2 (Preferred Alt.)	Alternative 3	Alternative 4
	increased visitation, unrestricted public use, and minimal habitat management. There would be 0 acres of emergent beds protected from all uses and 280 acres buffered from high-speed boating by no-wake zones.	seasonal closures around nesting and feeding areas. The number of acres of emergent beds that are protected from all uses would vary because of dynamic seasonal closures, and 700 acres would be buffered from high-speed boating by no-wake zones.	emergent beds between Parking Lots 3 and 8 and in Murphy's Neck and no-wake zones adjacent to most of these closed areas. There would be 680 acres of emergent beds protected from all uses because of closed areas and 210 acres buffered from high-speed boating by no-wake zones.	closure of all emergent beds and the southeast end of the lake. There would be 870 acres of emergent beds protected from all uses because of closed areas and 40 acres buffered from high-speed boating by no-wake zones.
Riparian areas and associated species	Minor long-term negative effects as riparian habitat would continue to be subjected to a variety of impacts stemming from increased human use. These effects could be balanced by long-term positive effects if on-trail-only regulations are renewed and enforced.	Minor long-term positive effects due to implementing seasonal closures and on-trail-only regulations during sensitive nesting periods. Increases in visitation would reduce the positive impacts of these regulations.	Minor long-term positive effects from only allowing wildlife-dependent on-trail travel and improved habitat management. Construction of a boardwalk and increased use in the area of the boardwalk would negatively impact this portion of riparian habitat. Minor short-term negative effects related to construction of trail through riparian habitat.	Intermediate long-term positive effects from only allowing wildlife-dependent on-trail travel and improved habitat management.
Shrub-steppe habitat and associated species	Minor long-term negative effects as shrub-steppe habitat would continue to be subjected to a variety of impacts stemming from increased human use. These effects could be balanced by long-term positive effects if on-trail-only regulations are renewed and enforced.	Minor long-term positive effects related to seasonal trail use regulations, allowing nonwildlife-dependent uses on designated trails only, and proposed habitat improvements.	Intermediate long-term positive effects from allowing only on-trail wildlife-dependent activities, and improved habitat management.	Intermediate long-term positive effects from allowing only on-trail wildlife-dependent uses, improved habitat management, and a decrease in overall visitation.
		Minor short-term negative effects related to construction of new facilities and an additional trail on the Observation Hill Trail System.		
Mudflats and associated	Intermediate long-term negative effects resulting from increased human-	Intermediate long-term positive effects resulting from both improved habitat management and seasonal to year-round		Intermediate long-term positive effects due to year-

	Alternative 1	Alternative 2 (Preferred Alt.)	Alternative 3	Alternative 4
species	caused disturbance to mudflats and associated species. 560 acres of productive mudflat habitat would be open to disturbance.	public use closures. All productive mudflat acreage would be protected through seasonal closures.		round closure of mudflats in the West Pool and the waters adjacent to them, along with a year-round closure adjacent to the mudflats in the southeast end of the lake. All productive mudflat acreage would be protected through seasonal closures.
Waterfowl populations	Negligible effects to waterfowl populations and habitats from hunt program. Waterfowl harvest on the Refuge accounts for a small portion of the overall waterfowl numbers based on mid-winter surveys at both the Flyway and State levels, and harvest numbers are not expected to increase under any of the alternatives.			
Threatened and endangered species	Negligible effects as there are no known federally endangered, threatened, or candidate species that occur on the Refuge other than through occasional vagrant use.			
Effects to Public Uses and Human Environment				
Waterfowl hunting	Negligible long-term negative effect due to minimal control of invasive weeds affecting quality of hunt.	Minor long-term positive effect. Waterfowl hunt area would remain unchanged, except youth hunt area would be in an area previously closed to hunting.	Minor long-term negative effect. Waterfowl hunt areas would be reduced, but hunt quality should increase from reduced crowding.	Negligible effect. Similar to Alternative 3 except that the South Side Recreation Area waterfowl hunt area would be larger and the youth hunt area would be in an area previously closed to hunting.
Upland game hunting	Negligible long-term negative effect due to minimal control of invasive weeds. Upland hunt areas would remain unchanged.	Negligible effect on opportunities to enjoy quality upland hunting. Hunt areas would remain unchanged.	Minor long-term negative effect as the upland game bird hunt area would be reduced, but reduced disturbance from nonwildlife-dependent activities in the hunting area should increase hunt quality.	Significant long-term negative effect due to completely eliminating upland game bird hunting on the Lake Lowell Unit.
Big game hunting	Negligible long-term negative effect due to minimal control of invasive weeds. Hunt areas would remain	Negligible effects on opportunities to enjoy quality big game hunting. Hunt areas would remain	Negligible to minor negative effects on opportunities to enjoy quality big game hunting.	Negligible effects on opportunities to enjoy quality big game hunting. Hunt areas remain

	Alternative 1	Alternative 2 (Preferred Alt.)	Alternative 3	Alternative 4
	unchanged.	unchanged. Anglers would have access to hunting area during hunting season.	Hunt areas remain unchanged. Only wildlife-dependent public use activities allowed in hunting zones, but proposed boardwalk may increase use by wildlife-dependent users.	unchanged. Only wildlife-dependent public use activities allowed in hunting zones, which would reduce disturbance to target species and reduce safety concerns.
Fishing	Negligible long-term negative effects due to spread of invasive weeds and minimal weed management.	Minor long-term positive effect. Although access restrictions would increase, most fishing areas would remain accessible by boat. Habitat and access improvements would improve quality of fishing experience.	Intermediate long-term negative effect. Fishing access would be reduced with permanent on-water closures and increased no-wake zones. Improved access for bank fishing.	Significant long-term negative effect due to increased restriction in areas open to fishing compared to other alternatives and increased no-wake zones. Gotts Point would remain closed to vehicles.
Wildlife observation and photography	Minor long-term negative effect because access would be restricted to trails only. Recreational opportunities would otherwise remain unchanged.	Minor long-term positive effect. Off-trail access would be allowed in some areas year-round and in other areas seasonally. Additional viewing facilities would provide additional opportunities.	Negligible or minor long-term negative effect. No off-trail access would be allowed, but additional viewing facilities would provide additional opportunities.	Minor long-term negative effect. Similar to Alternative 3 except that fewer miles of trails and fewer viewing facilities would be available.
Environmental education	Negligible effects as current programs would be continued.	Minor long-term positive effect. Although emphasis would be on interpretation over EE, shift in EE to emphasize teacher-led, on-site programs would improve the quality of EE experiences. However, the number of EE participants would decrease.		Intermediate long-term positive effect. Similar to Alternatives 2 and 3 except that emphasis on EE over interpretation would increase number of guided opportunities.
Interpretation	Negligible effects as current programs would be continued.	Intermediate long-term positive effect. Emphasis would be on interpretation over EE, so there would be increased guided and unguided interpretive opportunities.		Intermediate long-term positive effect. Despite emphasis on EE over interpretation, there would be an increase in guided and unguided interpretive opportunities.

	Alternative 1	Alternative 2 (Preferred Alt.)	Alternative 3	Alternative 4
Water-based nonwildlife-dependent recreation	Negligible effects as current uses would be continued.	Minor long-term negative effect. Area accessible by boat would remain unchanged, but those areas would be subject to seasonal wildlife closures and more no-wake zones.	Intermediate long-term negative effect related to fewer swimming areas, more closed areas of lake, more no-wake zones, and slightly shorter boating season.	Significant long-term negative effect as no nonwildlife-dependent recreation would be allowed.
Land-based nonwildlife-dependent recreation	Negligible long-term negative effect, due to increases in visitation (if access continues off-trail). Minor long-term negative effect related to restricting access to trails only.	Minor long-term negative effects as nonwildlife-dependent activities would be allowed only on East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System.	Significant long-term negative effects as dogs and horses would not be allowed and bicycling would be allowed only along the proposed trail adjacent to the entrance road.	Significant long-term negative effects. Similar to Alternative 3, but bicycling would not be allowed.
Cultural resources	Negligible to minor long-term negative effect due to inadequate inventory and interpretation of cultural resources.	Minor long-term positive effect from stronger inventory, evaluation, and protection of and education about cultural resources.	Minor long-term positive effect from stronger inventory, evaluation, and protection of and education about cultural resources.	Minor long-term positive effect from stronger inventory, evaluation, and protection of and education about cultural resources.
Environmental justice	Negligible effect due to maintaining current uses.	Minor long-term positive effect due to the potential to provide a positive effect on lower-income communities by increasing access to wildlife-dependent recreational opportunities.	Minor long-term negative effect through implementation of fees and the removal of swimming at the Upper Dam.	
Economic environment	Negligible long-term positive effect due to a direct increase of 21 jobs and $979,000 added to the economy of Ada and Canyon Counties. Total increase only accounts for less than 0.01% impact in these counties.	Negligible long-term positive effect due to a direct increase of 24 jobs and $1.1 million added to the economy of Ada and Canyon counties. Total increase only accounts for less than 0.01% impact in these counties.	Negligible long-term positive effect due to a direct increase of 22 jobs and $706,000 added to the economy of Ada and Canyon counties. Total increase only accounts for less than 0.01% impact in these counties.	Negligible long-term positive effect due to a direct increase of nine jobs and $469,000 added to the economy of Ada and Canyon counties. Total increase only accounts for less than 0.01% impact in these counties.

6.2 Effects Common to All Alternatives

6.2.1 Integrated Pest Management

Potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides would be presented in Pesticide Use Proposals (PUPs) on the Refuge. PUPs and potential effects from chemical pest control would be evaluated using scientific information and analyses documented in Chemical Profiles (see Appendix G). These profiles provide quantitative assessment and screening tools and threshold values to evaluate potential effects to species groups (birds, mammals, and fish) and environmental quality (water, soil, and air). PUPs (including appropriate BMPs) would be approved when the Chemical Profiles provide scientific evidence that potential impacts to the Refuge's biological resources and its physical environment are likely to be only minor, temporary, or localized in nature. Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species in order to achieve resource management objectives.

The effects of these nonpesticide IPM strategies to address pest species on Refuge lands would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the Refuge. For example, the effects of mowing to control invasive plants in an improved pasture would be similar to those effects summarized for mowing, where it would be specifically used to provide short-grass foraging habitat for wintering geese.

Based on scientific information and analyses documented in Chemical Profiles (see Appendix G), most pesticides approved for use on Refuge lands would be of relatively low risk to nontarget organisms as a result of low toxicity or short-term persistence in the environment. Thus, potential impacts to Refuge resources and neighboring natural resources from pesticide applications would be expected to be minor, temporary, or localized in nature, except for certain mosquito treatments necessary to protect health and safety.

6.3 Effects to the Physical Environment

Topics addressed in this section consist of direct and indirect effects to hydrology, water quality, air quality, and visual quality.

6.3.1 Effects to Hydrology

None of the alternatives would be expected to have any measurable effect on the local hydrology. The water contained in the Lake Lowell Unit of Deer Flat NWR is not controlled by the Refuge, and none of the action alternatives consider future activities that change the inflows or outflows associated with the operations of the reservoir. The Refuge also has no jurisdiction over the water in the Snake River, so actions considered in these alternatives would have no influence on regular in-stream flows or local hydrological patterns. A very slight change in the amount of water used in the surrounding landscape may occur due to vegetation restoration and removal adjacent to the lake. These changes should be imperceptible. The capacity of the lake may also be very slightly affected by water displacement caused from additions of docks or any other in-water structure. Given the

extremely low level of change to hydrology from the action alternatives, we anticipate that the effect would be negligible.

6.3.2 Effects to Water Quality

Lake Lowell is an impaired water body with multiple inputs coming from surrounding agricultural land and containing high concentrations of fertilizers and chemicals associated with farming practices. Under any of the alternatives, the Service would continue to work with other Federal and State agencies to identify and implement water quality improvements. Strategic planning that would have any effect on the long-term improvements of water quality cannot be undertaken without the full partnership with cooperating agencies.

With the action alternatives, the overall water quality, water chemistry, temperature, and risk of contaminant release would remain relatively unchanged. Negligible short-term impacts to water quality could occur under all alternatives, stemming from the control of invasive plant species and short-term sedimentation associated with construction and maintenance activities. All of the action alternatives include mechanical removal of shoreline vegetation, which has the potential to expose soils to wind and water erosion. These activities would include the use of BMPs, be confined to small areas, and be short-term in nature; therefore, mechanical removal of shoreline vegetation would not be expected to introduce substantial amounts of additional sediment into the lake. The use of herbicides or pesticides to control invasive plants, which is included in the action alternatives, also poses several environmental risks, including drift, volatilization, persistence in the environment, water contamination, and harmful effects to wildlife (Hoshovsky and Randall 2000). In situations where mechanical and biological invasive plant control methods are ineffective, the Refuge may use approved herbicides in accordance with the Refuge's IPM program. The use of BMPs would reduce the risk of negative effects to water quality.

Removal of carp from Lake Lowell has potential to positively impact water quality. As explained in Chapter 4, by rooting around in muddy substrates while feeding, carp damage roots and stir up sediment, causing otherwise clear waters to become muddy (Kozfkay 2011). Sediment and organic material can then become suspended in the water column. The removal of carp under all alternatives is expected to decrease turbidity and improve water quality.

The operation of motorboats on the Lake Lowell Unit of Deer Flat NWR would change across alternatives. In the Preferred Alternative (Alternative 2), boats would be allowed to operate on the lake as they have in the past with minor changes to no-wake zones and closed areas. In Alternatives 3 and 4, there may be a negligible long-term positive effect in water quality through a reduction in motorboat use due to wake restrictions and, under Alternative 4, the elimination of high-speed boating. The continued monitoring of motorboat use on the Lake Lowell Unit and enforcement of current and future Federal, State, and local laws that seek to reduce negative environmental effects associated with motorboats are expected to have a positive effect over the current state on both wildlife and visitor use. Given that Alternative 1 would result in the greatest increase in visitation over time, it would have the most long-term negative effect on water quality when measured against current conditions. Given that the largest issues with water quality in Lake Lowell are derived from sedimentation, other issues created from return flows, and airborne contaminants, the small amount of positive or negative change occurring from Refuge management activities is expected to have a negligible effect on water quality. Without having a full understanding of the horsepower, types, manufacture year, and usage of motors on the lake, it is impossible to quantify any potential impacts from changes in boating.

The operation of motorboats by visitors to the Snake River Islands Unit is difficult to calculate because visitors may also visit islands that are not part of the Refuge or may engage in in-river recreation in the river itself (e.g., fishing, hunting). Therefore, the amount of additional river usage by individuals solely visiting Refuge islands is unknown. Given the estimated visitation of the Refuge-owned islands and the fact that some of these visitors are disembarking on the islands while on the water for other purposes, travel to and from the islands is expected to have a negligible effect on water quality when measured against current conditions, under all alternatives.

6.3.3 Effects to Air Quality

The action alternatives would be expected to have negligible long-term effects to air quality compared to current management. Proposed restoration activities may result in temporary increases in vehicle emissions (from tractors and heavy equipment) due to the proposed restoration and construction activities identified in the action alternatives. In Alternatives 1 and 2, a slight increase in vehicular and motorboat emissions could be expected over time due to an increase in visitation over time from the current condition, while a decrease in visitation could be expected to decrease vehicular and motorboat emissions in Alternatives 3 and 4. Given the reduction in visitation and the no-wake speeds expected in Alternative 4, there may be a long-term positive effect on air quality when compared to the current state. However, the magnitude of the effect on county-wide air quality is difficult to calculate and would most likely be negligible.

Some minor short-term negative impacts to local air quality may result from the use of prescribed fire. Historically, prescribed fire has been used on the Refuge as a means of controlling or rehabilitating plant communities. The use of prescribed fire is proposed in all of the action alternatives to enhance both the upland and riparian habitats around the Refuge. Fire performs several important functions in these habitats including increased nutrient availability, suppression of woody vegetation, removal of thatch, and exposing of bare soil for seed germination. Prescribed fire may be used to control undesirable vegetation such as cheatgrass and monocultures of false indigo and cattails. Smoke produced by prescribed burns may temporarily impact local air quality, wildlife habitat and visitor experience. According to U.S. Fish and Wildlife Service Clean Air Act directives,

> our policy is to protect and enhance the quality of the Nation's air resources to promote the conservation of fish and wildlife resources, and to protect the public health and welfare and the productive capacity of populations. In order to accomplish this, we will comply with all applicable Federal, interstate, State, regional, and local air quality regulations. (561 FW 2.2, Clean Air Act)

In addition, prescribed fire management directive states the following:

> Prescribed fire and other hazardous fuel treatments must comply with the National Environmental Policy Act (NEPA) and other legislation and policies related to endangered species, air quality, … (621 FW 1, Fire Management Program 1.16, D.)

Local residents' acceptance of Refuge decisions to use prescribed fire and tolerance of short-term impacts to air quality sometimes depend on the areal extent of the treatment, the degree of planning that precedes implementation, the adequacy of the resources (human, equipment, and fiscal) available to the managing agency, and the proximity of the fuel treatment to developed areas (Winter et al. 2002). In all alternatives, the Service would work with the local communities and minimize adverse air quality impacts through participation in the Montana/Idaho Airshed Group. The group members

consist of Federal, Tribal, State and private land managers in Idaho and Montana. The intent of the Airshed Group smoke management program is to minimize or prevent smoke impacts while using fire to accomplish land management objectives.

The combustion products (smoke) from forest wildfires or prescribed burns can affect visibility and the quality of life of certain population subgroups that are particularly smoke-sensitive, including those with respiratory ailments such as asthma (Winter et al. 2002). According to regional fire management staff, these impacts can be minimized by proper timing and preparation for burning. Under all alternatives, the Southeast Idaho National Wildlife Refuge Complex Fire Management Officer submits a list of planned burn projects to an online database managed by the Smoke Management Unit (SMU) in Missoula, Montana (http://www.smokemu.org/index.cfm). Information about each burn project consists of the type of burn, fuel type and loading, number of acres in each unit, legal location, and elevation. Each burn unit is assigned an identification number. The day before the planned ignition, the burn boss accesses the online SMU database to submit a proposed prescribed burn for the following day.

The SMU meteorologist then develops a daily smoke dispersion forecast by airshed and posts to the SMU website. The SMU smoke management program coordinator develops daily burn unit recommendations during spring and fall and posts to the SMU website. In addition, IDEQ may review the dispersion forecast and burn proposals daily and relay any issues or concerns to the SMU.

The SMU issues daily decisions, which can recommend against burning when atmospheric conditions are not conducive to good smoke dispersion. Restrictions may be directed by airshed, elevation, or special impact zones around populated areas. The burn boss accesses the daily decision notice from the SMU website the day before planned ignition. In all alternatives, prescribed burn projects would only be conducted when the SMU does not post a burning restriction for the airshed in which the Refuge is located.

No nonattainment areas are located in or near the Refuge, and specific smoke-sensitive areas are identified in individual burn plans and appropriate mitigation measures have been identified for all alternatives.

The Refuge prepared a fire management plan in 2009, which guides the Refuge's wildland fire and prescribed fire programs (Appendix K). This plan defines levels of protection needed to provide for firefighter and public safety, protect facilities and resources, and restore and perpetuate natural processes affected by fire. The fire management plan also defines levels of ambient air quality that would postpone the use of fire. The plan is written to comply with a Service-wide requirement that refuges with burnable vegetation develop a fire management plan (620 DM 1).

Many of the strategies applied to reaching the goals and objectives of this plan included various methods of vegetation management. In addition to fire, strategies include chemical, biological, and mechanical control. Application of herbicide may result in drift that could contribute to localized impacts to air quality. Because applicators are trained to minimize drift by managing droplet size and only applying during light winds (less than 10 miles per hour) and because any drift would rapidly dissipate, this effect is expected to be negligible under all alternatives. Emissions from the heavy equipment, tractors, ATVs and passenger vehicles used during spraying and transit to and from restoration areas would also have a small impact on air quality. This impact is also expected to be negligible and short-term because of the limited amount of rehabilitation planned, standard compliance with BMPs and the offsetting benefits of habitat improvements.

Overall, the strategies proposed in the action alternatives are expected to have a negligible long-term and minor short-term (during the period of burning) effects on air quality.

6.3.4 Effects to Visual Quality

The implementation of any of the action alternatives is expected to have minor effects on visual quality (i.e., scenery). Kiosks and docks would be placed in strategic locations. These additions would be designed to enhance visitors' ability to appreciate natural or cultural resources within the immediate area and are expected to have a negligible effect on visual quality. The largest proposed construction project would be a 2-mile boardwalk between Parking Lots 1 and 3 on the south side of the Lake Lowell Unit under Alternative 3. This project is proposed to be developed within the treed area on the south side of the Refuge and should mostly be hidden from the view of those on the water and in the upland, as well as for drivers passing by. The most common public uses in this area are waterfowl and upland hunting, and the proposed boardwalk has the potential to have a significant long-term effect on waterfowl hunters that use the riparian area. Larger construction projects are slated for the Lower Dam Recreation Area, which is already developed with parking areas, bathrooms, and buildings. Any changes to the Lower Dam Recreation Area should have negligible impacts to its visual quality.

Although construction of new facilities may have some negative impact on visual quality, they would be designed to help enhance the visitor's experience of the scenic beauty of the Refuge by providing access to new areas of the Refuge, providing guidance to visually interesting portions of the Refuge, and/or providing better access to currently used areas (e.g., docks).

If buoys or signs are used to identify no-wake zones and closed areas, the view of the shoreline for on-water users may be degraded. The increase in signage required to designate no-wake and/or closed areas along the perimeter of the lake in Alternatives 3 and 4 would cause a negative long-term effect to visual quality of the shoreline from the water. However, these restrictions on use would also have a positive impact on visual quality by reducing disturbance and allowing better wildlife viewing. Because the closed areas would be adjusted to coincide with nesting areas in Alternative 2, the amount of necessary signage/buoys would probably lead to a negligible long-term effect by increasing both the amount of signage and also the amount of viewable wildlife.

The expected reduction of users in Alternative 4 could increase each visitor's ability to enjoy the scenic beauty of the Refuge, while a large projected increase in users under Alternatives 1 and 2 could detract from the visual quality. Visitation under Alternative 3 is expected to increase slightly providing a negligible effect on visual quality.

The action alternatives are expected to have negative effects on visual quality from new construction and signage, while they are expected to have positive effects on visual quality from increased access, increased user knowledge, decreased habitat disturbance, and, in Alternative 4, decreased interaction with other visitors. Because of the positive and negative long-term effects expected within the action alternatives, the overall effect would be negligible. The increase in visitation under Alternative 1 is expected to negatively impact visual quality. Without regulations in place to reduce disturbance to Refuge habitats, this alternative is expected to have a minor long-term negative effect on visual quality.

6.4 Effects to Wildlife and Habitats

Changes in habitat and public use management can have both positive and negative effects on wildlife and habitats. The same action (e.g., invasive species control) can have both beneficial effects (e.g., removal of undesirable vegetation) and negative impacts (e.g., removal of nontarget species through overspray). Even keeping the status quo (Alternative 1) can have negative effects on Refuge habitats over time. For example, the current invasive species control programs involves opportunistically treating invasive species as they are located if time and resources permit. If this type of invasive species control were allowed to continue, Refuge habitats would be impacted negatively as the undesirable plants were allowed to continue spreading.

Facilities associated with public uses can also cause irreversible habitat loss or modification. General locations for new or modified facilities have been indicated in the strategies under Goals 1, 3, and 4 and identified on the public use maps for each alternative (Maps 4-9). Exact dimensions and locations for new facilities would be determined in the site design stage, prior to construction. Most of these structures (i.e., trails and a visitor contact station) would be placed in shrub-steppe areas; accordingly, most of the habitat loss due to facilities is addressed under this habitat type. A few other projects (i.e., docks, boardwalk, canoe/kayak launches) may impact small portions of emergent beds or riparian habitat.

Effects of actions from each alternative on wildlife and habitats, measured against the current condition of the Refuge, are addressed within each specific habitat type below. Because waterfowl use many types of habitats, use the Refuge in all seasons, and are addressed in multistate planning efforts, effects to waterfowl species are discussed separately (see Section 6.4.6). Effects to threatened and endangered species are also covered separately (see Section 6.4.7).

6.4.1 Effects to Open-water Habitat and Associated Wildlife: Lake Lowell

Open-water habitat refers to the limnetic zone or the water that is well lit, free of emergent vegetation and is typically away from the shore of the lake. At full pool there are approximately 6,400 acres of open-water habitat on Lake Lowell but that number drops in the late summer and early fall as demands for irrigation increase. Although Lake Lowell is not a natural lake and requires human manipulation to maintain, the habitats created by the reservoir are especially important to local and migratory wildlife looking for suitable water sources in the highly degraded Snake River Plain and shrub-steppe desert. Wildlife species that rely on the open water of Lake Lowell include but are not limited to ducks, geese, gulls, pelicans, grebes, osprey, bald eagles, beavers, muskrats, and various species of fish, amphibians, and aquatic invertebrates. Other species of wildlife, such as deer, coyotes, badgers, most hawks and owls, passerine birds, snakes, and terrestrial invertebrates, are likely to use the open-water habitat periodically but are not reliant on it for their existence.

Alternative 1: Under the status quo alternative, open-water habitat would continue to be subjected to a variety of impacts stemming from human use and presence. There would continue to be no use restrictions throughout the majority of the lake, and current closures may not adequately protect trust resources. Avian species that rely on the open water for food and space, such as pelicans, grebes and gulls, would continue to be a secondary consideration behind nonwildlife-dependent recreational uses of the Refuge. A number of species that use open-water habitat would continue to be subjected to long-term negative impacts during daylight hours from April to September. The productivity of these species at Lake Lowell could continue to decline as motorboating and other water sports

continue to increase on the reservoir, impacting approximately 6,400 acres of open water. It is anticipated that most species of wildlife using the lake would be subjected to general impacts of human presence, but some species like nesting grebes and herons would be more susceptible to the impact of boating traffic on open water because of their reliance on this habitat for feeding, nesting, and escape from predators.

Alternative 2: Under the Preferred Alternative, more open-water habitat and associated wildlife would be protected from the effects of human presence, with expanded and strategically placed no-wake zones along with seasonal closures of sensitive nesting areas that extend into the open-water habitat. Space with reduced or no human intrusion would be available for species that depend on open water. High-speed boating would still impact 4,700 acres of open-water habitat. Impact to most wildlife species would be more or less uniform as provisions in this alternative specifically target species that are more susceptible to impacts stemming from open-water recreational activities.

Alternative 3: Tow-behind or wake-causing activities (e.g., water skiing, wake boarding, and tubing) would be restricted to the West Pool of the lake and the remainder would be considered a no-wake zone. The southeast portion of the open-water habitat on Lake Lowell would be closed and considered a sanctuary. More open-water habitat would be set aside for wildlife and nonwildlife-dependent recreation would be restricted to portions of the lake that would likely have only minor negative impacts to wildlife. High-speed boating would still impact approximately 2,370 acres of open-water habitat.

Alternative 4: All open-water habitat on Lake Lowell would be restricted to no-wake speeds, and the southeast end would be closed and considered a sanctuary. Human activity would be restricted to only wildlife-dependent recreation, and impacts to wildlife would likely be negligible. Under this alternative, no open-water habitat would be impacted by high-speed boating. Impacts to wildlife species under this alternative would be minimal because a blanket protection would be provided Refuge-wide.

6.4.1.1 Effects of Wildlife and Habitat Management Actions

All on-water management activities may have short-term or temporary negative impacts to wildlife due to the presence of Refuge personnel near wildlife using open-water habitats. Because these activities are short-term and are intended to improve long-term conditions, any negative effects to grebes are expected to be negligible and far outweighed by intended positive effects. The removal of carp is expected to have significant long-term positive effects on open-water habitats. The population of carp in Lake Lowell is estimated at 1.2 million (IDFG 2010a). Carp are thought to represent a high threat to the submerged vegetation's ecological functions due to their impacts on submergent vegetation and water quality. Treatments using the natural plant chemical rotenone are expensive, not target-specific, and may not be practical for a lake the size of Lake Lowell. Although elimination of carp is not expected, reduction in carp numbers would positively affect Refuge habitats. Carp removal is proposed under all alternatives.

IDFG recommended three options for substantial carp reduction: physical control such as seining, a yet-to-be studied biological control using a koi-herpes virus, or chemical control using a rotenone treatment applied to the lake in extreme low water and/or low storage years. It is thought that physical control may not be the best option for controlling carp at Lake Lowell for four reasons: the size of Lake Lowell, age of the carp found (young), carp's reproduction success in the lake, and high natural mortality for these carp. These same characteristics may indicate that suppression of

spawning could result in an overall reduction in the population (IDFG 2010a). Although rotenone has the potential to depress the carp population for a period of time, carp populations would rebound if not continually managed after treatment with rotenone. For example, carp populations in Lake Lowell that were decreased with rotenone in the 1960s have grown over time to reach their current levels. Studies on carp movement conducted by IDFG, as well as future research into the currently untested use of koi-herpes virus, should assist in determining the most beneficial removal process. These removal techniques have the potential to cause both significant positive and negative effects. The negative effects of physical control include the complications of by-catch (i.e., nontarget species being killed or injured). Because all fish species in Lake Lowell are nonnative and were stocked at some point, injury or removal is not as much of a concern as if they were native species. Because these species can be restocked, the impact should be short-term and of limited scope. Chemical and biological controls may have unforeseen consequences that could cause negative impacts to nontarget species. Unfortunately, we have no way of knowing what these impacts may be, how long they may persist, or how destructive they may be. Working with the Service's Regional biologists to assess each type of control method before it is used, based on use elsewhere, should reduce unforeseen impacts. If mechanical control techniques are used, there is expected to be negligible short-term negative impacts to nontarget species. The removal of carp from Lake Lowell would likely have a significant long-term positive effect on the vegetation and invertebrate communities as well as the water quality.

Effects from different approaches to carp control:

Under the Action Alternatives, a variety of approaches may be used at Deer Flat Refuge (following further assessment) to achieve the stated target and restore vegetative cover. Approaches may include non-selective removal or exclusion devices such as the application of piscicide; use of barriers; or water manipulation. Selective devices such as commercial harvest and recreational angling may also be used. Chemo-attractants or chemorepellents may be used in conjunction with any of these methods. The following paragraphs specifically examine the effect of usage of piscicide (specifically rotenone), angling, commercial harvest and chemo-attractants/chemo-repellents. Barriers could also encompass a wide range of potential designs but there is no design in place and therefore will not be further analyzed. Water manipulation is unlikely to be used as a tool for the Refuge's lacustrine habitats due to the sheer size of the lake and the inability to alter any irrigational use for wildlife purposes without substantial coordination with other agencies.

Piscicide:

Piscicides are chemicals that kill fish. Rotenone is a natural substance derived from several tropical and sub-tropical plants. It is a broad-spectrum piscicide that is toxic to most fish over the range at which it is toxic to carp. For carp, it is known to be toxic to juvenile and adult fish. An overview of the effects of rotenone is available in a U.S. Bureau of Reclamation (USBR) document developed for a Bonita Creek (Arizona) project (USBR 2010). Fish eggs are much more resistant to rotenone treatments than larval or adult stages. For example, newly fertilized rainbow trout eggs were 41 to 106 times more resistant; salmon eggs are 10 times more resistant than the fish; and carp eggs are 50 times more resistant (Oregon Department of Fish and Wildlife [ODFW] date unknown).

Although both fish and aquatic macroinvertebrates are highly susceptible to rotenone (Skaar 2001), most macroinvertebrate populations quickly recover to pretreatment levels (Lennon 1970; Schnick1974b). Gill-breathing amphibians (i.e., frog and toad tadpoles and larval salamanders) are also adversely affected (Hamilton 1941). Amphibian adults and reptiles are less sensitive than fish

and should not be harmed when rotenone is applied at concentrations typically used in fisheries management (Farringer 1972). Fall applications of rotenone reduce or eliminate impacts on amphibians because most species are in the adult stage of development.

Rotenone is very unstable in the environment (half-life measured in days) and completely breaks down within 1 to 4 weeks depending on pH, alkalinity, temperature, dilution, and exposure to sunlight (Schnick 1974). It also adsorbs strongly to organic matter in sediment and is rapidly degraded (Dawson et al. 1983). Rapid neutralization (oxidation) occurs when rotenone is mixed with potassium permanganate or sodium permanganate (Engstrom-Heg 1971; Finlayson et al. 2000). Inert ingredients in the liquid formulation of rotenone consist of petroleum hydrocarbons as solvents and emulsifiers (primarily naphthaline, methylnaphthalenes, trichloroethylene, and xylenes). Studies of residual concentrations in water treated with liquid formulations indicate that solvent levels are below toxic thresholds (Ling 2003).

Commercial Harvest:

Commercial harvest has the potential to be an important tool in the control of carp in Lake Lowell. It has been successfully used in several locations, including Utah Lake, Utah. Meronek et al. (1996) conducted a review of fish control projects and found that success rates for physical removal methods ranged from 33 percent to 57 percent. A recently released study (Weber et al. 2011) modeled the effect of commercial harvest of carp on size structure, abundance, and egg production, recruitment, and growth. The study found exploitation simulations in which a 575-mm (22.6 inches) length restriction represented commercial gear selectivity. Simulated common carp size structure declined modestly (9%-37%) in all simulations. The abundance of common carp declined dramatically (28%-56% of starting levels) at low levels of exploitation (0%-20%), but exploitation greater than 40 percent had little additive effect, the final populations only being reduced 49 percent to 79 percent despite high exploitation (>90%). At a moderate level of exploitation (40%), maximum lifetime egg production was reduced to 77 percent to 89 percent of starting levels, indicating the potential for recruitment overfishing. Exploitation further reduced common carp size structure, abundance, and egg production when simulations were not size selective.

Commercial harvest currently occurs on Lake Lowell but it is a small operation. Large-scale operation is being explored in cooperation with the IDFG and a commercial company that is actively seeking places with carp infestations. If used, fishing would be limited to seasons and locations that would minimize disturbance to lake wildlife and native fish. In addition to the likely positive effects of reducing carp abundance, egg production, and size structure, commercial fishing may lead to negative short-term impacts on water quality (increased turbidity) and the aquatic habitat (benthic disturbance).

Non-commercial Angling:

This method may include bow-hunting or other methods used by recreational anglers to catch fish. Fishing effects are explored in the Fishing CD in Appendix B. This method is likely to have negligible effects on the population of carp due to the huge population in existence and the small number of anglers that actively target carp.

Chemo-attractants and/or Chemo-repellants:

These may be used in conjunction with one or more of the techniques mentioned above. Pheromones (as a particular class of natural chemo-attractants and repellents) are recognized as potent modulators of behavior (and physiology) that may be effectively used to attract, repel, or guide fish movement, and/or disrupt normal mating behavior (Sorensen and Stacey 2004). When developed and deployed together with other techniques as part of an integrated approach, they may have the potential to greatly increase the efficiency of control efforts (Sorensen and Stacey 2004). A variety of different pheromones are produced by any individual species, some of which are species-specific and others not (Sorensen 2006). According to Sorensen and Hoye (2007), "Pheromones have the distinct advantages of being potent, easy and potentially inexpensive to produce and apply, and environmentally benign" (see also Sorensen and Vrieze 2003; Twohey et al. 2003). However, as discussed by Sorensen and Hoye (2007), the challenge of isolating and applying pheromones for any species is likely to be considerable. In the case of the sea lamprey migratory pheromone, it took a large team over 16 years to identify three components at a cost of over a million dollars. Therefore, use of pheromone technology (except experimentally) may be premature, since pheromones used for pest control in the United States are considered "pesticides" by the Environmental Protection Agency (EPA) and must pass through the normal pesticide registration process. In addition, the normal procedures prior to use of a pesticide would apply, requiring considerable time and funds. Experimental use in the research phase must also have a special permit. Effects would need to be further developed in a pesticide use proposal (PUP).

The removal of vegetation to create more of a diverse interface between open water and emergent vegetation habitat is also a goal in all of the action alternatives. Marsh birds (e.g., egrets, herons, ibis) can often be seen along the open water and emergent vegetation interface foraging for food. Western and Clark's grebes nest in the emergent vegetation but need access to open water in order feed and brood their young. Removal of some sections of the smartweed bed in order to create more edge effect may have minor short-term impacts to the open-water habitat in the way of resuspension of sediment, reduced oxygen content, and disturbance to fish and wildlife in the immediate vicinity. The effects of this habitat modification would likely have a minor long-term positive impact on most wildlife that use this habitat and a moderate to significant long-term positive effect on nesting grebes.

Conducting wildlife surveys, monitoring, and inventory also have the potential to affect wildlife that use the open water. For instance, during grebe brood count surveys, biologists using motorboats routinely displace and disturb groups of grebes foraging and rearing their young in the open water. Waterfowl, secretive marsh birds, and raptors all tend to flush and escape the presence of humans even when those humans are trying to study them. The negative effects associated with the work of researchers on Lake Lowell are expected to be short-term and minor. Biologists are typically very aware of the effects of their presence and attempt to minimize disturbance. The Refuge provides food and space (in the way of closed areas and time restrictions for recreational use) for flushed wildlife to restore energy levels that may be depleted by disturbance. The purpose of research and studies is to determine criteria for which management can make decisions to improve conditions for wildlife thereby mitigating disturbance effects.

6.4.1.2 Effects of Public Use and Public Use Management

General responses of wildlife and habitat to human disturbance have been described in many sources. Immediate responses by wildlife to human presence can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, and even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995a; Miller and Hobbs 2000; Miller

et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Studies have shown that the severity of the effects depends upon the distance of the disturbance to the animal(s) and the disturbance's duration, frequency, predictability, and visibility to wildlife (Burger 1998; Knight and Cole 1991; Miller et al. 1998; Rodgers and Smith 1997; Vos et al. 1985). Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path. The third response, attraction, can be a variety of different scenarios. For example, bears habitually feeding in landfills or campsite dumpsters is a form of attraction. Attraction can also be associated with the purpose of the Refuge, to provide and maintain habitats and suitable conditions for wildlife use, either naturally or through management actions.

Habitats on which wildlife species rely may also be impacted by visitor use under all alternatives. Unpaved or unsurfaced trails are susceptible to a variety of impacts from recreationists including vegetation loss due to trampling and soil compaction and erosion (Adkison and Jackson 1996; Dale and Weaver 1974; Leung and Marion 1996). Trail widening and creation of side trailing (social trailing) increases the area of disturbed land (Liddle 1975).

Clark's and western grebes exemplify species that experience the negative impacts caused by unrestricted public use of open-water habitats. Grebes nest in the emergent beds of Lake Lowell and rear their young in the open water, typically from June through October. During the 2010 and 2011 nesting season, as water levels dropped and feeding habitat became shallower, grebes moved more into the open water. Grebe chicks are altricial (dependent on adults for protection) and ride between the wings on their parents' back until they are two to four weeks old. Back-brooding is essential for survival of young chicks as their plumage is not developed to withstand long periods of swimming and they are not adapted to loaf on shore (Storer and Nuechterlein 1992). As grebes move more into the open water, the potential for disturbance by open-water recreational activities is greatly increased. High-speed boating leads to disruption of feeding areas, which may lead to a loss of production and displacement of waterbirds from preferred habitats (Burger 1997). Grebe adults and chicks are often killed by boats (Anderson, as cited in Ivey 2004) and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Shaw 1998; Storer and Nuechterlein 1992). Current recreational uses on Lake Lowell have the potential to cause significant effects on the nesting population of grebes.

Shorebirds are also negatively impacted by public use of open water. Public use may affect shorebirds through disturbance effects associated with visitors in close proximity to feeding and

resting areas. The scope of disturbance depends on public use activities, size of the group(s), the season of use, and the location and duration of the activity.

Mudflats used most by shorebirds are those near the New York Canal at the east end of the lake. Even though this area is within a no-wake zone, the open water and adjacent emergent beds (if flooded) are open to boaters until September 30. The recreational activities in this area have the potential to disturb migrating shorebirds. The consequences of human disturbance, in terms of physical condition or survival, are currently unknown (Fernández et al. 2010) but studies have shown that shorebirds avoid areas of higher disturbance. For example, when comparing bird response on paired lower and higher use days at trail sites, a study in California found the number of shorebirds decreased with increasing trail use, with higher trail-use days averaging 25 percent fewer birds than on lower use days (Trulio and Sokale 2008). Increased public use adjacent to shorebird feeding and resting areas would cause a negative impact by decreasing their ability to use these habitats.

Waterfowl are also expected to be negatively impacted by increased public use of open water areas. Boating impacts on waterfowl depend on the noise, speed, and proximity of watercraft (Cywinski 2004). Some impacts of watercraft (powerboats or personal watercraft) on waterfowl include flushing and disturbance. Flushing tends to reduce the time waterfowl spend feeding and causes them to feed at night or to leave prime feeding grounds. Flushing also increases the energy expenditure of waterfowl, which can reduce their ability to complete migration or successfully reproduce in the next breeding season. For migrating and wintering waterfowl, effects include increased energy expenditure and depleted fat reserves and potential changes in migration patterns (Korschgen and Dahlgren 1992). In a disturbance study on Lake Erie, birds flew away from the disturbance, altering the diving ducks' daily patterns of habitat use as the ducks tended to leave a preferred feeding area for a suboptimal area (Knapton et al. 2000).

Using the general effects and response information explained above as well as knowledge of Refuge-specific species, the following effects are expected for the various alternatives.

Alternative 1: A significant amount of human activity occurs in the open-water habitat of Lake Lowell. In a 2011 lake use study conducted by the U.S. Geological Survey (USGS) (see Appendix L), 74 percent of users were active in the open-water habitat of Lake Lowell. Because there would be virtually no change to public use regulations on the Refuge and public use is estimated to increase over time, there would be a significant long-term negative impact to wildlife from human disturbance. All 6,400 acres of open-water habitat would be open to high-speed boating in this alternative.

Alternative 2: The increase in open-water areas closed to high-speed boating (through the implementation of no-wake zones) should provide a minor long-term positive effect on wildlife using those areas relative to the current state. The no-wake zone in the Narrows and on the southeast end of the lake would reduce the speed and potentially noise caused by watercraft. It may also reduce the number of craft using those particular areas. Taking into account the research cited above, the reduction in speed, noise, and use in these areas should positively impact shorebirds, waterfowl, and grebes by providing less-disturbed areas to feed and rest. However, an increase in overall visitation is likely to increase use in areas where high-speed boating is allowed, causing a minor long-term negative effect in these areas. The positive and negative aspects of this alternative cancel each other out, leaving a negligible effect on open-water habitat and the wildlife associated with it. In this alternative, 4,700 acres (73 percent) of open-water habitat would be open to high-speed boating activities.

Alternative 3: Alternative 3 would have an intermediate long-term positive on wildlife using open-water habitats by providing a large no-wake area (the entire East Pool) and a substantial portion of open water that would be closed to all use (at the southeast end). The open-water closure encompasses or is adjacent to areas where shorebird feed and rest; areas where grebes nest, feed, and rest; and open-water areas highly used by waterfowl. The closed area would provide an undisturbed opportunity for waterfowl, grebes, and shorebirds, as well as other wildlife, to feed and rest. It would also reduce disturbance to nesting areas. The no-wake zone and closed area would provide an area of reduced disturbance that would encompass or be adjacent to areas that are currently the highest used habitats on the lake for wildlife feeding, nesting, and resting and would therefore provide an intermediate long-term positive effect on wildlife and habitats. Only a modest increase in visitation is expected under Alternative 3, which should not create the same negative effects as expected in Alternative 2. Approximately 2,370 acres (37 percent) of the lake would be exposed to high-speed boating activities under this alternative.

Alternative 4: Alternative 4 would have a significant long-term positive impact to wildlife and open-water habitat by reducing human-caused disturbance on the entire lake. The closed area in the southeast end of the lake would be the same size as the closed area in Alternative 3; however, the no-wake zone covering the entire lake would provide a greater reduction in human disturbance on the lake. All nesting, feeding, and resting areas on the lake would be free of high-speed boating and most likely experience less visitation; therefore, these areas would be less disturbed by noise, wake, speed, and human presence.

6.4.1.3 Overall Effects

The majority of effects to wildlife that use the open-water habitat associated with Deer Flat NWR would be positive, when compared to the current condition, under the three action alternatives. By design, these alternatives seek to deviate from the status quo in order to decrease human disturbance in the open-water habitat. The reduction of invasive carp, modification of habitat, and research under all alternatives would benefit Refuge fish and wildlife. The proposed no-wake zones and closures in Alternatives 3 and 4 would add to these benefits. With a slight increase in public use, Alternative 3 is expected to provide intermediate long-term positive effects. With the decrease in public use that is expected under Alternative 4, a significant long-term positive effect is expected. The expected increase in public use under Alternative 1, with a lack of reduced disturbance zones for wildlife, would result in intermediate to significant negative consequences for Refuge wildlife (particularly for migratory birds). The increase in visitation under Alternative 2 would lessen the positive effects of proposed no-wake zones and habitat improvements, resulting in only minor long-term positive effects.

6.4.2 Effects to Emergent-bed Habitat and Associated Wildlife: Lake Lowell

Emergent-bed habitat refers to the vegetative zone characterized by inundated weed beds and other flooded vegetation that is typically adjacent to open-water habitat. At full pool, there are approximately 845 acres of emergent-bed habitat on the Lake Lowell Unit, but that number drops in the late summer and early fall as demands for irrigation increase. The Snake River Islands Unit may have a small amount of emergent-bed habitat, but jurisdictional boundaries limit the ability of Service staff to implement appropriate management strategies. Again, even though Lake Lowell is not a natural lake and requires human manipulation to maintain, the habitat created by the reservoir is especially important to local and migratory wildlife looking for suitable water sources in the highly

degraded Snake River Plain and shrub-steppe desert. Emergent beds are particularly desirable in that they are considered some of the most productive habitats on earth (Novitzki et al. 1999). Grebes at Lake Lowell nest in the emergent beds and large nesting colonies have been noted along the south shore of Lake Lowell. Although regular grebe nesting surveys were not conducted until 2010, references to nesting grebes have occurred regularly in Refuge files and historical Refuge pamphlets. The shoreline and emergent vegetation provide important habitat for a wide variety of wildlife, but these areas are especially important for nesting and breeding grebes in Idaho (IDFG 2005). In order to protect this habitat, the Refuge has proposed different measures to provide grebes and other waterbirds opportunities to nest, forage, and rest with minimal disturbance. Eleven species of waterfowl, including mallard, cinnamon teal, wood duck, and gadwall, nest around the lake edges and rear their young in the open water, typically in the early summer. Other wildlife species that rely on the emergent beds of Lake Lowell include but are not limited to pelicans, herons, egrets, fish, amphibians, and aquatic invertebrates. Deer, coyotes, badgers, most hawks and owls, passerine birds, snakes, and terrestrial invertebrates likely use emergent vegetation periodically but are not reliant on it for their existence.

All Alternatives: The carp removal project would continue and would expect to realize wildlife and habitat benefits as the population of carp in Lake Lowell is reduced. Water quality and other research and investigations would increase with the help of partners.

Alternative 1: No changes would be made to public use activities or habitat and wildlife management above and beyond those listed in Section 6.2. Nesting, feeding, and resting grebes, herons, eagles, waterfowl, and other wildlife would be increasingly disturbed by proximity of the public as visitation continues to grow. As a result, Alternative would have intermediate to significant long-term negative impacts to these species.

Action Alternatives (2-4): Habitat management would include a more strategic approach to invasive species management, opening channels to provide access to open water, increases in research and monitoring, over Alternative 1, and identification of optimal water levels for emergent beds. Public use management actions include increases in no-wake zones and closed areas (seasonally closed in Alternative 2) to reduce human disturbance to wildlife.

6.4.2.1 Effects of Management Actions

Management actions proposed as part of this CCP/EIS are intended to provide long-term positive effects to wildlife species including waterfowl and grebes. The action alternatives propose strategies that would improve wildlife habitat by creating a diverse assemblage of native plants, reducing the amount of invasive species, and reducing the amount of human disturbance in sensitive areas. Some management actions may have short-term or temporary negative impacts to waterfowl or grebes by removing vegetation, manipulating water levels, and causing short-term disturbances such as the use of heavy equipment. These activities are short-term, temporary habitat modifications and are intended to improve long-term conditions.

All Alternatives (1-4): Under all alternatives, carp removal would continue, although carp removal under the action alternatives would potentially be more robust than current carp removal strategies. Because carp uproot and eliminate submerged vegetation, increase turbidity, and decrease the overall abundance and diversity of the invertebrate community (Miller and Crowl 2006), the removal of carp under all alternatives is expected to improve the quality of the habitat, water quality, and survivability of fish eggs and fingerlings. Increased survival of fish would result in a greater food

source for Refuge wildlife. Under all alternatives, staff would also work with partners to find additional ways to improve water quality. Improving water quality would be beneficial for emergent beds and their associated wildlife. The presence of humans performing monitoring activities would likely cause a short-term negative impact, but the ability to improve water quality would provide a far greater positive impact. There would be an increase in research, inventory, and monitoring under all alternatives with the greatest increases realized in the action alternatives. Increases in research, inventory, and monitoring may cause some short-term negative impacts, but the knowledge gained from the studies would improve the management of the emergent beds and their associated wildlife in the future.

Alternative 1: Other than those common effects listed in Section 6.2, there would be no change in habitat and wildlife management under this alternative. The invasive species control programs would continue to opportunistically treat invasive species as they are located if time and resources permit and minimally apply the concepts of IPM. New infestations of purple loosestrife and other aquatic invasive species may be left untreated, leading to more and more habitat being taken over by these undesirable species. The lack of desirable species, like smartweed, would reduce food sources available to waterfowl and other wildlife and may cause them to seek feeding habitat elsewhere. If the food source is greatly compromised, breeding species may be forced to leave Lake Lowell. A reduction in desirable plants like smartweed might also make it more difficult for wildlife to find suitable nesting material if the infestation of nondesirable vegetation is extensive, resulting in significant long-term negative impacts for these species.

Action Alternatives (2-4): These alternatives propose to increase access to open water from emergent beds by opening channels in the emergent beds. These channels would positively impact nesting grebes and waterfowl by providing easy access to open water feeding areas from more densely vegetated nesting areas. Increased and targeted reduction of invasive species in the action alternatives would create a more diverse assemblage of native and desirable plant species.

Alternatives 2 through 4 also include various methods of mapping, monitoring, and controlling invasive species on the Refuge that would follow the IPM Plan (see Appendix G). Control measures include biological, chemical, and mechanical methods in keeping with Service policy. Impacts from invasive vegetation management can vary depending on size, timing, and location of control. Impacts to nontargeted vegetation from the use of equipment and from herbicide overspray, as well as impacts to habitat and wildlife from human presence during treatment, can all create potential negative effects. These effects are considered temporary and would be negligible especially when considering the long-term positive effects of wildlife habitat that is free of the infestation of invasive species. Reduction of invasive species in emergent beds is expected to benefit waterbirds, waterfowl, and fish.

Increases in research, inventory, and monitoring in Alternatives 2 through 4 would be above and beyond those identified in Alternative 1 and may cause some short-term negative impacts. However, the knowledge gained from the studies would improve the management of the emergent beds and their associated wildlife in the future.

The Refuge has identified an optimal water level for the emergent beds in the action alternatives. If the Board of Control is able to accommodate these levels while still meeting its irrigation purpose, there would be a significant positive effect on the emergent beds and the wildlife that use them. Nesting grebes and other on-water nesting birds would benefit the most from emergent beds that stay inundated throughout the spring and summer.

6.4.2.2 Effects of Public Use and Public Use Management

Using the general effects and response of wildlife and habitat to human disturbance described in Section 6.4.1.2, as well as knowledge of Refuge-specific species, the following effects could be seen versus the current state.

Alternative 1: The amount of human activity that occurs in the emergent beds near the shores of Lake Lowell is not fully known. In a 2011 lake use study conducted by the USGS (see Appendix L), less than 20 percent of users were active in the emergent beds or on the edge of emergent beds. These users were typically anglers who were fishing from boats. Three factors would lead to an intermediate to significant long-term negative impact to wildlife from human disturbance from this alternative. First, wildlife in and adjacent to these areas are highly susceptible to disturbance. Second, under this alternative, there would be virtually no change to public use regulations on the Refuge. Third, public use is estimated to increase over time. In this alternative, 0 acres of emergent beds would be protected from all uses, and 280 acres would be buffered from high-speed boating by no-wake zones.

Increased public use in the emergent beds is likely to negatively impact Clark's and western grebes that nest in the emergent beds of Lake Lowell. Because the breeding population of Clark's and western grebes is listed as imperiled by the State of Idaho (IDFG 2005), any potential negative impact to their nesting habitat should be seen as significant. Species are designated imperiled in Idaho if few populations exist, there is a rapid decline in numbers, or other factors make the species vulnerable to range wide extinction or extirpation (IDFG 2005). Clark's and western grebes are also candidate species for listing as threatened or endangered in Washington State, and Clark's grebes are a species of concern in Arizona, Montana, and Wyoming (Ivey 2004). In Canada, the western grebe is considered a sensitive species in Alberta (Hanus et al. 2002; Yanch 2006) and is on British Columbia's provincial Red List (i.e., candidates for endangered or threatened status) because of population declines, few active breeding sites, and the vulnerability of those sites to habitat erosion and human disturbance (Burger 1997).

High-speed boat wakes have the ability to tip or flood grebe nests, causing abandonment (Burger 1997). The effects of human disturbance to wildlife populations is discussed throughout this document, and the proximity of humans to grebe nests, especially for long durations of time, or at high-speeds, could also cause nest or colony abandonment. Under the status quo alternative, public uses are allowed in the emergent beds, even where nesting is occurring. Public use of these areas is likely to increase over time.

Shorebirds would be negatively affected by increased visitation under Alternative 1 in much the same way as was discussed above (Section 6.4.1.2). The disturbance to shorebirds would be even greater given the proximity of the emergent habitats to the mudflats used by shorebirds.

The effects of increasing visitation would also negatively affect nesting and feeding waterfowl. Disturbance can reduce courtship behavior and decrease egg and duckling survival. Disturbed adults may leave their eggs, nestlings, or ducklings, thus reducing survival rates (Korschgen and Dahlgren 1992). Dabbling ducks use the emergent zone for feeding. Disturbance of these areas could result in the use of less suitable feeding areas or the need to locate feeding areas off-refuge. Smartweed is an especially good source of food for waterfowl, with ducks using the seeds, the plant, and the invertebrates that live among the smartweed. Public use programs can affect waterfowl either through direct alteration of habitat as a result of facility construction, physical alteration of habitat

from off-trail use, and disturbance effects associated with visitors in close proximity to nesting, feeding, and roosting waterfowl. The physical impact of public use activities depends upon the size of the group(s), the season of use, and the location and the duration of the activity. The construction and maintenance of visitor use facilities (i.e., trails, pullouts, and photography blinds) could have effects on soils, vegetation, and possibly hydrology in specific areas. This could potentially increase erosion and cause localized soil compaction (Liddle 1975); reduced seed emergence (Cole and Landres 1995); alteration of vegetative structure and composition; and sediment loading (Cole and Marion 1988).

Alternative 2: Identifying buffer distances for nesting waterbird colonies, shorebird feeding areas, and other sensitive wildlife species would allow the Refuge to implement seasonal closures that would reduce human disturbance in these areas. Reduction of human disturbance should lessen human-caused nest abandonment, increase the amount of time spent on nests by adults, and reduce human-caused flushing events. Providing no-wake zones adjacent to shore and areas of highest wildlife use would lessen the impacts of wake and speed on wildlife. A no-wake zone would also reduce public use to those visitors that are willing to travel approximately 5 miles per hour or slower. Grebes and other on-water nesting birds that nest in the no-wake and seasonally closed areas would be expected to experience fewer instances of nesting disturbance due to boat wakes. The reduction in human use in the no-wake zones and seasonally closed areas would also be expected to lower the instances of flushing from feeding and nesting areas for a variety of wildlife species (e.g., eagles, herons, grebes, shorebirds, waterfowl). The three docks proposed in Alternative 2 could impact between 1,050 and 2,400 square feet of emergent-bed habitat depending on the size of the docks. Given that these docks are proposed for areas outside of known nesting colonies, their impact should be minimal. In this alternative, a varied number of acres of emergent beds would be protected from all uses because of dynamic seasonal bird closures, and 700 acres would be buffered from high-speed boating by no-wake zones.

Alternative 3: Initiating closures of the southeast end of the lake as well as emergent beds between Parking Lots 3 and 8 and in Murphy's Neck would provide habitat for resting, feeding, and nesting waterbirds that is protected from human disturbance. These closures would allow undisturbed use of areas that would only be protected by no-wake zones in Alternative 2. Nesting colonies may grow throughout the season as birds that were forced to abandon nests create a second nesting site or as late-arriving birds select nesting sites. This alternative may provide more protection for these types of nesters because their nests may be outside of the boundaries of the seasonal nesting closures created in Alternative 2. There would be an overall reduction in disturbance to emergent beds and the wildlife that use them. Providing large swaths of closed emergent beds would make it easier for birds to find food for themselves and their chicks adjacent to nesting sites. The four docks that are proposed under this alternative could impact between 1,400 and 3,200 square feet of emergent-bed area, depending on the size of the docks. Given that these docks are proposed for areas outside of known nesting colonies, their impact should be minimal. In this alternative, 680 acres of emergent beds would be protected from all uses because of closed areas, and 210 acres would be buffered from high-speed boating by no-wake zones.

Alternative 4: The removal of wake-causing activities in Alternative 4, coupled with the closure of all emergent beds and the southeast end of the lake, would provide the greatest reduction in damage from wakes and in flushing and abandonment caused by human disturbance. This reduction would significant positive benefit for waterbirds, shorebirds, waterfowl, and other wildlife that use the emergent beds. This alternative would provide an even larger area free from human disturbance to food sources, making it easier for birds to find food for themselves and their chicks adjacent to

nesting sites. Removal of high-speed boaters from the lake would most likely reduce the overall use of the lake by boaters, further reducing human disturbance to wildlife. The two docks that are proposed under this alternative could impact between 700 and 1,600 square feet of emergent-bed area, depending on the size of the docks. Given that these docks are proposed for areas outside of known nesting colonies, their impact would be minimal. In this alternative, 870 acres of emergent beds would be protected from all uses because of closed areas, and 40 acres would be buffered from high-speed boating by no-wake zones.

6.4.2.3 Overall Effects

The majority of effects to wildlife that use emergent-bed habitat associated with Deer Flat NWR would be positive under the three action alternatives. By design these alternatives seek to deviate from the status quo in order to provide adequate space in emergent-bed habitat. Protection measures proposed in the action alternatives would result in positive cumulative effects for fish and wildlife that use these habitats. The continued growth of visitation without increased public use management would lead to a significant negative effect to emergent beds and the wildlife species that use them for feeding, resting, nesting, and rearing under Alternative 1. Alternative 2 would provide a minor long-term positive effect by providing no-wake zones adjacent to shore areas of highest wildlife use and seasonal closures around nesting waterbirds and feeding shorebirds. Alternative 3 would provide intermediate long-term positive effects due to closures of the southeast end of the lake as well as emergent beds between Parking Lots 3 and 8 and in Murphy's Neck and by implementing no-wake zones adjacent to most of these closures. Alternative 4 would provide significant long-term positive effect due to the removal of wake-causing activities coupled with the closure of all emergent beds, and the southeast end of the lake.

6.4.3 Effects to Riparian Habitat and Associated Species

Riparian habitat refers to the interface between the upland areas and wetland areas of the Refuge. The riparian zone is characterized by hydric soils that support a vegetative community dominated by water-dependent plants. There are approximately 1,900 acres of riparian habitat on the Lake Lowell Unit and 630 acres on the Snake River Islands Unit. The total number of acres for both Refuge units fluctuates depending on precipitation, water use, and flow regimes. Although Lake Lowell is not a natural lake and requires human manipulation to maintain, the riparian habitat created by the reservoir is especially important to local and migratory wildlife looking for suitable habitat in the highly degraded Columbia Basin and shrub-steppe desert. Over 60 percent of western neotropical birds use riparian areas during the breeding season or as a stopover for migration (Krueper 1993). One study has shown that some riparian areas harbor up to 10 times the number of neotropical migrants than do neighboring nonriparian habitats (Stevens et al. 1977). Of the 243 bird species breeding in Idaho, 113 (46%) use riparian habitat as nesting habitat. Many of the other 130 species also use riparian habitat as a source of water, as migratory corridors, or for other purposes. Of the 119 neotropical migratory landbirds, 68 (57%) use riparian habitat. Many of Idaho's mammals, amphibians, reptiles, fish, and mollusks also depend on riparian habitat for survival (Idaho Bird Conservation Plan 2000).

Alternative 1: Under the status quo alternative, riparian habitat would continue to be subjected to a variety of impacts stemming from human use and presence. The closure for the nesting eagle in the North Side Recreation Area would continue to be the only riparian closure specific to nesting wildlife.

Alternative 2: The Preferred Alternative would have minor long-term positive effects to riparian habitat relative to Alternative 1 and the current condition, by implementing strategic seasonal closures that would surround active nesting areas thereby reducing human presence during sensitive periods. Space within these closures would provide intact riparian habitat with reduced or no human intrusion.

Alternative 3: This alternative would provide minor long-term positive effects to additional riparian habitat acres permanently closed (outside of the hunt season) to provide for riparian-dependent species. Wildlife and nonwildlife-dependent recreation would be restricted to portions of the Refuge that would likely have fewer negative impacts to wildlife using riparian habitat.

Alternative 4: Riparian protections in this alternative would be similar to Alternative 3. However, human activity under Alternative 4 would be restricted to only wildlife-dependent recreation, which would reduce disturbance and provide an intermediate, long-term positive effect on riparian habitats and the wildlife using them.

6.4.3.1 Effects of Habitat and Wildlife Management Actions

Alternative 1: Invasive species would continue to be removed on an opportunistic basis with no plan or strategy in place to direct or prioritize areas in need of treatment. New infestations of tamarisk, white bryony, poison hemlock, and other undesirable species may be left untreated, leading to more and more habitat being taken over by these undesirable species. The lack of desirable species, like cottonwood and willow, would reduce the attractiveness of the Refuge riparian area to nesting and migrating birds such as neotropical migrants, bald eagles, herons, and cormorants. Under this alternative, fire management would continue to focus on the current firebreaks and minimal removal of undesired vegetation. As dead and downed trees, rank vegetation, and ladder fuels continue to accumulate, the possibility of a catastrophic fire increases. If the growth of undesirable vegetation and increase in large fires is extensive, the loss of healthy riparian habitat from the Refuge could cause dramatic negative effects, because intact riparian habitat is so important.

Action Alternatives (2-4): Alternatives 2 through 4 also include various methods of mapping, monitoring, and controlling invasive species on the Refuge that would follow the IPM Plan (see Appendix G). Control measures include biological, chemical, and mechanical methods in keeping with Service policy. Impacts from invasive vegetation management can vary depending on size, timing, and location of control. Impacts to nontargeted vegetation from the use of equipment and from herbicide overspray, as well as impacts to habitat and wildlife from human presence during treatment, can all create potential negative effects. These effects are considered temporary and would be negligible especially when considering the long-term positive effects of wildlife habitat that is free of the infestation of invasive species. Reduction of invasive species in riparian habitat is expected to benefit a wide variety of wildlife on the Refuge.

Removal of unwanted invasive or noninvasive vegetation through the use of controlled burning and mechanical techniques is expected to increase the health of the riparian areas by allowing new growth and reducing the chances of a large catastrophic wildfire. Although removal of vegetation would have temporary negative impacts to wildlife species, the increase of overall health of the managed area would be a long-term positive benefit for the habitat and wildlife. For example, in order to create an opening in a riparian forest to increase edge effect (attractive to many species of wildlife due to the variance in habitat condition), some portions of vegetation would be removed

mechanically. It is highly likely that some passerine birds would be displaced as perches, nesting sites, and territories are removed.

Under the action alternatives, the removal of undesirable, nonnative animals (e.g., feral cats and feral dogs) from the Refuge is proposed. Removal of these animals from the Refuge would reduce predation on native wildlife, and reduce the possibility of domestic animals spreading disease to Refuge wildlife. Removal of feral animals would reduce the amount of predation on passerine bird species, small mammals, and reptiles. Removal of feral cats and dogs would also reduce the amount of wildlife disturbance and reduce the possibility of disease transmission, thus benefiting a wide variety of wildlife species.

Increases in research, inventory, and monitoring would be above and beyond those identified in Alternative 1 and may cause some short-term negative impacts. However, the knowledge gained from the studies would improve the management of the riparian areas and their associated wildlife in the future.

6.4.3.2 Effects of Public Use and Public Use Management

Using the general effects and responses of wildlife and habitat to human disturbance described in Section 6.4.1.2, as well as knowledge of Refuge-specific species, the following effects could be seen versus the current state.

A new Lake Lowell Unit deer hunt was recently implemented under a different planning process (USFWS 2011a) and began in fall 2012. The majority of this new hunt takes place in the riparian area on the south side of the Lake Lowell Unit, and the effects of this hunt on wildlife and habitat are discussed as part of that environmental assessment (EA) (USFWS 2011a). None of the alternatives propose to make changes to this new hunt.

Historically, deer hunting has been allowed on the Snake River Islands Unit. None of the alternatives propose to make changes to this hunt. In general, deer hunting (along with its management) on the Refuge involves human presence in riparian habitat, which may result in impacts. In areas open to public use, social trails fragment viable wildlife habitat and increase user impact on the natural system. Wildlife (both deer and other nontarget species) typically respond to recreationists by flushing away from the perceived danger, which effectively reduces the amount of suitable habitat available to them (Taylor and Knight 2003). Frequent flushing of an animal increases the amount of expended energy, which reduces their overall growth and reproductive potential, and causes animals to avoid otherwise suitable habitat (Geist 1978).

Alternative 1: Under the status quo alternative, riparian habitat would continue to be subjected to a variety of impacts stemming from human use and presence. The enforcement of on-trail-only recreation could have a long-term positive effect by reducing impacts from off-trail travel. Currently, this Refuge regulation is not well known or enforced, even though the last compatibility determination for walking and jogging stated on-trail use only as a stipulation. There would be no new closures to protect wildlife nesting or wintering adjacent to highly used public use trails. If the 1994 compatibility determinations for upland uses were regulated, there could be a benefit to wildlife over the current state by ensuring that all upland users (aside from hunters) stay on designated trails. Overall, however, there would, be minor long-term negative impacts due to the projected increase in Refuge users under this alternative if on-trail regulations are not renewed or enforced.

Alternative 2: Off-trail recreational use by wildlife-dependent users would be allowed all year in the East Side Recreation Area. All visitors would be required to stay on-trail from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck to protect breeding and nesting birds, such as bald eagles, red-tailed hawks, great blue herons, grebes, egrets, cormorants, and others. The access point to Murphy's Neck would be moved to the Lower Dam Recreation Area (LDRA), with a fully ADA-accessible trail from the LDRA through the riparian area to Murphy's Neck. This trail may have minor negative effects on the wildlife using the immediately adjacent riparian area. Expansion of on-water no-wake and seasonally closed areas is expected to have a long-term positive effect on wildlife using the riparian areas adjacent to these areas. Wildlife like nesting herons and bald eagles are expected to benefit from these changes through a decrease of human-caused disturbance. Allowing nonwildlife-dependent visitors to use only the Observation Hill Trail, the Kingfisher Trail, and the East Dike Trail, and not allowing any nonwildlife-dependent group activities would lessen the impacts to wildlife on these trails and elsewhere on the Refuge.

Alternative 3: Under this alternative, a 2-mile long boardwalk is proposed to be constructed between Parking Lots 1 and 3. This would result in disruption to approximately 2 acres of riparian habitat that is currently minimally used by visitors outside of the hunting season. The construction of this boardwalk may reduce the positive effects of the other public use management strategies.

Alternatives 3 and 4: These alternatives propose that only wildlife-dependent activities be allowed in the uplands and that all upland use (except for hunting) occur on maintained roads and trails. The combination of fewer visitors using the uplands (because there would be no nonwildlife-dependent activities allowed), and keeping them on roads and trails would greatly reduce human disturbance to wildlife in the riparian areas versus the current state. The uses that are likely to occur are also more likely to be slower (i.e., no jogging) and less disturbing (i.e., no dogs) than current activities. The reduction of high-speed boating in Alternative 3, and the removal of high-speed boating in Alternative 4along with the removal of boating activities near the majority of the shoreline is expected to benefit wildlife using riparian areas adjacent to the lakeshore (e.g., nesting herons and eagles) through a reduction in noise and proximity of humans to nesting wildlife.

6.4.3.3 Overall Effects

Some of the negative effects of an increase in visitation in Alternative 1 could be countered by enforcing the 1994 compatibility determination for upland uses. However, if current levels of enforcement are continued, this alternative would have a minor long-term negative impact versus the current condition because of increased visitation projected under Alternative 1. Under Alternative 2, wildlife is protected through the use of on-trail-only requirements during months when wildlife is most vulnerable. Allowing nonwildlife-dependent users to only use the Observation Hill Trail, the Kingfisher Trail, and the East Dike Trail would lessen the impacts to wildlife and elsewhere on the Refuge. Not allowing nonwildlife-dependent group activities on the Refuge under Alternatives 2 and 3 would positively impact wildlife adjacent to all designated trails. Increases in public use may reduce some of the positive effects seen in these alternatives over the current state. The reduction in or complete removal of nonwildlife-dependent uses in Alternatives 3 and 4 is expected to positively impact the wildlife of the Refuge, by reducing fast-paced activities, human interactions with wildlife, and the noise associated with group and nonwildlife-dependent uses. A decrease in public use is also expected under Alternative 4, which is expected to decrease human-caused disturbance to wildlife. The modest increase in public use under Alternative 3 is not expected to counter the positive effects created by the proposed actions. However, the boardwalk proposed under Alternative 3 would cause direct impacts to riparian resources on the south side of the lake. Alternative 4 would have the most

positive effects to wildlife and riparian habitat with no nonwildlife-dependent uses being allowed and a reduction in future visitation over the current state. Taking into consideration all impacts, the changes to public use management in Alternatives 2 and 3 would lead to minor long-term positive effects to riparian habitat and wildlife species. Changes under Alternative 4 would lead to an intermediate long-term positive effect.

6.4.4 Effects to Shrub-steppe Habitat and Associated Species

Shrub-steppe refers to the upland areas above the influence of the wetland zones around the Refuge. The shrub-steppe habitat is characterized by dry soils that are exploited by mostly nonnative vegetation. Native vegetation that does exist is dominated by sagebrush, four-winged saltbush, and various grasses. Even though most of the vegetation is nonnative, these areas provide nesting and foraging habitat for ground-nesting birds, resting and feeding areas for flocks of geese, foraging space for raptors, and habitat for small mammals and other wildlife (e.g., northern harriers, mule deer, badgers, gopher snakes). There are approximately 830 acres of shrub-steppe habitat on the Lake Lowell Unit and 550 acres on the Snake River Islands Unit. Uplands on the Refuge typically consist of patches of big sagebrush with a cheatgrass understory between Lake Lowell, agricultural fields, fences, roads, and irrigation dikes. Uplands on the Snake River Islands typically occur in the middle of the islands and are often surrounded by a circle of riparian vegetation. The shrub-steppe habitat on the Refuge is highly fragmented; the area near the Visitor Center has the largest contiguous piece of this habitat (550 acres).

Sagebrush shrub-steppe ecosystems and the wildlife that depend on them are thought to be among the most imperiled in North America (Dobkin and Sauder 2004; Knick et al. 2003; Knick and Rotenberry 2002; Mac et al. 1998). Populations of shrubland and grassland birds, which represent an important component of the biodiversity of the western United States, are declining more rapidly than other groups of bird species in North America (Dobkin 1994; Knopf 1994; Saab and Rich 1997; Vickery and Herkert 1999). Declines in sagebrush-dependent species can be attributed to the once-greater than 60 million hectares of the Intermountain West shrub-steppe habitat being degraded, fragmented, converted to agriculture, or changed to vegetative states dominated by exotic annual grasses (Miller and Eddleman 2001; West 1996). These disturbance regimes have accelerated soil erosion and the loss of sagebrush ecosystems (Bunting et al. 2003; West and Young 2000) to a point where the ecological integrity may be pushed beyond a threshold from which they can recover (Allen 1988; Belnap and Eldridge 2001). Large-scale conservation and restoration of sagebrush lands are becoming high priorities for natural resource agencies because of the declines in the populations of widely distributed species such as sage-grouse (BLM 2002). Nationally, less than 3 percent of the area dominated by sagebrush lies within areas that receive permanent legal protection (Scott et al. 2001; Wright et al. 2001). An estimated 99 percent of historical sagebrush habitats in the Snake River Plain had been converted to cropland by the early 1980s (Hironaka et al. 1983).

Alternative 1: Under the status quo alternative, shrub-steppe habitat would continue to be subjected to a variety of impacts stemming from human use and presence. Wildlife species that rely on shrub-steppe habitat would be expected to endure additional human-caused disturbance because of the projected increase in visitation under this alternative.

Alternative 2: The Preferred Alternative would offer additional protections in shrub-steppe habitat by implementing seasonal on-trail regulations that would surround active nesting areas thereby reducing human presence during sensitive periods. Space within these closures would provide intact shrub-steppe habitat with reduced or no human intrusion.

Alternative 3: On-trail use requirements and fewer nonwildlife-dependent activities would provide additional shrub-steppe habitat protections. A small projected reduction in visitation to the Refuge would also be expected to result in a decrease in human-caused wildlife disturbance.

Alternative 4: Alternative 4 would offer the most protections for sage-steppe habitat and associated wildlife. The projected reduction in visitation and allowing only on-trail wildlife-dependent uses would be expected to greatly reduce human-caused impacts to wildlife.

6.4.4.1 Effects of Habitat and Wildlife Management Actions

Management actions proposed as part of this plan are intended to provide long-term positive effects to shrub-steppe habitat and associated wildlife. The action alternatives propose strategies that would improve the quality of shrub-steppe habitat by reducing the amount of invasive species, most notably cheatgrass, and creating a diverse assemblage of native grass plants to improve the fuel levels and reduce chances of destructive fires. Many of these management actions would have short- term or temporary negative impacts to wildlife species. For example, a controlled burn to reduce the amount of cheatgrass duff and help establish a native grass understory would likely displace the wildlife species in the immediate area. However, the reduction of cheatgrass would provide a long-term positive benefit.

Alternative 1: Invasive species would continue to be removed on an opportunistic basis with no plan or strategy in place to direct or prioritize areas in need of treatment. New infestations of cheatgrass, poison hemlock, white bryony, tamarisk, whitetop, and other undesirable species may be left untreated, leading to more and more habitat being taken over by these undesirable species. The lack of desirable species, such as native bunchgrasses, wheatgrass, and Idaho fescue, would reduce the attractiveness of the Refuge shrub-steppe habitat to nesting and migrating birds such as burrowing owls, western meadowlarks, and Savannah sparrows. Under this alternative, fire management would continue to focus on the current firebreaks and minimal removal of undesired vegetation. As cheatgrass continues to accumulate, the possibility of a widespread catastrophic fire increases. If the growth of undesirable vegetation and increase in large fires is extensive, the loss of healthy shrub-steppe habitat from the Refuge would negatively impact species that rely on shrub-steppe habitat.

Action Alternatives (2-4): Alternatives 2 through 4 also include various methods of mapping, monitoring, and controlling invasive species on the Refuge that would follow the IPM Plan (see Appendix G). Control measures include biological, chemical, and mechanical methods in keeping with Service policy. Impacts from invasive vegetation management can vary depending on size, timing, and location of control. Impacts to nontargeted vegetation from the use of equipment and from herbicide overspray, as well as impacts to habitat and wildlife from human presence during treatment, can all create potential negative effects. These effects are considered temporary and would be negligible especially when considering the long-term positive effects of wildlife habitat that is free of the infestation of invasive species. Reduction of invasive species in shrub-steppe habitat is expected to benefit a wide variety of plant and wildlife species.

Removal of unwanted invasive or noninvasive vegetation through the use of controlled burning and mechanical techniques is expected to increase the health of the shrub-steppe areas by allowing growth of native plants like Wyoming big sagebrush, bluebunch wheatgrass, and Idaho fescue, and reducing the chances of a large catastrophic wildfire. Although these removal methods would have temporary negative impacts to wildlife species, the increase of overall health of the managed area would be a long-term positive benefit for the habitat and wildlife.

Under the action alternatives, the removal of undesirable, nonnative animals (e.g., feral cats and dogs) from the Refuge is proposed. Removal of these animals from the Refuge would reduce predation on native wildlife, and reduce the possibility of domestic animals spreading disease to Refuge wildlife. Removal of feral animals such as domestic cats would reduce the amount of predation on passerine bird species, small mammals, and reptiles. Removal of cats and dogs would also reduce the amount of wildlife disturbance and reduce the possibility of disease transmission benefiting a wide variety of wildlife species.

Removing unnecessary internal firebreaks within the shrub-steppe habitat of the Refuge would reduce fragmentation of habitat. This action would also reduce the number of firebreaks requiring maintenance, thereby leaving more time for other habitat management activities.

Increases in research, inventory, and monitoring would be above and beyond those identified in Alternative 1 and may cause some short-term negative impacts. However, the knowledge gained from the studies would improve the management of the shrub-steppe habitat and its associated wildlife in the future (e.g., a study to determine the most effective cheatgrass removal techniques could make restoration of native habitats more cost effective and efficient in the future, leading to more restored acres).

6.4.4.2 Effects of Public Use and Public Use Management

Using the general effects and responses of wildlife and habitat to human disturbance described in Section 6.4.1.2, as well as knowledge of Refuge-specific species, the following effects could be seen versus the current state.

Deer hunting would take place on a small amount of upland habitat on both units of Deer Flat NWR. These hunts are more associated with riparian habitat as discussed above, and additional effects in upland habitat are expected to be minimal and similar to those discussed in the riparian section above.

Alternative 1: Under the status quo alternative, shrub-steppe habitat would continue to be subjected to a variety of impacts stemming from human use and presence. Compatibility determinations for upland uses last completed in 1994 required uses to be on-trail only. Enforcement of the on-trail-only regulation could have a positive long-term effect by reducing impacts from off-trail travel. Currently, this Refuge regulation is not well known or enforced. There would be no additional closures to protect wildlife nesting or wintering areas adjacent to highly used trails. If the 1994 compatibility determinations for upland uses were enforced, there could be a benefit to wildlife over the current state by ensuring that all upland users (aside from hunters during hunting season) stay on designated trails. There would, however, be negative impacts due to the projected increase in Refuge users under this alternative.

Action Alternatives (2-4): Creation of an additional trail on the Observation Hill Trail System is expected to reduce trespass on the seasonally closed portion of the trail.

Alternative 2: Off-trail recreational use by wildlife-dependent users would be allowed all year in the East Side Recreation Area. All visitors would be required to stay on-trail from February 1 through July 31 in the North Side and South Side Recreation Areas to protect breeding and nesting birds, such as quail, killdeer, kingbirds, horned larks, and sage thrashers. Modifying the current firebreak from the entrance parking lot to the observation platform may increase use of this trail and also

increase human disturbance to wildlife in its vicinity. Under Alternative 2, the construction of new facilities would be expected to result in loss of shrub-steppe acreage, with the amount varying depending on the construction option chosen for the visitor contact station: approximately 4 acres if a new visitor contact station is built and 2.9 acres if the existing Environmental Education Building is converted into the visitor contact station. Some of the new facilities would be installed at the Lower Dam Recreation Area, most of which has already been converted to manicured lawn. Approximately 2 acres of more natural habitat would also be disturbed.

Alternative 3: Under this alternative, horseback riding and dog walking would not be allowed, all users would be required to stay on-trail at all times, and nonwildlife-dependent group activities would not be allowed. These changes from the current state would be expected to have an intermediate long-term positive impact on wildlife using sagebrush-steppe habitats through a reduction of noise, pet-caused wildlife disturbance, unpredictability of visitor travel, soil and vegetation compaction, human-caused wildlife disturbance, and a only a modest increase in overall visitation. Under Alternative 3, the construction of new facilities would be expected to result in loss of shrub-steppe acreage, with the amount varying depending on the construction option chosen for the visitor contact station: approximately 3.7 acres if a new visitor contact station is built and 2.6 acres if the existing Environmental Education Building is converted into the visitor contact station. Approximately 1.8 acres would be disturbed outside of the Lower Dam Recreation Area.

Alternative 4: Alternative 4 would have the greatest long-term positive impacts to wildlife and habitats because only on-trail wildlife-dependent activities would be permitted and there is a projected reduction of overall visitation under this alternative. These changes from the current state would be expected to have a long-term positive impact on wildlife using sagebrush-steppe habitats through a reduction of noise, speed of visitor travel, unpredictability of visitor travel, pet-caused wildlife disturbance, soil and vegetation compaction, human-caused wildlife disturbance, and a reduction in overall visitation. Under Alternative 4, the construction of new facilities would be expected to result in loss of shrub-steppe acreage, with the amount varying depending on the construction option chosen for the visitor contact station: approximately 1.9 acres if a new Visitor Contact Station is built and 0.7 acre if the existing Environmental Education Building is converted into the Visitor Contact Station. Approximately 0.5 acre would be disturbed outside of the Lower Dam Recreation Area.

6.4.4.3 Overall Effects

All alternatives have the potential to have some positive effect on shrub-steppe habitats and associated wildlife. The negative impact of increased visitation in Alternative 1 would reduce any positive effects that could be seen from enforcement of on-trail regulations. If on-trail regulations are not renewed or enforced, the increase in visitation would create a minor long-term negative effect on all 830 acres of shrub-steppe habitat. Although Alternative 2 does not restrict use to trails year-round, the seasonal trail use regulations, the proposal to allow nonwildlife-dependent uses on designated trails only, and proposed habitat improvements are expected to provide an overall minor long-term positive effect on 520 acres of shrub-steppe habitat. Because Alternative 3 proposes to not allow nonwildlife-dependent group activities, dog walking, horseback riding, or off-trail use, along with only a small increase in overall visitation and proposed changes in habitat management, it is expected to have an overall intermediate long-term positive effect on 520 acres of shrub-steppe habitat. Because Alternative 4 proposes to allow only on-trail wildlife-dependent uses, improve habitat management, and see a decline in overall visitation, it is expected to have the least amount of

negative impact and have an intermediate long-term positive effect on shrub-steppe habitat and associated wildlife on all 830 acres of shrub-steppe habitat.

6.4.5 Effects to Mudflats and Associated Species: Lake Lowell

According to the Manomet Center for Conservation Sciences, shorebird species have declined worldwide due, in part, to loss of habitat and human disturbance (Brown et al. 2001). Restoration, maintenance, and protection of habitat, especially mudflats, would be of great value to shorebird populations at Deer Flat NWR. Late in the summer, as Lake Lowell is drawn down for irrigation, numerous species of shorebirds use the exposed mudflats for feeding. Shorebirds depend upon wetland stopover sites to replenish depleted fat reserves used in their migratory flight (Dugan et al. 1981). Many wetland areas in Idaho and throughout the United States have been drained, developed, or otherwise altered, forcing shorebirds to use other remaining wetlands. Construction of reservoirs for power and irrigation across the United States has created about two million acres of such habitat since the mid-1950s (Howe 1987). Taylor and Trost (1992) showed that reservoirs in the western interior can be important migratory stopover sites for shorebirds. Chapter 4 of this document further explores the importance of mudflats in the Intermountain West, Idaho, and Deer Flat NWR. Management actions proposed as part of this CCP are intended to provide long-term positive effects to mudflats and associated wildlife. The action alternatives propose strategies that would improve the quality and quantity of this habitat by reducing the amount of recreational disturbance and encroachment of unwanted vegetation as well as improving upon what exists.

Alternative 1: There would be no change to the current state of habitat and wildlife or public use management. Refuge visitation is expected to increase. With no additional wildlife or habitat buffers being created, human-caused disturbance to feeding and resting shorebirds is also expected to increase.

Alternative 2: Seasonal closure of highly used mudflats would provide protection for feeding and resting shorebirds against human-caused wildlife disturbance. Habitat management improvements to existing mudflats, such as vegetation discing and removal, shoreline scouring, and firewood collection, are also expected to enhance the existing mudflat habitat. These enhancements, along with the removal of vegetation in order to create more mudflat habitat in the West Pool, are expected to have intermediate long-term effects on shorebirds.

Alternative 3: Seasonal closure of the mudflats and the waters adjacent to them in the West Pool, along with a year-round closure adjacent to the mudflats in the southeast end of the lake, would provide less-disturbed feeding and resting areas for shorebirds. Habitat management improvements to existing mudflats such as vegetation discing and removal, shoreline scouring, and firewood collection are also expected to enhance the existing mudflat habitat. These enhancements, along with the removal of vegetation in order to create more mudflat habitat in the West Pool, are expected to have intermediate long-term effects on shorebirds.

Alternative 4: The year-round closure of mudflats in the West Pool and the waters adjacent to them, along with a year-round closure adjacent to the mudflats in the southeast end of the lake, would provide less-disturbed feeding and resting areas for shorebirds. Habitat management improvements to existing mudflats such as vegetation discing and removal, shoreline scouring, and firewood collection are also expected to enhance the existing mudflat habitat. These enhancements, along with the removal of vegetation in order to create more mudflat habitat in the West Pool, are expected to have intermediate long-term effects on shorebirds.

6.4.5.1 Effects of Habitat and Wildlife Management Actions

Management actions proposed as part of this plan are intended to provide long-term positive effects to wildlife species including shorebirds. The action alternatives propose strategies that would improve shorebird habitat, namely the mudflats that are exposed in the fall as irrigation demands drawn-down lake levels. These improvements to shorebird habitat would consist of creating additional mudflats with more predictable exposures and discing vegetation to incorporate organic matter into the soil and encourage invertebrate growth.

Alternative 1: There would be no changes to the management of the mudflats or the species associated with them.

All Action Alternatives (2-4): Changes to management of the mudflats, including vegetation removal and creation of shallow pools of water, are expected to create long-term positive impacts on the mudflats and associated species. Shorebirds such as plovers, American avocets, western sandpipers, and marbled godwits would benefit from the removal of vegetation by having feeding areas that are free from predator perches. They would also benefit from the shallow scours by having more food and water's edge available as the lake is drawn down. Because of fluctuating water levels and the exposure of the mudflats, improvements to mudflats can only be done when conditions are right for shorebirds to be present, thereby causing disturbance. Measures to avoid negative interaction would be in place and habitat improvement activities are anticipated to be short-term, improving conditions in the long term. Any negative effects to shorebirds are expected to be negligible and far outweighed by intended positive effects.

6.4.5.2 Effects of Public Use and Public Use Management

Public use may affect shorebirds through disturbances associated with visitors in close proximity to feeding and resting areas. The scope of disturbance depends on public use activities, group sizes, the season of use, and the location and duration of the activity. The construction and maintenance of visitor use facilities (in this case an observation/photography blind in the Action Alternatives) could have effects on soils, vegetation, and possibly hydrology in a specific area. The construction, maintenance and use of this could potentially increase erosion, cause localized soil compaction (Liddle 1975); reduced seed emergence (Cole and Landres 1995), alter vegetative structure and composition; and cause sediment loading (Cole and Marion 1988) in the immediate area.

Mudflats used most by shorebirds are near the New York Canal at the east end of the lake. The New York Canal is the southern boundary of the east end of the East Side Recreation Area and is currently open to the public for numerous recreational activities including hunting and wildlife observation. Bird watchers walk in from Tio Lane to observe shorebirds in late summer and early fall and upland game hunters hunt mourning doves in dry smartweed beds adjacent to the mudflats. The consequences of human disturbance, in terms of physical condition or survival, are currently unknown (Fernández et al. 2010) but studies have shown that shorebirds avoid areas of higher disturbance. For example, when comparing bird response on paired lower and higher use days at trail sites, a study in California found that shorebird numbers decreased, with increasing trail use, with higher trail-use days averaging 25 percent fewer birds than lower use days (Trulio and Sokale 2008).

Using this information, the general effects on and responses of wildlife and habitat to human disturbance described in Section 6.4.1.2, as well as knowledge of Refuge-specific species, the following effects could be seen versus the current state.

Alternative 1: Because there are no proposed changes to public use management under Alternative 1 and Refuge visitation is expected to rise, human-caused disturbance to mudflats and the species associated with them is expected to increase over time resulting in a long-term negative impact.

Alternative 2: Strategic seasonal closures surrounding mudflat areas used by feeding and resting shorebirds are expected to reduce human-caused disturbance in these areas. Fewer disturbances should lead to fewer instances of flushing and allow the shorebirds to feed more and create fuel reserves that would be used during migration. Shorebirds such as sandpipers, black-necked stilts, sanderlings, and red knots are expected to benefit from these changes.

Alternative 3: A seasonal closure of the entire mudflat in the West Pool and adjacent waters and a year-round closure that encompasses the mudflat in the southeast end of the lake are expected to reduce human-caused disturbance even more than Alternative 2. Fewer disturbances should lead to fewer instances of flushing and allow the shorebirds to feed more and create fuel reserves that would be used during migration.

Alternative 4: A year-round closure of the entire mudflat in the West Pool and adjacent waters and a year-round closure that encompasses the mudflat in the southeast end of the lake are expected to reduce human-caused disturbance even farther than Alternative 3. Fewer disturbances should lead to fewer instances of flushing and allow the shorebirds to feed more and create fuel reserves that would be used during migration. Shorebirds like dowitchers, lesser yellowlegs, and long-billed curlews are expected to benefit from these changes.

6.4.5.3 Overall Effects

With no change to the current state of habitat and wildlife or public use management, and a projected increase in visitation, Alternative 1 is expected to have intermediate long-term negative effects on the mudflats and associated wildlife. Alternatives 2 through 4 are all expected to have intermediate long-term positive impacts to Refuge mudflats through both habitat and public use management changes. Alternative 4 is expected to have the greatest positive impact on mudflats and associated species.

6.4.6 Additional Effects to Waterfowl

6.4.6.1 Effects of Waterfowl Hunting on Local, Regional and Flyway Waterfowl Populations

Migratory game birds are those bird species designated in conventions between the United States and several foreign nations for protection and management. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any…bird, or any part, nest, or egg" of migratory game birds can take place and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds" and updated annually (16 U.S.C. 704(a)). The responsibility for managing and conserving migratory birds in the United States was delegated to the Service.

In acknowledgment of regional differences in hunting conditions, the Service administratively divided the nation into four flyways for the purpose of managing migratory game birds: Atlantic,

Mississippi, Central, and Pacific. Each flyway has a flyway council, a formal organization generally composed of one member from each state and province in that flyway. The Refuge is within the Pacific Flyway and allows hunting for ducks, geese (on the Snake River Island Unit), and coots.

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 C.F.R. 20) establishing the frameworks from which states may select season dates, bag limits, shooting hours, and other options for each migratory bird hunting season. The Service annually prescribes frameworks, or outer limits, for dates and times when hunting migratory birds may occur, and the number of birds that may be taken and possessed. These frameworks are necessary to allow states to select seasons and limits for recreation and sustenance; aid Federal, State, and Tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. The frameworks are essentially permissive, in that migratory bird hunting would not be allowed without them. Therefore, annual Federal regulations both allow and limit migratory bird hunting.

The process for adopting migratory game bird hunting regulations, located in 50 C.F.R. Part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rulemaking process lasts. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulation development schedules, based on “early” and “late” hunting season regulations.

Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties. Because the Service is required to take the abundance of migratory birds and other factors into consideration, it undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, state and provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of Federal and State governments. After the Service establishes final frameworks for hunting seasons, the states may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for national wildlife refuges open to hunting, including Deer Flat NWR, are never longer or larger than the State regulations.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88-14), filed with the EPA on June 9, 1988. A Notice of Availability was published in the Federal Register on June 16, 1988 (53 FR 22582), and a Record of Decision was signed on August 18, 1988 (53 FR 31341). Current year NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental

Assessment—Duck Hunting Regulations for 2006-2007, and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376); the Service announced its intent to develop a new supplemental environmental impact statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216).

Waterfowl use in and around the Refuge has been well documented and has seen some changes over time. Long-time residents fondly recall when the skies around Lake Lowell used to be black with ducks. Refuge annual narratives mirror these sentiments with photos and documentation of duck numbers in excess of half a million during the peak of migration. Those numbers have not been seen in the Treasure Valley since the late 1970s, probably due to the advent of "clean farming," conversion of farmland to housing development, natural shifts in the flyway, and/or a variety of other factors. Numbers of ducks and geese in the valley continue to provide a quality hunting experience and Deer Flat NWR is a waterfowl hunting destination for both local and out-of-state hunters.

Waterfowl hunting would essentially continue to occur as it is currently under all four alternatives. Small changes in the hunt areas in Alternatives 3 and 4 would likely have negligible impact on the Refuge's waterfowl numbers. There may be a small increase in harvest numbers under the action alternatives relative to the status quo due to the likelihood of increased waterfowl use of improved habitat. Even though small changes in management and enforcement of Refuge rules may slightly increase harvest numbers, it is expected to have negligible effect on regional waterfowl populations.

The Federal Harvest Information Program estimates that 16,800 hunters in Idaho spent 102,700 days hunting and harvested 225,100 ducks annually from 2001 through 2010. Over that same time period, the harvest information program estimates Idaho hunters harvested 59,800 Canada geese annually. This is the third highest total in the Pacific Flyway, behind Oregon and Washington, respectively. The number of waterfowl harvested on Deer Flat NWR is unknown; however, it is thought to be a small percentage of total numbers harvested in the state and even smaller in the flyway.

Deer Flat NWR personnel have performed winter waterfowl surveys since 1951. Because birds can move long distances over short periods of time during the winter migration, these surveys are not considered an accurate measurement. Regional and local population surveys like the one performed at this Refuge are best understood as an index (best used to measure trends over time) and not a true census at any particular time. For instance, Refuge waterfowl survey numbers (commonly between 300,000 and 500,000 ducks) for the late 1970s positively correlate with the anecdotal "skies were black with ducks" local sentiment. More recent and lower numbers (between 30,000 and 100,000) correlate with the frequently heard question, "Where have all the ducks gone?"

6.4.6.2 Effects of Hunting on Waterfowl

Hunting, by its nature, results in the intentional take of individual animals, as well as wounding and disturbance (DeLong 2002). It can also alter behavior (e.g., foraging time), population structure, and distribution patterns of wildlife (Bartelt 1987; Madsen 1995; Owens 1977; Raveling 1979; Thomas 1983; White-Robinson 1982). Waterfowl are wary, seeking refuge from all forms of disturbance, but particularly those associated with loud noise and rapid movement (Korschgen and Dolgren 1992). Numerous studies show human activities associated with hunting (boating, vehicle disturbance, human presence) cause increased flight time in waterfowl species, which requires a considerable amount of energy (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Human

disturbance compels waterfowl to change feeding habits like feeding only at night or deserting feeding areas entirely resulting in weight loss (Korschgen and Dolgren 1992).

6.4.6.3 Effects of Waterfowl Hunting on Waterfowl Habitat Use

The effects of human presence in wildlife habitat are discussed above in Section 6.4.1.2. The effect that hunting can have on distribution and use of habitat by waterfowl has also been well studied. Belanger and Bedard (1995) concluded that disturbance caused by hunting can modify the distribution and use of various habitats by birds (Madsen 1995; Owens 1977). Another study that took place at Sacramento National Wildlife Refuge found statistically significant differences in the densities of northern pintails among hunting units, units adjacent to hunting units, units adjacent to auto tour route, and units isolated from disturbance (Wolder 1993). Prior to the opening of hunting season, pintails had been fairly evenly distributed throughout usable habitat. Not surprisingly, after hunting season started the pintails moved to more isolated wetlands and units closed to hunting and therefore removed from hunting pressure, indicating an avoidance of disturbed areas. Belanger and Bedard (1989) studied the effect of disturbances to staging greater snow geese in a Quebec bird sanctuary and found that disturbance to a flock of geese influenced goose use of the sanctuary on the following day. When disturbance exceeded two events per hour, it produced a 50-percent drop in the mean number of geese present in the sanctuary the next day. These studies corroborate what is apparent at Deer Flat NWR during winter waterfowl surveys. Closed areas or sanctuaries (approximately 1,330 acres or 13 percent of Refuge lands) typically hold larger numbers of ducks and geese than areas that are open to public hunting.

Disturbance due to hunting may also cause waterfowl to alter feeding and resting routines resulting in decreased energy intake and increased energy expenditure. Wintering black ducks at Chincoteague NWR experienced reduced energy intake and doubled energy expenditure because of increased avoidance of disturbance (Morton et al. 1989). Belanger and Bedard (1995) analyzed flushing responses and feeding habits of snow geese and found that high disturbance rates (more than two times per hour) limited the ability of the geese to adequately compensate for energy loss even with altered feeding regimes.

Hunters may also cause damage to the physical habitat that waterfowl rely upon. The primary impact hunters have on habitat is the trampling of vegetation and creation of social trails. Trail widening and creation of social trails increases the area of disturbed land (Adkison and Jackson 1996; Dale and Weaver 1974; Liddle 1975). Pedestrians can potentially cause structural damage to plants and increase soil compaction and erosion (DeLuca et al. 1998; Whittaker 1978). These impacts are unlikely to occur on the well-defined, gravel surface of Refuge trails; however, social trails associated with off-trail use remain an issue for Refuge Managers as plants are trampled and wildlife is disturbed. Because hunting requires off-trail use in the pursuit and/or recovery of game this concern is difficult to mitigate.

Control of invasive plant species on the Refuge is a difficult and never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Propagules of nonnative plants can be transported into new areas on hunters' boots, clothing, dogs, and equipment. There is the possibility that these transports could be new nonnative plants not currently found at the Refuge or in a particular area of the Refuge. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants would be controlled and monitored as part of the Refuge's IPM Plan (see Appendix G).

6.4.6.4 Overall Effects

With regard to the effects on the Refuge's current harvest of waterfowl, the impacts of continuing the recreational hunting program would be negligible. Waterfowl harvest on the Refuge accounts for a small portion of the overall waterfowl numbers based on mid-winter surveys at both the Pacific Flyway and State levels. Therefore, and in consideration of the regulatory oversight of the harvest conducted at the flyway level prior to each season, we conclude that waterfowl hunting would not have a significant impact on local, regional, or Pacific Flyway waterfowl populations. Hunting can contribute to the well-being of wildlife by providing financial, educational, and sociological benefits to hunters, who are thereby committed to the availability of wildlife for their sport. Hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of wildlife and habitat conservation, which ultimately contributes to the NWRS mission. The hunting community has been among the largest support base for funding state wildlife management agencies (Heberlein 1991; Jahn and Trefethen 1978), and refuges provide an opportunity for a high-quality waterfowl hunting experience to all citizens regardless of economic standing. Many individual refuges have developed extensive public information and education programs that bring hunters into contact with Refuge activities and facilitate awareness of wildlife issues beyond hunting.

6.4.7 Effects to Threatened and Endangered Species

There are no listed or candidate species known to occur on the Refuge. There are various counties that surround both units of the Refuge that have a variety of listed species historically or currently occurring within the county. Of these species, only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant as sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off Refuge (e.g., Bruneau hot springs snail and Packard's milkvetch) or roam great distances and/or would not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts to listed or candidate species or their habitats from recreational uses would be negligible. If any use results in unacceptable adverse effects to listed or candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

6.5 Effects to Public Uses

Welcoming visitors and providing opportunities for them to enjoy wildlife-dependent public uses is an important role of the Refuge System. This section includes assessment of the change in Refuge user numbers expected under each of the alternatives, of how management actions under each alternative could affect quality opportunities for the Refuge System's priority (i.e., hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and nonpriority (e.g., recreational boating, swimming, jogging, and horseback riding) public uses, as well as the amount of illegal uses and environmental justice considerations.

6.5.1 Estimating Annual Recreation Visits

Estimates of FY11 visitation based on the sampling techniques described in Section 5.3.2 are provided in Table 6-2.

Table 6-2. Estimates of FY11 Visits to the Lake Lowell and Snake River Islands Units. Visitors may engage in more than one activity per visit.

Recreational Activity	Visits
Waterfowl hunting	5,100
Upland game hunting	1,100
Mourning dove hunting	100
Big game hunting	75
Shoreline or dock fishing	18,300
Boat fishing	27,000
Wildlife watching and photography	23,900
Environmental education	11,000
Interpretation (including Visitor Center)	21,000
Nonwildlife-dependent boating	49,400
Swimming and other beach activities	38,700
Walking and Jogging	16,500
Other Activities (e.g., picnicking)	11,300
Total	**223,475**

Source: 2011 Refuge Annual Performance Plan database.

6.5.2 Projected User Numbers in 15 Years

Refuge decisions about features of public use management—such as how many facilities to build, where to build them, how much staff time to devote to programs, and how much parking to provide—influence visitation for years to come. Similarly, and often playing a greater role, demographic shifts, cultural preferences, and economics influence Refuge visitation. Even small annual shifts can have a profound effect over time.

The CCP team projected the number of visits that would be expected at the end of 15 years, by alternative (Table 6-3). The population projections and outdoor recreation trend data and projections used in making those projections are summarized below.

The 2010 census showed a 21.1-percent increase in Idaho's population from 2000 through 2010, with population increases of 43.7 percent and 30.4 percent over the same period in Canyon and Ada counties, respectively (U.S. Census Bureau 2010). COMPASS (2010) projected a 3.6-percent average percent increase per year between 2010 and 2025 for Canyon County and 3.1-percent average percent increase per year for the region (i.e., Ada and Canyon Counties) in the same time frame. The growing state and regional populations, coupled with an increasing interest in nature-based recreation and tourism within Idaho and nationally, would influence public uses at the Refuge under all management alternatives.

Many of the public use opportunities currently provided at the Refuge are very popular within Idaho and are projected to attract new participants in the coming years. IDPR began tracking outdoor recreation trends in 2002 in the first Idaho Statewide Comprehensive Outdoor Recreation and Tourism Plan (SCORTP) for 2003 through 2007 (IDPR 2003). Comparing the 2002 data with their

most recent survey data from 2004-2005 (IDPR 2006), the data show substantial increases in a two-year period for the following activities: geocaching (154 percent), outdoor photography (44 percent), jet boating (30 percent), bird watching (29 percent), canoeing (26 percent), walking for exercise (22 percent), and watching wildlife other than fish (21 percent). The data also reveal a substantial decrease for running (26 percent).

IDPR (2010) reports boat license sales statewide. Given that about 95 percent of Lake Lowell Unit visitors are from within a 50-mile radius (see Appendix L), the boat licensing data in neighboring counties (Ada, Canyon, Owyhee, and Payette Counties) were used. Although the data are limited and shows fluctuations that cannot be interpreted easily, the data are reasonably well described with a logarithmic equation. This yields a 12-percent increase over baseline in projected boat licenses after 15 years. This is similar to a projection by Bowker et al. (1999) of a 1-percent constant annual growth rate in number of days involved in motorboating.

Hunting and fishing license data provided by Wiedmeier (pers. comm., 2011) show a quite small (0.46 percent) constant annual increase in hunting licenses sold statewide between 2005 and 2010. Fishing license sales show a more uneven but the trend, when analyzed, again shows a small (0.46 percent) constant annual increase in fishing licenses.

Bowker et al. (1999) developed models to project future outdoor recreation participation to 2050 based on data from the National Survey on Recreation and the Environment (NSRE) conducted in 1995. The NSRE is the only ongoing assessment of national recreation trends. According to the Bowker report, fishing, hunting, wildlife watching and photography, hiking, walking, biking, horseback riding, picnicking and family gatherings, motorboating, and visiting beaches are projected to increase at a rate higher than population growth within the Rocky Mountain region (including Idaho). Bowker, et al. (1999) projected that nonpool swimming would increase at a rate that keeps pace with population growth.

Finally, Cordell (2008) describes general trends in nature-based recreation, comparing data from the NSRE completed between 1999 and 2001 to the survey completed between 2005 and 2008. Refuge activities that were among the fastest-growing nature-based outdoor activities from 2000 through 2007 included viewing and photographing nature, kayaking, visiting water, visiting nature centers, and big game hunting.

Table 6-3 displays visitation projections by use. The current number of Refuge visits is displayed, as well as the expected visits that would occur by the end of CCP implementation for each of the alternatives. Projected changes in visitation by use over the next 15 years for Alternative 1 were estimated using equations that fit observed trends described above, over a 15-year horizon. Visitation increases or decreases for the other alternatives by the end of 15 years were estimated based on the following considerations:

- Changes in recreational programs, facilities, and resources under each alternative (for more information on effects from proposed changes see Sections 6.5.3 through 6.5.12);
- Changes observed in visitation at Deer Flat NWR over the last 10 years (Refuge staff experience and best professional judgment); and
- Trend data described above.

Potentially contingent changes (e.g., restriction in upland game hunt hours based on results of visitor use surveys) are not reflected in these visitation projections.

Table 6-3. Deer Flat NWR's Current and Projected Annual Visits in 15 Years, by Alternative

Recreational Activity	Current Visits	Annual Visits at the End of 15 Years				Assumptions
	(2011)	Alt 1	Alt 2	Alt 3	Alt 4	
Waterfowl hunting	5,100	5,450	5,450	3,150	4,360	*Alt 1*: Assume linear trend line at 0.46% annual increase based on IDFG (pers. comm., C. Wiedmeier 2011) trend data. For deer hunting, assume all 45 tags in the new Lake Lowell controlled hunt would be filled each year. *Alt 2*: Same as Alternative 1 because no change in hunt area. *Alts 3 and 4*: For waterfowl, upland game, and mourning dove hunts, assume reduction proportional to reduced acreage available for hunting.
Upland game hunting	1,100	1,180	1,180	550	410	
Mourning dove hunting	100	110	110	50	40	
Big game hunting	75	125	125	125	125	
Fishing	45,300	48,430	48,430	23,260	12,710	*Alt 1*: Assume linear trend line at 0.46% annual increase based on Wiedmeier (pers. comm., 2011) trend data. *Alt 2*: Same as Alt 1, assuming minimal impact of more no-wake zones and of seasonal closures around wildlife nesting or feeding areas. *Alt 3*: Assume 60% reduction in fishing in the East Pool due to increased time to access fishing spots. Use USGS data (see Appendix L) for percentage of anglers who fish in emergent beds to determine displacement from emergent beds closed to fishing. *Alt 4*: Same assumptions as Alt 3 but 60% reduction for entire lake because all no wake.
Wildlife watching and photography	23,900	49,690	52,170	49,690	47,200	*Alt 1*: Assume 5% constant annual growth rate (compounded, exponential trend line) based on projections from Bowker et al. (1999) and Cordell (2008) for various wildlife viewing, photography, and nonconsumptive activities. *Alt 2*: Assume a 5% higher number of baseline visits from Alt 1 because of improved facilities. *Alt 3*: Assume same as Alt 1 because restriction to on-trail travel balanced by improved facilities. *Alt 4*: Assume 5% lower number of baseline visits from Alt 1 because of restriction to on-trail travel and fewer improved facilities.
Environmental education	11,000	11,000	14,650	14,650	16,980	Current visits include Refuge programs, EE Building users, and traveling trunks. *Alt 1*: Assume remains the same because current staff are doing maximum # possible programs. *Alts 2 and 3*: Assume demand increases at rate of local population growth (COMPASS 2010). However, overall decrease caused by increased staff emphasis on interpretation balanced by increase in teacher-led programs, and no EE Building. *Alt 4*: Assume increase despite no EE Building because of increased staff emphasis on EE and more teacher-led programs.
Interpretation	21,000	32,720	58,740	58,740	39,670	Current visits include Visitor Center (VC) visits and participants in interpretive programs. *Alt 1*: Assume demand increases at rate of local population growth (COMPASS 2010). *Alts 2 and 3*: Assume staff/volunteers make 30 interpretive contacts on 3 days per week during 12 peak visitation weeks. Assume contacts at new Visitor Contact Station (VCS) about same as

Recreational Activity	Current Visits	Annual Visits at the End of 15 Years				Assumptions
	(2011)	Alt 1	Alt 2	Alt 3	Alt 4	
						at VC. Although it would be open seasonally, it is at a higher-use location than the VC. *Alt 4*: Assume reduced staff/volunteers contacts because reduced focus on interpretation (30 contacts on 3 days per week during 8 peak visitation weeks). Assume reduced contacts at the new VCS because only wildlife-dependent activities would be allowed.
Nonwildlife-dependent boating	49,400	55,080	50,040	21,480	0	*Alt 1*: Assume growth based on logarithmic equation derived from IDPR (2010). Although boating visits would eventually be limited by available parking, projected increases are not expected to exceed parking capacity except on a few days each summer. *Alt 2*: 19% of ski/tubing currently happens in east section of the East Pool (see Appendix L), which approximately corresponds with the proposed no-wake zone. Assume 25% of those who currently ski/tube in that area would be displaced from the lake and the remainder would move to other parts of the East Pool. *Alt 3*: Assume 39% reduction of Alt 1 projection because 39% of categories corresponding with defined nonwildlife-dependent boating activities (skiing/tubing plus recreation) in USGS study (see Appendix L) currently occur in the West Pool. Although some displaced from the East Pool would move to west, assume that is balanced by amount displaced by AM no-wake restriction. *Alt 4*: No nonwildlife-dependent activities allowed.
Swimming and other beach activities	38,700	60,290	54,260	40,700	0	*Alt 1*: Assume increase at rate of population growth (COMPASS 2010) based on (Bowker et al. 1999) projection. *Alt 2*: Assume 90% of current swimming and beach uses would occur at areas designated for swimming in Alt 2 based on best professional judgment. *Alt 3*: Assume 75% of beach uses in Alt 2 would occur at the LDRA based on best professional judgment. *Alt 4*: No swimming allowed.
Walking and jogging	16,500	19,160	19,160	15,330	11,500	*Alt 1*: Assume 1% constant annual increase (Bowker et al. 1999). *Alt 2*: Same as Alt 1, assuming most walking/jogging already occurs on wider trails. *Alt 3*: Assume reduction by 20% because dogs would not be allowed. *Alt 4*: Assume reduction by 25% because jogging would not be allowed.
Other activities (e.g., picnicking)	11,300	13,120	11,810	11,810	0	*Alt 1*: Assume 1% constant annual increase (based on Bowker et al. 1999 projection for picnicking). *Alt 2*: Assume 90% of current picnicking activity occurs at areas designated for picnicking in Alt 2. *Alt 3*: Assume same as Alt 2. *Alt 4*: No such activities allowed.
Total (% change from current visits)	**223,475**	**296,255 (+32.6%)**	**316,025 (+41.5%)**	**239,475 (+7.2%)**	**132,915 (-40.5%)**	These totals may include some double-counting. For example, projected interpretation visits include contact with nonwildlife-dependent users.

6.5.3 Effects from Wildlife and Habitat Management Actions on Recreational Opportunities and Cultural Resources

Many management actions are proposed to benefit wildlife and habitat on both the Lake Lowell and Snake River Islands Units. Some of these activities may temporarily have minor negative effects on visitors from noise, presence of machinery and staff, and potentially restricted access while the treatments are implemented. However, most are expected, over the course of the CCP, to have long-term positive effects on wildlife habitat and therefore on wildlife-dependent recreational opportunities. These long-term effects are discussed in the next several paragraphs for major wildlife and habitat management actions proposed in the action alternatives.

Efforts to remove carp would have variable effects on recreational opportunities depending on the strategy selected. Short-term effects of seining would be negligible, because seining is usually more effective in fall and winter when the lake is already closed to boats. The long-term improvement in open-water and emergent-bed habitats expected from a reduction in carp biomass through any of the strategies would have an overall intermediate positive effect on waterfowl hunting, fishing, and wildlife observation and photography by improving wildlife habitat and a negligible long-term effect on other activities. If chemical or biological controls were selected for carp control, they could have longer-term negative consequences for all recreational activities through consequences to nontarget sportfish species. Working with Service Regional biologists to assess each type of control method before it is used, based on use elsewhere, should reduce unforeseen impacts.

Opening channels in emergent beds could have a minor short-term negative effect on access for wildlife-dependent and nonwildlife-dependent lake activities during cutting of channels. However, it would have a minor long-term positive effect on fishing and waterfowl hunting by improving access to emergent beds.

Use of prescribed fire in the upland and riparian habitats is proposed in the action alternatives. Although there would be short-term negative impacts to local air quality, limitations on access during prescribed burns, and a short-term displacement of species, use of prescribed fire would have a minor long-term positive effect on wildlife-dependent recreational opportunities by improving fish and wildlife habitat.

Reduction in invasive plants in various habitats through improved invasive plant control would have a minor long-term positive effect on wildlife-dependent recreational opportunities by improving fish and wildlife habitat.

Discing of fire lines would continue in the action alternatives, but some would be removed in riparian and upland habitats to reduce habitat fragmentation. This would have a minor negative effect on ease of access for off-trail users in Alternative 2. However, it would not reduce access in Alternatives 3 and 4, where travel is required on designated trails (except during hunting).

Discing of mudflats near Farm Field 5 would have a minor positive effect on wildlife observation and photography opportunities by improving shorebird habitat, and therefore shorebird viewing opportunities. It would have a negligible effect on other wildlife-dependent and nonwildlife-dependent opportunities.

In the action alternatives, implementation of seasonal or year-round closures and access restrictions (e.g., on-trail requirements and no-wake zones) to protect important wildlife areas (e.g., eagle nests, grebe colonies, osprey nests, heron rookeries, shorebird feeding areas, and wintering waterfowl closures) would reduce visitor access to some areas. Some of these closures and access restrictions would be implemented based on wildlife activity, so areas that had at one time been closed to protect wildlife activity would be reopened if that activity shifts or disappears. The effects of these closures and access restrictions are discussed below in Sections 6.5.4 through 6.5.12 by each type of opportunity.

In all alternatives, staff would monitor the effects of public use on wildlife and consider modifications to the location, timing, and/or type of public use if disturbance to wildlife or habitat degradation reaches unacceptable levels.

The National Historic Preservation Act (NHPA) of 1966, as amended, establishes the Federal Government's policy on historic preservation and the programs through which that policy is implemented. An impact to cultural resources would be considered significant if it adversely affects a resource listed in or eligible for listing in the National Register of Historic Places (NRHP). In general, an adverse effect may occur if a cultural resource would be physically damaged or altered, isolated from the context considered significant, or affected by project elements that would be out of character with the significant property or its setting. Title 36 C.F.R. 800 defines effects and adverse effects on historic resources. Cultural resource surveys will be conducted before conducting any major habitat restoration project. Earth-moving activities occurring in proximity to known sites would be monitored because of the potential for buried cultural material in these areas. If any cultural materials are uncovered during excavation, the Regional Historic Preservation Officer would be contacted to review the materials and recommend a treatment that is consistent with applicable laws and policies. The habitat management and restoration projects proposed under all of these alternatives would not be expected to have an adverse effect on historic resources. Major disturbance would be avoided by the survey and consultation process as described in Section 106 of NHPA.

6.5.4 Effects from Public Use and Public Use Management Actions on Quality Waterfowl Hunting

Indicators of effects on waterfowl hunting opportunities are (1) acres available for general waterfowl hunting; (2) area available for youth waterfowl hunt; and (3) management actions that affect hunt quality.

6.5.4.1 Lake Lowell Unit

Under Alternative 1, waterfowl hunting would be allowed in the East Side and South Side Recreation Areas. Human- or electric-powered boats could be used up to 200 yards from the shore. In the East Side Recreation Area, waterfowl hunting would be walk-in only. A youth waterfowl hunt would be allowed in all designated waterfowl hunt zones in accordance with IDFG regulations. There would be no blinds or designated hunting spots. Portable blinds would be allowed if they are removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and would be available on a first-come, first-served basis. Installation of an ADA-compliant hunting opportunity at an appropriate location would be proposed under all alternatives, including the status quo.

Few changes are proposed in Alternative 1. Invasive plant control would continue to be minimal, and therefore invasive plant infestations would increase, thus reducing waterfowl habitat quality. This would have a minor long-term negative effect on waterfowl hunting opportunity.

In Alternative 2 (Preferred Alternative), the waterfowl hunt area would remain the same as the status quo, with the exception of the youth hunt area, which would be restricted to an area previously closed to waterfowl hunting east of Parking Lot 1 to the New York Canal. Although this would reduce the total area available for the youth hunt (1,940 acres in Alternative 1 and 190 acres in Alternative 2), it would open an area that provides better waterfowl habitat and where hunters would be less disturbed by late-season boaters using the waterfowl hunt area. This would therefore likely create a higher-quality youth hunt. An ADA-accessible waterfowl hunting blind would be installed at an appropriate location to improve hunting opportunity for hunters with physical disabilities. Waterfowl hunters would also be limited to 25 shotgun shells per day. This should increase the quality of the hunt by reducing sky busting (described in Objective 2.1) and encouraging ethical behavior. However, limiting number of shotgun shells would also potentially limit hunting opportunity. In Alternative 2, unlike the other alternatives, anglers would have access to fishing from open shoreline within hunting areas during hunting season. This could increase disturbance to target species from other users and increase safety concerns. However, signs would also be posted at all hunting access points to notify Refuge users when a hunt is underway, which may actually provide a higher-quality hunt by discouraging incursion of non-hunters and thus reducing disturbance to target species from other users and reducing safety concerns. Also, using results of visitor use surveys, we would evaluate whether to implement restricted upland game hunting hours to reduce conflicts with waterfowl hunters. Both these actions to reduce conflict with other users should increase the quality of the waterfowl hunt.

Alternative 3 would reduce the size of the waterfowl hunting area by reducing the hunt area in the South Side Recreation Area to between Parking Lots 3 and 8 and in the East Side Recreation Area to west of the Leavitt Tract. This would reduce the area available for waterfowl hunting from 2,250 to 1,300 acres. It would also reduce the number of waterfowl hunters by changing the waterfowl hunt to a controlled hunting opportunity (e.g., sign-in/out at parking areas or lottery). This would reduce waterfowl hunting opportunities but should increase hunt quality by reducing crowding. The youth waterfowl hunt area would be larger than the area designated in Alternative 2 but would be in an area with lower-quality waterfowl habitat. Only wildlife-dependent public use activities would be allowed in waterfowl hunting zones, which would reduce disturbance to hunters.

Alternative 4 is similar to Alternative 3 except that the South Side Recreation Area waterfowl hunting area would be larger, but waterfowl hunting would not be allowed in the East Side Recreation Area, so only 1,800 acres would be available. The youth waterfowl hunt would shift to the east as in Alternative 2. Only wildlife-dependent public use activities would be allowed, which would reduce disturbance to upland hunters from nonwildlife-dependent users.

In all action alternatives, carp removal efforts, opening channels in emergent beds, and reduction in invasive plants would be expected to have a minor positive effect on waterfowl hunting by improving waterfowl habitat. However, reduction in fire line discing would have a minor negative effect on hunting access by reducing ease of access.

6.5.4.2 Snake River Islands Unit

In Alternative 1, waterfowl hunting, including the youth hunt, would be allowed on all Refuge islands. There would be no blinds or designated hunting spots. Portable blinds would be allowed if they are removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and would be available on a first-come, first-served basis.

No recreational changes are proposed in the action alternatives that would affect the quantity or quality of waterfowl hunting on the Snake River Islands Unit.

6.5.4.3 Overall Effects

In Alternative 1, there would be a negligible long-term effect on waterfowl hunting since reduction of hunt quality due to the spread of invasive plants would be balanced by an improvement in hunter access through the construction of a new ADA-accessible hunting opportunity. In Alternative 2, there would be a minor long-term positive effect on visitor opportunities to enjoy quality waterfowl hunting opportunities. In Alternative 3, the hunt area would be reduced from 2,250 acres in Alternative 1 to 1,300 acres, but that would be partially offset by increased hunt quality and reduction of crowding from implementing a controlled hunt and improvements in waterfowl habitat through wildlife and habitat management actions, having an overall minor long-term negative effect on waterfowl hunting. In Alternative 4, reduction of the hunt area from 2,250 acres in Alternative 1 to 1,800 acres, offset by improved habitat for the youth hunt and improvements in waterfowl habitat through wildlife and habitat management actions, would have an overall negligible effect on waterfowl hunting opportunity. Overall, because no recreational changes are proposed, we expect negligible effects on waterfowl hunting opportunities at the Snake River Islands Unit in all alternatives.

6.5.5 Effects from Public Use and Public Use Management Actions on Quality Upland Game Hunting

Indicators of effects on upland hunting opportunities are (1) acres available for upland hunting; and (2) management actions that affect hunt quality.

6.5.5.1 Lake Lowell Unit

In Alternative 1, upland game bird hunting (including mourning dove) would be allowed in the East Side and South Side Recreation Areas at the Lake Lowell Unit. Few changes are proposed in Alternative 1. Invasive plant control would continue to be minimal, and therefore invasive plant infestations would increase, thus reducing upland habitat quality. This would have a minor long-term negative effect on upland hunting.

In Alternative 2, the upland game hunt area would remain the same as the status quo. In Alternative 2, unlike the other alternatives, anglers would have access to fishing from open shoreline within hunting areas during hunting season. This could increase disturbance to target species from other users and increase safety concerns. However, signs would be posted at all hunting access points to notify Refuge users when a hunt is underway, which may actually provide a higher-quality hunt by discouraging incursion of non-hunters and thus reducing disturbance to target species from other users and reducing safety concerns. Using results of visitor use surveys, we would periodically

evaluate whether to implement restricted upland game hunting hours to reduce conflicts with waterfowl hunters, although this potential effect is not evaluated here. If such a reduction in hunting hours were implemented, the total upland hunting opportunity would be reduced. These changes would have a negligible effect on upland hunting.

Alternative 3 would reduce the size of the upland game bird hunting area from 2,250 (Alternatives 1 and 2) to 400 acres by eliminating the hunt in the South Side Recreation Area and eliminating the Leavitt Tract from the hunt zone in the East Side Recreation Area. Only wildlife-dependent public use activities would be allowed in the remaining upland hunting zones, which would increase hunt quality by reducing disturbance to target species from other users and reducing safety concerns. Reduction in the hunt area would have an intermediate long-term negative effect.

In Alternative 4, upland game bird hunting would be completely eliminated from the Lake Lowell Unit, which would have a significant negative effect on upland hunting opportunities.

In all action alternatives, prescribed fire and reduction in invasive plants would be expected to have a minor positive effect on upland hunting by improving upland game habitat. However, reduction in fire line discing would have a minor negative effect on hunting access by reducing ease of access.

6.5.5.2 Snake River Islands Unit

In Alternative 1, upland game hunting would continue to be allowed on all Refuge islands. No recreational changes are proposed that would affect the quantity or quality of upland game hunting on the Snake River Islands Unit.

6.5.5.3 Overall Effects

In Alternative 1, there would be a negligible long-term negative effect on upland game bird hunting from the spread of invasive plants due to minimal invasive species management. Alternative 2 would have a negligible effect on visitor opportunities to enjoy quality upland game bird hunting opportunities. In Alternative 3, the hunt area would be reduced, but reduced disturbance from nonwildlife-dependent activities in the hunting area and improvements in upland habitat through wildlife and habitat management actions should increase hunt quality, having an overall minor negative effect on upland game bird hunting. Alternative 4 would have a significant negative long-term effect on upland game bird hunting opportunities by completely eliminating the opportunity on the Lake Lowell Unit of the Refuge.

Overall, negligible effects on upland game hunting opportunities would be expected at the Snake River Islands Unit in all alternatives.

6.5.6 Effects from Public Use and Public Use Management Actions on Quality Big Game Hunting

Indicators of effects on big game hunting opportunities are (1) acres available for big game hunting; and (2) management actions that affect hunt quality.

6.5.6.1 Lake Lowell Unit

A new Lake Lowell Unit deer hunt was recently implemented under a different planning process (USFWS 2011a) and began in fall 2012. This hunt would continue unchanged under all alternatives. In Alternative 2, unlike the other alternatives, anglers would have access to fishing from open shoreline within hunting areas during hunting season. This could increase disturbance to target species from other users and increase safety concerns. However, signs would be posted at all hunting access points to notify Refuge users when a hunt is underway, which may actually provide a higher-quality hunt by discouraging incursion of non-hunters and thus reducing disturbance to target species from other users and reducing safety concerns. Under Alternatives 3 and 4, there would be no upland bird hunting within the deer hunting zone and only wildlife-dependent public use activities would be allowed in hunting zones, which may reduce disturbance to target species from other users and reduce safety concerns. However, in Alternative 3, the proposed boardwalk between parking lots 1 and 3 does fall within the deer hunting area, so wildlife-dependent boardwalk users may increase disturbance to target species from other users and increase safety concerns. Overall, changes in access to the deer hunt area would have a negligible to minor negative effect of disturbance on deer hunt quality.

In all action alternatives, prescribed fire and reduction in invasive plants would be expected to have a minor positive effect on deer hunting by improving habitat. However, reduction in fire line discing would have a minor negative effect on hunting access by reducing ease of access.

6.5.6.2 Snake River Islands Unit

In Alternative 1, big game hunting would be allowed on all Refuge islands. No recreational changes are proposed in the action alternatives that would affect the quantity or quality of waterfowl hunting on the Snake River Islands Unit.

6.5.6.3 Overall Effects

In Alternative 1, there would be a negligible long-term negative effect on big game hunting from the spread of invasive plants due to minimal invasive species management. In the action alternatives, a negligible effect would be expected due to hunting acres remaining the same as presently available.

6.5.7 Effects from Public Use and Public Use Management Actions on Quality Fishing

Indicators of effects on fishing opportunities are (1) acres available for boat fishing; (2) area available for shoreline fishing; (3) facilities available for dock fishing; and (4) management actions that affect fishing quality.

6.5.7.1 Lake Lowell Unit

In Alternative 1, the entire lake would be open to fishing from boats between April 15 and September 30. Between October 1 and April 14, fishing would be allowed from human-powered boats 200 yards in front of the Upper and Lower Dams (Fishing Areas A and B). Boat fishing is popular throughout the boating season and peaks from April through June. Shoreline fishing would be allowed from open shoreline, with the exception of waterfowl-hunting season, when fishing would be allowed only

in Fishing Areas A and B, 200 yards in front of the Upper and Lower Dams (about 120 acres). Shoreline fishing is common from April through September and is usually highest in June. During the boating season, there would continue to be an ADA-accessible fishing dock at the West Upper Dam boat ramp. This is currently the only ADA-accessible fishing opportunity at the Refuge and the only designated fishing dock. SUPs would continue to be issued for fishing tournaments with special provisions. Currently some ice fishing occurs when the lake freezes.

Under all action alternatives, signs would be posted at hunting access points to notify Refuge users when a hunt is underway. This would improve the fishing experience by improving the safety of fishing visitors. In addition, new fishing facilities (including ADA-accessible fishing access trails and ADA-accessible docks) would improve fishing quality by providing more accessible shoreline fishing opportunities. Wading access to fishing at the Lake Lowell Unit would be restricted to the boating season (April 15-September 30) except in Fishing Areas A and B. Although the lake is currently closed during that time, the restriction on wading access to fishing is not being communicated to the public, and visitors sometimes wade or use float tubes between October 1 and April 14. If Alternative 1 were selected, this requirement would be enforced, reducing fishing access. Finally, if it were possible to increase bottom structure to benefit fish without interfering with the irrigation purpose of the reservoir, the increased structure would improve fishing opportunities by providing fish habitat.

Under Alternative 1, invasive plant control would continue to be minimal, and therefore invasive plant infestations would increase, thus reducing fish habitat quality. This would have a negligible long-term negative effect on fishing.

In Alternative 2, the fishing area accessible by boat would remain the same, with the exception of those areas subject to seasonal wildlife closures (e.g., grebe, eagle, and heron nesting and shorebird feeding). The number of acres closed seasonally would vary depending on wildlife activity. If seasonal closures like those proposed as part of Alternative 2 had been implemented in 2011, 170 acres would have been closed between February 1 and July 1 and 1,050 acres between April 15 and September 30. There would be additional no-wake areas, including an expansion of the no-wake zone in the East Pool, a 200-yard no-wake buffer along the south shore, and a no-wake area in the Narrows between the East and West Pools. Although these no-wake areas would increase the time it would take to reach some fishing spots, most of the available fishing area would still be accessible by boat with the exception of those areas subject to seasonal wildlife closures as discussed above. Access for fishing tournaments would remain unchanged from the status quo.

In Alternative 2, access to bank fishing would remain the same in the East Side Recreation Area and at Gotts Point, again with the exception of those areas subject to seasonal wildlife closures. Gotts Point would also be fully open to vehicle access upon completion of an MOU with Canyon County to resolve law enforcement issues, and ADA-accessible trails and a dock would be provided to improve fishing access at Gotts Point. Access to bank fishing would be restricted to trails during the nesting season (February 1-July 31) in all other areas, and open to off-trail travel the rest of the year. Additional trails would be developed to provide fishing access, including at popular fishing access points at Parking Lots 4 and 7 on the south side, from a proposed trail at Murphy's Neck, and at Gotts Point. In addition, ADA-accessible docks would be provided at appropriate locations, including at the Lower Dam Recreation Area, east end of the Upper Dam, Gotts Point, and at Parking Lot 1. Fishing opportunities would also increase during waterfowl hunting season, because fishing would be available from the all areas open to access, rather than just Fishing Areas A and B. After the disabled-accessible 0.65-mile trail proposed in Murphy's Neck were installed, access to Murphy's

Neck for fishing may be moved from road-side parking on Orchard Avenue to the Murphy's Neck trail. If that change were made it would increase the distance shoreline anglers would need to walk, but it would also improve visitor safety and accessibility for people with disabilities. Ice fishing would not be allowed. Because of additional fishing access through new facilities and reopening of Gotts Point to vehicles, there would be a minor long-term positive effect on fishing access.

Alternative 3 would reduce the fishing area from 7,300 acres accessible by boat in Alternative 1 to 5,800 acres, because the current no-wake zone on the east end of the lake and the emergent beds between Parking Lots 3 and 8 on the south side and at Murphy's Neck would be closed. In addition, historical grebe nesting colonies would be closed throughout the boating season, and there would be a seasonal closure to protect shorebird foraging habitat from Murphy's Neck to the Narrows, as well as other seasonal closures as in Alternative 2. There would also be additional no-wake areas, including the entire East Pool, a 200-yard buffer from the emergent vegetation on the south side in the West Pool, and in the West Pool from sunrise to noon, thus increasing the time it would take to reach many fishing spots, but also reducing disturbance from wake-causing boats and increasing the opportunity to fish from nonwake-causing boats. The lake would close to boating 10 days earlier than under Alternative 1.

Access to bank fishing would be restricted to trails and docks in all areas, thus restricting bank fishing access further than under Alternative 2. Additional trails and docks would be developed to provide additional fishing access, and Gotts Point would be fully open to vehicle access upon completion of an MOU with Canyon County to resolve law enforcement issues.

Alternative 4 reduces the fishing area accessible by boat to 5,400 acres, because emergent beds would be closed between Parking Lots 1 and 3 and at Murphy's Neck, and a 100-yard area along the shore would be closed between Murphy's Neck and the Narrows. The entire lake would be open only to no-wake boating, thus increasing the time it would take to reach many fishing spots, but also reducing disturbance from wake-causing boats and increasing the opportunity to fish from nonwake-causing boats. Eliminating nonwildlife-dependent boating activities would reduce disturbance to anglers and therefore improve the quality of the angling experience.

Access to bank fishing would be similar to Alternative 3, with the following exceptions. Gotts Point would remain closed to vehicle access, and an ADA-accessible trail would be installed from Gotts Point parking area 1 to parking area 2 and then to the water. Two additional trails accessing the lake for fishing would also be installed at Parking Lots 2 and 3.

In all action alternatives, carp removal efforts and reduction in invasive plants would be expected to have a minor positive effect on fishing by improving fish habitat. Opening channels in emergent beds would improve access to fishing spots in emergent beds. However, the reduction in fire line discing would have a minor negative effect on fishing access by reducing ease of access along firebreaks.

6.5.7.2 Snake River Islands Unit

In Alternative 1, fishing would be allowed from all Refuge islands between June 1 and January 31. The Service does not have jurisdiction over the waters of the Snake River, so no management actions are proposed to improve fish habitat. In Alternatives 2 through 4, all islands would be closed for bank fishing until June 15 to protect nesting geese. A few islands (four to six currently) would not open until July 1 to protect colonial-nesting birds. Delaying opening of Refuge islands for fishing from

shore until June 15 or July 1 would reduce the opportunity to fish from shore during late spring and early summer. However, there are few users at that time of year.

6.5.7.3 Overall Effects

In Alternative 1, there would be a negligible long-term negative effect on fishing from the spread of invasive plants due to minimal invasive species management.

In Alternative 2, although fishing access would be restricted during the nesting season in some areas and no-wake zones would increase the time it would take to reach some fishing spots, most of the available fishing area would still be accessible by boat, management actions would improve fish habitat, and additional trails and docks would improve access at popular fishing areas. Overall, these changes would have a minor long-term positive effect on fishing opportunities. Although the Lake Lowell Unit would be closed to ice fishing, this would have a negligible effect on fishing opportunities because very few little ice fishing occurs currently.

In Alternative 3, fishing access would be reduced because of permanent on-water closures and increased no-wake zones. This would be partially offset by reductions in disturbance to anglers from wake-causing activities. Although there would be improved access for bank fishing, overall there would be an intermediate long-term negative effect on access to fishing at the Lake Lowell Unit.

In Alternative 4, reductions in disturbance to anglers from wake-causing activities would partially offset the further restrictions to on-water fishing access. Gotts Point would also remain closed to vehicles. Overall there would be a significant long-term negative effect on fishing opportunities.

Although access to bank fishing on the Snake River Islands Unit would be slightly reduced in all action alternatives because of lengthened nesting closures, not many anglers fish from shore above the mean high water line. Because no other changes are proposed to fishing access or regulations, we expect a negligible effect on fishing opportunity on the Snake River Islands Unit.

6.5.8 Effects from Public Use and Public Use Management Actions on Quality Wildlife Observation and Photography

Indicators of effects on wildlife observation and photography opportunities are (1) number of miles of trail available; (2) facilities available for wildlife observation and photography; and (3) management actions that affect wildlife observation and photography quality.

6.5.8.1 Lake Lowell Unit

In Alternative 1, wildlife observation and photography would continue to occur throughout the Refuge. Some of the best locations are in the North Side Recreation Area west of the Visitor Center and at the Tio Lane entrance. From the Tio Lane entrance, the East Dike Trail gives access to wetlands, and the Kingfisher Trail allows access to riparian forests and the lakeshore. Gotts Point is a popular place for photographing sunsets. A total of 10 miles of trail would continue to be available.

Most wildlife-watching and photography facilities would continue to be located in the North Side Recreation Area and include the Visitor Center viewing room and spotting scope, an osprey nesting

webcam, trails, two ADA-accessible wildlife-viewing platforms, and a wildlife-viewing blind. Three developed viewing facilities would continue to be available.

Although the most recent compatibility determinations allow walking and jogging (with the exception of competitive jogging) on roads, trails, and firebreaks and not off-trail, the requirement to remain on roads, trails, and firebreaks is not being communicated to the public. People frequently leave trails for wildlife watching and photography, and for other recreational activities. If Alternative 1 were selected, this requirement would be enforced, reducing off-trail access.

Under Alternative 1, the lake would continue to be open to motorized and nonmotorized boats for wildlife observation and photography between April 15 and September 30 and to nonmotorized boats in Fishing Areas A and B the rest of the year.

Under all action alternatives, signs would be posted at hunting access points to notify Refuge users when a hunt is underway. This would improve the observation and photography experience by improving the safety and awareness of visitors. In Alternative 2, off-trail access for wildlife observation and photography would be allowed in the East Side Recreation Area, Lower Dam Recreation Area and Gotts Point. Gotts Point would also be fully open to vehicle access upon completion of an MOU with Canyon County to resolve law enforcement issues. Access would be restricted to trails during the nesting season (February 1-July 31) in the North Side and South Side Recreation Areas but open to off-trail travel the rest of the year. Thus, off-trail access would increase beyond that available in Alternative 1. There would also be some seasonal wildlife closures (e.g., eagle and heron nesting) that would restrict access, but these closures should increase the quality of observation and photography opportunities by reducing wildlife disturbance. There would be a larger no-wake area for wildlife observation and photography. An additional 3 miles of trails for a total of 13 miles and an additional two blinds and platforms would be developed for observation and photography on land, and an on-water self-guided or virtual geocaching opportunity would be developed. In addition, those trails and facilities developed primarily for fishing access (see Section 6.5.7.1) would also be available for observation and photography.

Alternative 3 is similar to Alternative 2 except that no off-trail access would be allowed except in the Lower Dam Recreation Area from April 15-September 30. Additional trails and facilities would be the same as in Alternative 2, except that the firebreak to the observation platform west of the Visitor Center from the entrance road parking lot would be rehabilitated rather than upgraded to a trail, a 2-mile boardwalk is proposed between Parking Lots 1 and 3. There would therefore be a total of 14.5 miles of trail and four new blinds and platforms. In addition, no on-water self-guided or virtual geocaching opportunity would be developed. A reduction in the area available for waterfowl and upland game bird hunting would improve the wildlife observation and photography experience in those areas by providing a less disturbed and safer opportunity.

Alternative 4 is similar to Alternative 3 except that the boardwalk and its associated docks and the bike/walking trail along the entrance road would not be developed, so only 12 miles of trails and only two new viewing facilities would be available. Eliminating hunting from the East Side Recreation Area would reduce potential conflicts between user groups and thus improve the quality of wildlife observation and photography. Eliminating nonwildlife-dependent recreational activities would reduce wildlife disturbance and therefore improve wildlife observation and photography opportunities. As in Alternative 3, a reduction in the area available for waterfowl and upland game bird hunting would improve the wildlife observation and photography experience in those areas by providing a less disturbed and safer opportunity.

In all action alternatives, carp removal efforts, prescribed fire, reduction in invasive plants, and discing of mudflats would be expected to have a minor positive effect on wildlife observation and photography by improving wildlife habitat and therefore viewing opportunities. However, reduction in fire line discing would have a minor negative effect by reducing ease of access for wildlife observation and photography.

6.5.8.2 Snake River Islands Unit

Under Alternative 1, wildlife observation and photography would continue to be allowed on all Refuge islands between June 1 and January 31 and viewing of islands from the shore year-round.

In Alternatives 2 through 4, all islands would be closed for wildlife watching and photography until June 15 to protect nesting geese. A few islands (four to six currently) would not open until July 1 to protect colonial-nesting birds. Delaying opening of Refuge islands for fishing from shore until June 15 or July 1 would reduce the opportunity to wildlife watching and photography during late spring and early summer, but there is currently minimal use at that time of year.

6.5.8.3 Overall Effects

In Alternative 1, the requirement to stay on trail would begin to be enforced, thus reducing access to wildlife observation and photography opportunities and having a minor long-term negative effect. Wildlife and habitat management actions would be expected to improve wildlife viewing opportunities. Although observation and photography access would be restricted during the nesting season in some areas in Alternative 2, those restrictions would improve opportunities by reducing wildlife disturbance. In addition, off-trail travel would be allowed year-round in some areas and seasonally in others and additional trails and viewing facilities would also improve access. Overall, these changes would therefore have a minor positive effect on observation and photography opportunities. In Alternative 3, although restricting wildlife observation and photography to on-trail travel would restrict opportunities, providing additional facilities and wildlife and habitat management actions would have a positive effect, suggesting an overall negligible or minor long-term negative effect on wildlife observation and photography opportunities. In Alternative 4 would be similar to Alternative 3, except with fewer new facilities, resulting in a minor long-term negative effect on access to observation and photography opportunities.

Although the time in late spring and early summer available for wildlife observation and photography on the Snake River Islands Unit would be slightly reduced in all action alternatives, not many users visit the islands during those times. Therefore, this reduction would have a negligible effect on observation and photography opportunities on the Snake River Islands Unit.

6.5.9 Effects from Public Use and Public Use Management Actions on Quality Environmental Education

Indicators of effects on EE opportunities are (1) number of students participating annually in on- and off-site EE programs; and (2) management actions that affect quality of EE opportunities.

6.5.9.1 Lake Lowell Unit

In Alternative 1, the Refuge would continue to offer EE programs and materials correlated with state educational standards both on- and off-site. Requests for on-site programs usually peak in May, while demand for off-site programs is fairly steady between October and May. During FY11, approximately 11,000 people participated in Refuge-led programs, about half on-site and half off-site. In 2010, the Friends of Deer Flat Wildlife Refuge began providing bus scholarships to fund field trips from local schools. Some requests for guided EE programs have been turned down each year since 2008 because the demand cannot be met with current staffing levels. The Environmental Education Building at the Lower Dam Recreation Area would continue to be available for rent between April 15 and September 30 by teachers and youth group leaders conducting EE programs.

In Alternative 2, interpretation would be emphasized over EE. However, appropriate themes and target grades would be selected to refine the scope of the remaining EE programs to that best suited for Refuge field trips, classroom programs, and traveling trunks. Similarly, existing nonschool EE programs (e.g., day camps, Scout Day, Youth Conservation Corps) would be modified to be consistent with the selected themes. Refuge-specific instructor training would be developed so that teachers would lead 75 percent of on-site educational programs by the end of 15 years, allowing for more on-site programs than limited Refuge staffing would allow. At least two covered learning facilities would be provided in areas that facilitate EE programs on designated themes. This might include a portable learning lab (trailer) to be used in areas away from the Visitor Center. Finally, the Environmental Education Building at the Lower Dam Recreation Area would no longer be available to rent because it would be converted to or replaced by a visitor contact station. Overall, a decrease to 9,400 participants in EE programs is projected.

Alternative 3 would be the same as Alternative 2 for EE opportunities.

In Alternative 4, EE would be emphasized over interpretation, but EE opportunities would otherwise be the same as in Alternative 2. Eliminating nonwildlife-dependent recreational activities would reduce wildlife disturbance and therefore improve the quality of on-site EE opportunities. The same number of EE program participants are projected as in Alternative 1.

6.5.9.2 Snake River Islands Unit

In Alternative 1, there are no EE activities on the Snake River Islands Unit. No changes are proposed in the action alternatives for EE opportunities on the Snake River Islands Unit.

6.5.9.3 Overall Effects

The effect of Alternative 1 would be negligible because current programs would be continued. In Alternatives 2 and 3, there would be a minor long-term positive effect on EE opportunities. Although the shift in the EE program to emphasize teacher-led programs would, overall, increase quality of on-site EE opportunities, there would be a reduction in the total number of EE program participants. Alternative 4 would provide similar though slightly increased guided EE opportunities compared to Alternatives 2 and 3. The quality of the EE experience would also be expected to be higher because of the elimination of nonwildlife-dependent recreational activities. Alternative 4 would have an intermediate long-term positive effect on EE opportunities.

6.5.10 Effects from Public Use and Public Use Management Actions on Quality Interpretation

Indicators of effects on interpretive opportunities are (1) number of visitors participating annually in guided and unguided interpretive programs and (2) management actions that affect quality of interpretation opportunities.

6.5.10.1 Lake Lowell Unit

In Alternative 1, interpretive displays would continue to be available in the Visitor Center. Near the Visitor Center is the self-guided Nature Trail with a brochure about habitat that corresponds with numbered posts along the half-mile trail, as well as the Centennial Trail with interpretive signs about the history of the Refuge and reservoir. As is currently the case, regularly scheduled, staff-led interpretive walks and talks would not be offered due to limited staff, despite requests from the public. Volunteer-guided walks are popular when offered in conjunction with special events. Although brochures would continue to be provided in brochure boxes on regulation signs at all major access points, there would continue to be no interpretive signs or maps at the Lake Lowell Unit, with the exception of those along the Centennial Trail. Other than staff and volunteers at the Visitor Center, there would continue to be no staff or volunteers stationed at high-use Refuge areas. Currently, 21,000 visitors participate annually in guided and unguided interpretive programs, including visiting the Visitor Center.

In Alternative 2, interpretation would be emphasized over EE. Guided interpretive opportunities would be increased by providing volunteer- and staff-led guided and roving interpretive programs at high-use visitor access points on selected themes and by doubling from two to four the number of special events hosted on-site. Unguided opportunities would be provided by installing additional interpretive signs on new and existing trails and facilities, as well as by installing a nature exploration area at the Lower Dam Recreation Area. Although use of the Visitor Center auditorium would be restricted to wildlife-dependent recreation groups, this would not reduce interpretive opportunities, as current nonwildlife-dependent groups are not providing interpretive opportunities. Project an increase to 37,700 participants annually.

Alternative 3 would be the same as Alternative 2 for interpretive opportunities.

In Alternative 4, EE would be emphasized over interpretation, but EE and interpretive opportunities would otherwise be the same as in Alternative 2, except that there would be no nature exploration area at the Lower Dam Recreation Area and only three special events would be hosted on-site. Eliminating nonwildlife-dependent recreational activities would reduce wildlife disturbance and therefore improve the quality of interpretive opportunities. A smaller increase to 25,400 participants annually would be projected.

6.5.10.2 Snake River Islands Unit

In Alternative 1, there would continue to be interpretive signs and maps at many of the most-used boat launches that access the Snake River Islands Unit. No changes are proposed in the action alternatives for interpretive opportunities on the Snake River Islands Unit.

6.5.10.3 Overall Effects

The effect of Alternative 1 would be negligible as current programs would be continued. In Alternatives 2 and 3, there would be an intermediate long-term positive effect on interpretive opportunities, because the staff and volunteer emphasis on interpretation would increase guided and unguided opportunities. Alternative 4 would provide similar though reduced opportunities for interpretation compared to Alternatives 2 and 3. The quality of the interpretive experience would also be expected to be higher because of the elimination of nonwildlife-dependent recreational activities. Alternative 4 would have an intermediate long-term positive effect on interpretive opportunities.

6.5.11 Effects from Public Use and Public Use Management Actions on Water-based Nonwildlife-dependent Recreation

Indicators of effects on water-based nonwildlife-dependent activities are (1) acres available for boating; (2) acres available for wake-generating activities; (3) number of designated swim beaches; (4) types of activities allowed; and (5) management actions that affect water-based nonwildlife-dependent recreational opportunities.

6.5.11.1 Lake Lowell Unit

In addition to the priority wildlife-dependent activities that would continue to be allowed at the Lake Lowell Unit under Alternative 1, many water-based nonwildlife-dependent public uses would also continue to occur. The lake would continue to be open to boating between April 15 and September 30. A total of 9,000 acres would be available for boating, and 7,300 acres available for wake-causing activities. Between October 1 and April 14, human-powered boats or boats with electric motors would continue to be allowed for waterfowl hunting in the South Side Recreation Area and human-powered boats would continue to be allowed in Fishing Areas A and B. Improved boat ramps would continue to be located at the Lower Dam Recreation Area and the east and west ends of the Upper Dam. Unimproved ramps would continue to be available at Parking Lots 1 and 7. All ramps would continue to be subject to closure due to low water levels. There would continue to be a no-wake zone on the east end of the lake. Although boating supports fishing, wildlife watching, and photography, the majority (65 percent) of boaters at the lake are pursuing nonwildlife-dependent recreation (see Table 6-2). Nonwildlife-dependent boating activities include motorized and nonmotorized boating; tow-behind activities such as waterskiing and wakeboarding; use of personal watercraft; and sailing, windsurfing, and kiteboarding; these activities would continue to be allowed. SUPs have been issued in recent years to hold sailing regattas at the lake, launching from the Lower Dam Recreation Area, and these events would still be allowed under Alternative 1.

Swimming and other beach activities are popular at Lake Lowell. Under Alternative 1, the only designated swimming beach would continue to be at the east end of the Upper Dam. Swimming is likely to continue to occur along any open shoreline and from boats in open water as well.

Ice skating occurs occasionally on Lake Lowell in winter. Because of safety concerns, (see Section 2.3.1) ice-related activities would not be allowed under any of the alternatives.

In Alternative 2, the area accessible by boat would remain the same as in Alternative 1, with the exception of those areas subject to seasonal wildlife closures (e.g., grebe, eagle, and heron nesting and shorebird feeding). The number of acres closed seasonally would vary depending on wildlife

activity. If seasonal closures such as those proposed under Alternative 2 had been implemented in 2011, 170 acres would have been closed between February 1 and July 1 and 1,050 acres between April 15 and September 30. Such seasonal closures would have a minimal effect on nonwildlife-based activities, because they would mostly occur in open water (see Appendix L) where closures would be minimal. At least one additional launch would be provided for kayaks and canoes. This new launch would have a minor positive effect on boating opportunities.

There would be additional no-wake areas, including an expansion of the no-wake zone in the East Pool. According to the USGS lake use study (see Appendix L), only about 19 percent of all tow-behind activities and 19 percent of other recreation (e.g., swimming from boats) occurred in this area, and some of these users would presumably shift into the wake-allowed areas. There would also be a no-wake zone in the Narrows and a 200-yard no-wake buffer along the south shore, but users in the open water in these areas could also presumably shift into the wake-allowed areas.

Boaters would not be allowed to use internal or external wake-generating devices (e.g., ballasts). They would also not be allowed to anchor or pull onto land adjacent to closed areas. However, less than 2 percent of boaters anchor along the bank (see Appendix L).

Kiteboarding and windsurfing would still be allowed to launch from any open shoreline but would be required to comply with no-wake zones. Although sailing would still be allowed, organized regattas would not. This would have a negligible to minor negative effect, as there are typically only two regattas per year with fewer than 25 participants per event.

Ice skating would not be allowed. This would have a negligible to minor negative effect on recreational opportunities, because very few people ice-skate on Lake Lowell.

Swimming would be allowed only at two designated swim beaches (at the east Upper Dam boat launch and the Lower Dam Recreation Area). This would have a minor negative effect on swimming opportunities, because most swimming currently occurs in these two areas. These areas would be monitored for water quality affecting human health, thus increasing the safety of swimmers.

In Alternative 3, the area accessible by boat would be reduced from Alternative 2, because the current no-wake zone on the east end of the lake and the emergent beds between Parking Lots 3 and 8 on the south side and at Murphy's Neck would be closed. In addition, historical grebe nesting colonies would be closed throughout the boating season, and there would be a seasonal closure to protect shorebird foraging habitat from Murphy's Neck to the Narrows, as well as other seasonal closures as in Alternative 2. There would therefore be 5,800 acres available for boating. In addition, the lake would close to boating on September 20 rather than September 30, thus slightly reducing the length of the boating season.

There would also be additional no-wake areas, including the entire East Pool, a 200-yard buffer from the emergent vegetation on the south side in the West Pool, and in the West Pool from sunrise to noon, thus eliminating many opportunities for nonwildlife-dependent recreational opportunities. This would leave 3,212 acres available for wake-causing activities. The lake would close to boating 10 days earlier than under Alternative 1.

Kiteboarding and windsurfing would be further restricted from Alternative 2, with launching allowed only from the Lower Dam Recreation Area. Typical wind conditions make launching in this location difficult. However, because there are not many days when wind conditions allow kiteboarding and

windsurfing and therefore there are not many participants in these activities, this restriction would have an intermediate long-term negative effect on recreational opportunities.

These changes would have an intermediate negative effect on recreational opportunities at Lake Lowell. However, there are three reservoirs within 60 miles of Lake Lowell (see Table 5-7) that offer similar nonwildlife-dependent recreational opportunities. According to the 2006-2010 Idaho SCORTP report (IDPR 2006), 73 percent of surveyed Idahoans said that the most they were willing to travel to their favorite outdoor recreation site for less than one day's activity was two hours or more.

As in Alternative 2, boaters would not be allowed to use internal or external wake-generating devices (e.g., ballasts) or to anchor or pull onto land adjacent to closed areas.

Swimming would be allowed only at a designated swim beach at the Lower Dam Recreation Area. Eliminating the swimming beach at the Upper Dam would have an intermediate negative effect on swimming opportunities, because it is currently very popular, especially with those who live closer to the Upper Dam.

In Alternative 4, no nonwildlife-dependent recreational activities would be allowed.

6.5.11.2 Snake River Islands Unit

The Refuge does not have management control of lands below the ordinary high water mark and therefore has no control over water-based activities in the Snake River.

6.5.11.3 Overall Effects

In Alternative 1, there would be no changes to water-based nonwildlife-dependent recreational opportunities, leading to a negligible long-term effect. Overall, proposed changes in Alternative 2 would have a minor long-term negative effect on water-based nonwildlife-dependent recreation because of seasonal wildlife closures and more no-wake zones. In Alternative 3, with fewer swimming areas, more closed areas, and more no-wake zones, there would be an intermediate long-term negative effect on water-based recreational opportunities. In Alternative 4, no nonwildlife-dependent recreation would be allowed, which would have a significant long-term negative effect.

6.5.12 Effects from Public Use and Public Use Management Actions on Land-based Nonwildlife-dependent Recreation

Indicators of effects on land-based nonwildlife-dependent activities are (1) miles of trail available for walking on-leash pets, and riding horses; (2) miles of trail available for bicycling; (3) types of activities allowed; and (4) management actions that affect land-based nonwildlife-dependent recreational opportunities.

6.5.12.1 Lake Lowell Unit

In addition to providing the priority wildlife-dependent activities in Alternative 1, many land-based nonwildlife-dependent public uses would also continue to occur. Walking with dogs, jogging, bicycling, and horseback riding currently occur throughout the year, both on- and off-trail. 10.5 miles

of trail are available for walking on-leash dogs, riding horses, and bicycling. Track teams have historically used the road/trail west of the Visitor Center for practice sessions, even though the most recent compatibility determination did not allow competitive jogging. This restriction has been enforced in recent years and would continue to be enforced under Alternative 1. Geocaching currently occurs on the Refuge. Local geocachers have been notified that caching is not allowed on the Refuge, but caches are still often placed on the Refuge or on private land accessed through off-trail travel across Refuge land. Geocaching would continue to be prohibited under Alternative 1. Picnicking would continue to be allowed as it currently occurs: primarily at the Lower Dam Recreation Area, which offers both a covered picnic shelter and scattered picnic tables. People also picnic at other access points. Visitors often request to reserve the shelter for weddings, birthdays, or other events, and it is would continue to be available on a first-come, first-served basis. Cross-country skiing would continue to be allowed on roads and trails. Because of the lack of heavy snowfall and/or enduring snow cover in the Treasure Valley, cross-country skiing is an infrequent Refuge use.

Under all action alternatives, signs would be posted at hunting access points to notify Refuge users when a hunt is underway. This would improve the experience of nonwildlife-dependent visitors by improving the safety and awareness of these visitors.

Although the most recent compatibility determinations allow walking and jogging (with the exception of competitive jogging) on roads, trails, and firebreaks and not off-trail, the requirement to remain on roads, trails, and firebreaks is not being communicated to the public, and visitors frequently leave trails. If Alternative 1 were selected, this requirement would be enforced, reducing off-trail access.

In Alternative 2, unleashed dogs would not be allowed on the Refuge. Leashed dogs, horses, and bikes would not be allowed on the Nature, Centennial, or Murphy's Neck Trails. However, nonwildlife-dependent activities would be allowed on the wider trails (entrance road and the East Dike, Kingfisher, and Gotts Point Trails, and the Observation Hill Trail System) that provide adequate space for multiple-use activities. In addition, owners would be required to remove dog feces. 8.75 miles of trail would be available for walking on-leash dogs, riding horses, and bicycling. There would also be some seasonal wildlife closures (e.g., eagle and heron nesting) that would restrict access to a variable number of acres annually. Walking with dogs, horseback riding, and bicycling currently occur mostly on the designated trails, so the proposed changes would have a minor negative effect on nonwildlife-dependent recreational opportunities and a minor positive effect on wildlife-dependent recreationists using the narrow trails. Cross-country skiing would not be allowed. This would have a negligible to minor negative effect on recreational opportunities, because very few people cross-country ski Lake Lowell.

Picnicking would be allowed only in designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area. This is where most picnicking currently happens, so the proposed change would have a minor negative effect on picnicking opportunities. Nonwildlife-dependent group activities (e.g., weddings, birthday parties, memorial services, retreats, and other activities) would be allowed only at the Lower Dam Recreation Area, and an SUP would be required with appropriate stipulations.

In Alternative 3, dogs and horses would not be allowed at the Refuge, and bicycling would be allowed only along the proposed trail adjacent to the entrance road (0.75 miles). This would have a

significant negative effect on the opportunity to participate in dog walking, horseback riding, and bicycling.

Alternative 4 would be similar to Alternative 3 except that bicycling would not be allowed.

6.5.12.2 Snake River Islands Unit

Currently, nonwildlife-dependent recreational activities rarely occur on the Refuge islands. The alternatives do not propose to change the nonwildlife-dependent activities that are allowed on the islands. Delaying opening of Refuge islands to public entry from June 1 as in Alternative 1 until June 15 or July 1 in the action alternatives would slightly reduce recreational opportunities. However, this would have a negligible effect because there are so few people that access the islands for these uses. In Alternative 4, no nonwildlife-dependent recreational activities would be allowed.

6.5.12.3 Overall Effects

In all alternatives, the effects to land-based recreation on the Snake River Islands Unit would be negligible.

In Alternative 1, the requirement to stay on trail on Lake Lowell Unit would begin to be enforced, thus reducing access and having a minor long-term negative effect. Overall, proposed changes in Alternative 2 would have a minor long-term negative effect on land-based nonwildlife-dependent recreation because of a reduction in miles of trail available for walking on-leash dogs, riding horses, and bicycling on the Lake Lowell Unit. Alternative 3, with the elimination of horseback riding and walking with dogs and the reduction in areas open for bicycling, would have a significant long-term negative effect on land-based recreational opportunities. In Alternative 4, no nonwildlife-dependent recreation would be allowed on either Unit, which would have a significant long-term negative effect.

6.5.13 Effects from Public Use and Public Use Management on Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, establishes the Federal Government's policy on historic preservation and the programs through which that policy is implemented. An impact to cultural resources would be considered significant if it adversely affects a resource listed in or eligible for listing in the National Register of Historic Places (NRHP). In general, an adverse effect may occur if a cultural resource would be physically damaged or altered, isolated from the context considered significant, affected by project elements that would be out of character with the significant property or its setting. Title 36 C.F.R. 800 defines effects and adverse effects on historic resources.

Cultural resource surveys will be conducted before the onset of any major construction project. These projects may include, but are not limited to, the construction of roads, trails, bridges, dikes, and visitor facilities. Earth moving activities occurring in proximity to known sites would be monitored because of the potential for buried cultural material in these areas. If any cultural materials are uncovered during excavation, the Regional Historic Preservation Officer would be contacted to review the materials and recommend a treatment that is consistent with applicable laws and policies. Any new cultural resources identified during the survey would be recorded and evaluated for

eligibility to the NRHP. If any sites are determined to be eligible to the NRHP, the restoration plans would need to be assessed for potential effects to the historic property. If effects are possible, the proposal would be reviewed to ensure that the effects have the least impact to original materials and are in conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Changes that comply with the Secretary's Standards would have no adverse effect on Historic Properties. Once an assessment has been completed, the findings would be forwarded to State Historic Preservation Officer (SHPO) for concurrence. Implementation of the procedures described above is expected to avoid adverse effects to historic resources; however, additional analysis under NHPA may be required once specific details are known.

The construction and public use facilities proposed under all of the alternatives would not be expected to have an adverse effect on historic resources. Major disturbance would be avoided by the survey and consultation process as described in Section 106 of NHPA described above. Expansion of facilities and trails under the alternatives would receive the same scrutiny, to ensure they would not detract from cultural resources; therefore, no adverse effects to cultural resources as a result of human activity within the Refuge are anticipated.

Incorporating cultural history as an integral part of interpretive and environmental education programming can have a positive effect on cultural resources. By providing a deeper understanding of the cultural resources and the role they represent on the landscape may foster appreciation and respect for cultural resources. Cultural history as explored in the setting of a wildlife refuge is about how people have interacted with, shaped, and been influenced by the environment. Native uses of plants for food, shelter, and tools; the cultural significance of certain animal species for food, identity, etc.; and traditional management and/or harvesting activities (fish weirs, controlled burning).

Section 110 of the NHPA requires Federal agencies to create a program to identify and protect historic properties. This program includes the nomination of eligible properties to the National Register of Historic Places; the designation of a qualified agency historic preservation officer; conducting agency programs and activities so that preservation values are considered; and the authority of Federal agencies to include the costs of preservation activities within overall project costs during undertakings. Many opportunities exist to comply with Section 110, including but not limited to the development of interpretive materials and exhibits, Refuge-based cultural heritage curriculum and resources for use both on and off Refuge, and a systematic program for recording and evaluating the Refuge's cultural resources. These opportunities also present excellent prospects for partnerships with tribal communities and historical societies.

Development of a more comprehensive understanding and inventory of cultural resources onsite would occur under Alternatives 2, 3 and 4. The increased gathering of data and knowledge will help the refuge to protect and understand the cultural resources of this area which is a slight positive effect for cultural resources as they would be more protected.

Under Alternatives 2, 3, and 4 Partnerships, interpretation, and education would be expanded, compared to Alternative 1. This work will strengthen current partnerships and provide high quality interpretation and education which would assist in laying the ground work for establishment of more effective partnerships and coordination. This would contribute to the public's understanding and appreciation for archaeological and historic resources and would be a slight positive effect to cultural resources.

Overall Effects

Under Alternative 1 cultural resources would receive basic consideration under Section 106 of the NHPA on a project (undertaking) by project basis resulting in a minor negative long-term effect. Under Alternatives 2, 3, and 4 increases in consideration provided through proactive cultural resource inventories and evaluations and an increase in the interpretation of cultural resources are expected to result in a minor long-term positive effect.

6.5.14 Amount of Illegal Use

Some of the same Refuge qualities that attract legitimate Refuge visitors—solitude, open public spaces, wooded areas, and minimal human interference—also attract individuals seeking places for illegal activities. Under all alternatives, the Refuge intends to curb illegal activities and create a safer environment for visitors. We would use a variety of techniques to improve visitor understanding of Refuge regulations. We would continue to partner with other law enforcement agencies, including meeting annually to discuss law enforcement and emergency response needs, issues, and opportunities to partner. Under all action alternatives, we would also work with the County Sheriff to (1) develop an MOU to increase on-refuge patrols on both land and water, to enforce existing State decibel limits, and to allow enforcement of other Refuge regulations, and (2) codify Refuge regulations or create a joint jurisdiction agreement so that the County Sheriff's deputies can enforce Refuge regulations. The action alternatives also provide the potential to use a variety of technical enhancements to deter and identify illegal activities. The actions outlined above would result in intermediate positive effects to recreational opportunities by creating a safer environment for all users.

6.5.15 Environmental Justice

Given the limited demographic information available for visitors of Deer Flat NWR, it is difficult to determine if there would be any increased impacts to lower-income or diverse communities. Because Alternative 1 is not proposing any major changes, there should be no environmental justice issues different from the status quo. An increase in free facilities and interpretation opportunities under Alternative 2 (Preferred Alternative) has the potential to provide a positive effect on lower-income communities by increasing access to wildlife-dependent recreational opportunities. The potential for the removal of swimming at the Upper Dam as proposed in Alternative 3 may disproportionately impact lower-income or diverse communities. It is possible under Alternative 4 that some lower-income communities may be negatively impacted by the reduction in free swimming and picnicking opportunities.

6.6 Economic Effects

The following economic effects analysis was compiled by the Policy Analysis & Science Assistance Branch of the USGS.

6.6.1 Methods for a Regional Economic Impact Analysis

Economic input-output models are commonly used to determine how economic sectors would and would not be affected by demographic, economic, and policy changes. The economic impacts of the

management alternatives for the Refuge were estimated using IMPLAN (Impact Analysis for Planning), a regional input-output modeling system developed by the U.S. Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than 400 economic sectors (Olson and Lindall 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group from multiple Federal and State sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau (Olson and Lindall 1999). For the Refuge analysis, the year 2009 IMPLAN 3.0 data profiles for Ada and Canyon Counties were used for the local area analysis. The IMPLAN county level employment data estimates were found to be comparable to the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2009.

Because of the way industries interact in an economy, activity in one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses would purchase extra labor and supplies to meet the increased demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the direct effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that does not stay in the local economy is termed a leakage (Carver and Caudill 2007). In order to increase supplies to local businesses to meet increased demand, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the indirect effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the induced effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. "Multipliers" (or "response coefficients") capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- **Employment** represents the change in the number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full-time and part-time workers, which are measured in total jobs.
- **Labor income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.
- **Value added** measures contribution to gross domestic product. Value added is equal to the difference between the amount an industry sells a product for and the production cost of the product, and is thus net of intermediate cost of goods.

This economic impact analysis provides the potential economic effects associated with the implementation of the CCP/EIS's management alternatives for Deer Flat Refuge. The economic impacts reported here are on an annual basis in 2011 dollars. Large management changes often take several years to achieve. The estimates reported for all the alternatives represent the final average annual economic effects after all changes in management have been implemented.

6.6.2 Impacts from Revenue Sharing

Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75 percent of the fair market value of lands acquired by the Service. Even though there is a formula to determine these payment amounts, the exact amount of the annual payment depends on Congressional appropriations, which may or may not follow the RRS Act formula. In recent years, the appropriations have been lower than the fully funded amount (i.e., the amount determined by applying the RRS Act formula). In FY10, actual RRS payments were 21 percent of authorized levels. FY10 RRS payments (made in 2011) totaled $4,547 to communities in Canyon County. Table 6-4 shows the resulting economic impacts of RRS payments under all alternatives. Accounting for both the direct and secondary effects, RRS payments under any one of the four CCP/EIS alternatives would generate total annual economic impacts of $1.9 thousand in labor income and $2.8 thousand in value added in the local two-county area.

Table 6-4. Annual Impacts from Refuge Revenue Sharing Payments Under Any CCP/EIS Alternative

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Direct effects	0	$1.4	$1.8
Secondary effects	0	$0.5	$1.0
Total Economic Impact	**0**	**$1.9**	**$2.8**

Note: The annual impact from Refuge revenue sharing payments would be the same regardless of which of the four CCP alternatives is selected for implementation.

6.6.3 Impacts from Public Use and Access Management

6.6.3.1 Refuge Visitor Expenditures in Local Economy

Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The FWS report *Banking on Nature: The Economic Benefits of National Wildlife Refuges Visitation to Local Communities* estimated the impact of national wildlife refuges on their local economies (Carver and Caudill 2007). According to the report, more than 34.8 million visits were made to national wildlife refuges in FY 2006, which generated $1.7 billion in sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated nearly 27,000 jobs, and over $542.8 million in employment income (Carver and Caudill 2007). Approximately 82 percent of total expenditures were from nonconsumptive activities, 12 percent from fishing, and 6 percent from hunting (Carver and Caudill 2007).

The priority "Big Six" wildlife-dependent uses—hunting, fishing, wildlife observation and photography, interpretation, and environmental education—are offered on the Lake Lowell Unit. Additionally, several other nonpriority uses occur on the Refuge including nonwildlife-dependent boating, swimming, jogging, and picnicking.

This section focuses on the regional economic impacts associated with Refuge visitation. Annual visitation estimates are based on several sources of Refuge statistics including counts of visitors entering the Visitor Center, counts of vehicles at dispersed access sites, and general observation by Refuge personnel. Annual visitation estimates are on a per-visit basis. Visitor spending profiles are

estimated on an average per-day (8-hour) basis. Because some visitors only spend short amounts of time visiting the Refuge, counting each visit as a full visitor day would overestimate the economic impact of Refuge visitation. In order to properly account for the amount of spending, the annual number of visits were converted to visitor days. Results from a recent visitor survey conducted during the summer of 2011(Sexton et al. 2012) showed that Refuge visitors spend on average five hours for fishing and nonwildlife-dependent boating; four hours for swimming; and three hours for wildlife-related nonconsumptive activities (wildlife watching and photography, environmental education, and interpretation) and land-based nonwildlife-dependent activities (walking, jogging, and picnicking). Refuge personnel estimate that big game and waterfowl hunters spend six hours and that upland game and other migratory bird hunters spend approximately four hours on the Refuge.

To determine the local economic impacts of visitor spending, only spending by persons living outside of the local two-county area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into Ada and Canyon Counties from visitors living outside the local area (hereafter referred to as nonlocal visitors) is considered new money injected into the local economy. Second, if residents of the local two-county area visit the Refuge more or less due to the management changes, it is likely that they would correspondingly change the spending of their money elsewhere in that local area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic impact analyses at the local level. However, it is possible that potential Refuge management actions that would restrict boating and other nonpriority recreation at the Refuge could result in visitors from the local area shifting their expenditures from Canyon County to Ada County or possibly going outside of Ada and Canyon Counties for recreation opportunities at reservoirs outside of the two-county area. For more information the contribution of local Refuge visitation, see Appendix M, which provides a contribution analysis of local visitor expenditures in the two-county area. Refuge personnel determined the percentage of nonlocal Refuge visitors based on parking lot surveys. Table 6-5 shows the estimated percent of current Refuge visits and visitor days by visitor activity.

Table 6-5. Estimated Current Annual Refuge Visitation

Visitor Activity	Total Annual Number of Visits	Number of Hours Spent at the Refuge	Total Annual Number of Visitor Days[a]	Percentage of Nonlocal Visits	Number of Nonlocal Visitor Days[a]
Priority Uses					
Fishing	45,300	5	28,313	7%	1,982
Big game hunting	75	6	56	8%	5
Waterfowl hunting	5,100	6	3,750	8%	300
Other migratory bird hunting (mourning dove)	100	4	50	8%	4
Upland game hunting	1,100	4	550	8%	44
Nonconsumptive: wildlife watching and photography, environmental education, and interpretation	55,900	3	20,963	10%	2,096
Nonpriority Uses					0
Nonwildlife-dependent boating	49,400	5	30,875	13%	4,014
Swimming and other beach activities	38,700	4	19,350	13%	2,516
Land-based nonwildlife-dependent (walking, jogging, and other activities (e.g., picnicking))	27,800	3	10,425	13%	1,355
Total Visitation	**223,375**		**114,331**		**12,315**

[a] One visitor day = eight hours.

The Refuge staff used several sources to project changes in visitation by activity over the next 15 years for each alternative. The Refuge staff estimated visitor projections based on the following considerations: Idaho and national visitation trend data; changes in recreational programs, facilities, and resources under each alternative; and changes observed in visitation at Deer Flat NWR over the last 10 years (i.e., Refuge staff experience and judgment).

A nonlocal visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. In this analysis, we use average daily visitor spending profiles from the *Banking on Nature* report (Carver and Caudill 2007) that were derived from the 2006 National Survey of Fishing, Hunting, and Wildlife-associated Recreation (the National Survey; USFWS and U.S. Census Bureau 2007). The National Survey reports trip-related spending of state residents and nonresidents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each FWS region. We used the spending profiles for nonresidents for FWS Region 1 (which includes Idaho), and updated the 2006 spending profiles to 2011 dollars using the Consumer Price Index Inflation Calculator. Average daily spending profiles for nonresident visitors to Region 1 for fishing ($65.98 per day), big game hunting ($94.98 per day), upland game hunting ($172.41 per day) and waterfowl hunting ($192.73 per day) were used to estimate nonlocal visitor spending for Refuge fishing and hunting related activities. The average daily nonresident spending profile for nonconsumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) ($121.59 per day) was used for all nonconsumptive wildlife viewing activities including nonpriority swimming and beach activities and land-based nonwildlife-dependent activities.

Banking on Nature does not include a spending profile for boating. To account for expenditures by boaters, it was assumed that boaters have similar expenditures to other nonconsumptive wildlife recreationists, along with additional fuel expenses to power motorboats. Based on this assumption, the boater spending profile for this analysis was constructed by adding average daily boating fuel expenditure costs to the average daily nonresident spending profile for nonconsumptive wildlife recreation from *Banking on Nature*. Average daily boating fuel expenditures per party were estimated by multiplying the average outboard fuel consumption for two- and four-stroke boats (3.2 gallons per hour; Nissan Marine 2012) by the U.S. average conventional retail gasoline prices for the summer of 2011 (May-August) ($3.68; U.S. Energy Information Administration 2012). Average daily boating fuel expenditures per person were then calculated by dividing average daily boating fuel expenditures per party by the average number of persons in a boating party (four persons per party; Sexton et al. 2012). This resulted in an average daily boating fuel expenditure of $23.57 per day and total nonresident daily boating expenditures of $145.16 per day.

Total spending by nonlocal Refuge visitors was determined by multiplying the average nonlocal visitor daily spending by the number of nonlocal visitor days at the Refuge. The economic impacts of each alternative were estimated using IMPLAN. Table 6-6 summarizes the economic impacts associated with current nonlocal Refuge visitation by activity for Alternative 1. Under Alternative 1, nonlocal Refuge visitors would spend approximately $1.95 million in the local economy annually. This spending would directly account for 19 jobs, $538.4 thousand in labor income, and $877.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional nine jobs, $309.7 thousand in labor income, and $546.2 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 1

would generate total economic impacts of 28 jobs, $848.1 thousand in labor income, and $1.4 million in value added.

Table 6-6. Average Annual Impacts of Nonlocal Visitor Spending by Activity for Alternative 1

Alternative 1	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.2*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	*1*	*$27.7*	*$45.9*
Nonconsumptive (wildlife watching and photography, environmental education, and interpretation)			
Direct effects	4	$111.4	$182.1
Secondary effects	2	$67.7	$118.9
Total effect	*6*	*$179.1*	*$301.0*
Nonpriority uses			
Nonwildlife-dependent boating			
Direct effects	7	$197.9	$322.6
Secondary effects	3	$105.3	$187.0
Total effect	*10*	*$303.2*	*$509.6*
Swimming and other beach activities			
Direct effects	4	$124.7	$203.8
Secondary effects	2	$75.7	$133.0
Total effect	*6*	*$200.4*	*$336.8*
Land-based nonwildlife-dependent (walking, jogging, and other activities, e.g., picnicking)			
Direct effects	2	$50.1	$81.8
Secondary effects	1	$30.4	$53.4
Total effect	*3*	*$80.5*	*$135.2*
Aggregate Nonlocal visitation			
Direct effects	19	$538.4	$877.6
Secondary effects	9	$309.7	$546.2
Total effect	*28*	*$848.1*	*$1,423.8*

Table 6-7 summarizes the economic impacts associated with current nonlocal Refuge visitation by activity for Alternative 2. Under Alternative 2, nonlocal Refuge visitors would spend approximately $1.99 million in the local economy annually. This spending would directly account for 19 jobs, $543.9 thousand in labor income, and $887.1 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 10 jobs, $314.4 thousand in labor income, and $554.6 thousand in value added. Accounting for both the direct and secondary effects, spending by nonlocal visitors for Alternative 2 would generate total economic impacts of 29 jobs, $858.4 thousand in labor income, and $1.4 million in value added.

Table 6-7. Average Annual Impacts of Nonlocal Visitor Spending by Activity for Alternative 2

Alternative 2	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.2*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	*1*	*$27.7*	*$45.8*
Nonconsumptive (wildlife watching and photography, environmental education, and interpretation)			
Direct effects	5	$149.8	$244.8
Secondary effects	3	$91.0	$159.8
Total effect	*8*	*$240.8*	*$404.6*
Nonpriority uses			
Nonwildlife-dependent boating			
Direct effects	6	$179.8	$293.1
Secondary effects	3	$95.6	$169.9
Total effect	*9*	*$275.4*	*$463.0*
Swimming and other beach activities			
Direct effects	4	$112.2	$183.4
Secondary effects	2	$68.1	$119.7
Total effect	*6*	*$180.3*	*$303.1*
Land-based nonwildlife-dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	2	$48.0	$78.5
Secondary effects	1	$29.2	$51.3
Total effect	*3*	*$77.2*	*$129.8*
Aggregate Nonlocal visitation			
Direct effects	19	$544.1	$887.1
Secondary effects	10	$315.4	$554.6
Total effect	*29*	*$858.6*	*$1,441.7*

Table 6-8 summarizes the economic impacts associated with current nonlocal Refuge visitation by activity for Alternative 3. Under Alternative 3, nonlocal Refuge visitors would spend approximately $1.4 million in the local economy annually. This spending would directly account for 13 jobs, $377.8 thousand in labor income, and $616.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional six jobs, $222.5 thousand in labor income, and $391.7 thousand in value added. Accounting for both the direct and secondary effects, spending by nonlocal visitors for Alternative 3 would generate total economic impacts of 19 jobs, $600.3 thousand in labor income, and $1 million in value added.

Table 6-8. Average Annual Impacts of Nonlocal Visitor Spending by Activity for Alternative 3

Alternative 3	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$17.5	$28.2
Secondary effects	0	$10.0	$17.6
Total effect	*1*	*$27.5*	*$45.8*

Alternative 3	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$10.1	$16.2
Secondary effects	0	$5.5	$9.8
Total effect	*0*	*$15.6*	*$26.0*
Nonconsumptive (wildlife watching and photography, environmental education, and interpretation)			
Direct effects	5	$146.8	$240.0
Secondary effects	3	$89.2	$156.7
Total effect	*8*	*$236.0*	*$396.7*
Nonpriority uses			
Nonwildlife-dependent boating			
Direct effects	3	$77.2	$125.8
Secondary effects	1	$41.1	$72.9
Total effect	*4*	*$118.3*	*$198.7*
Swimming and other beach activities			
Direct effects	3	$84.1	$137.6
Secondary effects	1	$51.1	$89.8
Total effect	*4*	*$135.2*	*$227.4*
Land-based nonwildlife-dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$42.1	$68.8
Secondary effects	1	$25.6	$44.9
Total effect	*2*	*$67.7*	*$113.7*
Aggregate Nonlocal visitation			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.5	$391.7
Total effect	*19*	*$600.3*	*$1,008.3*

Table 6-9 summarizes the economic impacts associated with current nonlocal Refuge visitation by activity for Alternative 4. Under Alternative 4, nonlocal Refuge visitors would spend approximately $631.0 thousand in the local economy annually. This spending would directly account for five jobs, $164.5 thousand in labor income, and $268.3 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional two jobs, $98.6 thousand in labor income, and $173.5 thousand in value added. Accounting for both the direct and secondary effects, spending by nonlocal visitors for Alternative 4 would generate total economic impacts of seven jobs, $263.1 thousand in labor income, and $441.8 thousand in value added.

Table 6-9. Average Annual Impacts of Nonlocal Visitor Spending by Activity for Alternative 4

Alternative 4	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	0	$9.5	$15.4
Secondary effects	0	$5.5	$9.6
Total effect	*0*	*$15.0*	*$25.0*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$13.3	$21.2
Secondary effects	0	$7.1	$12.7
Total effect	*0*	*$20.4*	*$33.9*
Nonconsumptive (wildlife watching and photography, environmental education, and interpretation)			
Direct effects	4	$123.9	$202.5

Alternative 4	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Secondary effects	2	$75.2	$132.2
Total effect	*6*	*$199.1*	*$334.7*
Nonpriority uses			
Nonwildlife-dependent boating			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Swimming and other beach activities			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Land-based nonwildlife-dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$17.8	$29.2
Secondary effects	0	$10.8	$19.0
Total effect	*1*	*$28.6*	*$48.2*
Aggregate Nonlocal visitation			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.6	$173.5
Total effect	*7*	*$263.1*	*$441.8*

Table 6-10 summarizes the total economic impacts associated with current nonlocal Refuge visitation by alternative. The total annual average economic impacts for Alternative 2 would be similar to Alternative 1. The impacts for Alternative 3 would be approximately 30 percent less than the impacts for Alternative 1. Alternative 4 would have the largest decrease in impacts (approximately 70 percent) compared to Alternative 1.

Table 6-10. Average Annual Impacts of Nonlocal Visitor Spending by Alternative

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Alternative 1			
Direct effects	19	$538.4	$877.6
Secondary effects	9	$309.7	$546.2
Total economic impact	*28*	*$848.1*	*$1,423.8*
Alternative 2			
Direct effects	19	$544.1	$887.1
Secondary effects	10	$314.5	$554.6
Total economic impact	*29*	*$858.6*	*$1,441.7*
Alternative 3			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.5	$391.7
Total economic impact	*19*	*$600.3*	*$1,008.3*
Alternative 4			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.6	$173.5
Total economic impact	*7*	*$263.1*	*$441.8*

6.6.4 Impacts from Refuge Administration

6.6.4.1 Personal Purchases by Staff

Refuge employees reside and spend their salaries on daily living expenses in the local area, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals and households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles allow for leakage of household spending to outside the region. The IMPLAN household spending pattern for households earning $35 to $50 thousand per year was used to reflect the average salary of full-time permanent employees at the Refuge ($46 thousand per year). Table 6-11 lists current Refuge staffing and additional positions needed under Alternatives 2, 3, and 4.

Table 6-11. Current Staffing and Additional Positions Needed to Implement the CCP

Current Refuge Staff Positions (Alternative 1)
Refuge Manager
Assistant Refuge Manager
Visitor Services Manager
Wildlife Biologist
Maintenance Worker
Administrative Assistant
Office Aid
Youth Conservation Corps Leader (full-time seasonal)
Youth Conservation Corps (4 full-time seasonal positions)
Environmental Education Specialist (Intern)
Volunteer Coordinator (Intern)
Biological Science Technician (Intern)
Additional Positions Needed to Implement the CCP under Alternatives 2,3, 4
*Biological Science Technician
*Environmental Education Specialist
*Volunteer Coordinator
Law Enforcement Officer

*If these positions were funded, the current interns would not be necessary.

Refuge personnel estimate that annual salaries total around $524.6 thousand for Alternative 1 and would increase to $711.1 thousand under Alternatives 2, 3, and 4. Table 6-12 shows the economic impacts associated with spending of salaries in the local two-county area by Refuge employees under all alternatives. For Alternative 1, salary spending by Refuge personnel would generate additional secondary effects (i.e., additional non-refuge jobs in the local economy) of four jobs, $141.1 thousand in labor income, and $254.7 thousand in value added in the local economy. Alternatives 2, 3, and 4 would generate additional secondary effects of five jobs, $191.2 thousand in labor income, and $345.2thousand in value added in the local economy.

Table 6-12. Annual Local Impacts of Salary Spending by Deer Flat NWR Personnel by Alternative

	Employment (# full and part time jobs)	**Labor income (Thousands, $2011)**	**Value Added (Thousands, $2011)**
Alternative 1			
Direct effects	0	$0.0	$0.0
Secondary effects	4	$141.1	$254.7

Total economic impact	*4*	*$141.1*	*$254.7*
Alternatives 2, 3, and 4			
Direct effects	0	$0.0	$0.0
Secondary effects	6	$191.2	$345.2
Total economic impact	*6*	*$191.2*	*$345.2*

Note: There are no direct effects to employment because direct effects are measured as increases in off-Refuge employment.

6.6.4.2 Work-related Purchases

A wide variety of supplies and services are purchased for Refuge operations and maintenance activities. Refuge purchases made in the local two-county area contribute to the local economic impacts associated with the Refuge. Major local expenditures include supplies and services related to annual maintenance costs for trails, buildings and signage, and small equipment; auto repairs, parts, and fuel; and utilities. Current Refuge nonsalary recurring expenditures average approximately $204.7 thousand per year. Average annual costs (including recurring costs and the annual average of one-time project costs in 2011 dollars over the life of the CCP) are anticipated to increase by $83.8 thousand for Alternative 1, $397.0 thousand for Alternative 2, $832.8 thousand for Alternative 3, and $362.6 thousand for Alternative 4. Total average annual nonsalary costs would total $288.5 thousand for Alternative 1, $601.7 thousand for Alternative 2, $1.04 million for Alternative 3, and $567.3 thousand for Alternative 4. The large increases in costs under Alternative 3 are related to the construction of a boardwalk. According to Refuge records, approximately 80 percent of the annual nonsalary budget expenditures are spent on goods and services purchased in the local two-county area. Table 6-13 shows the economic impacts associated with work-related expenditures in local communities near the Refuge. For Alternative 1, work-related purchases would generate a total economic impact of three jobs, $122.9 thousand in labor income, and $179.3 thousand in value added. Work-related purchases under Alternative 3 would generate the largest total economic impact of 15 jobs, $536.6 thousand in labor income, and $734.4 thousand in value added.

Table 6-13. Local Economic Impacts of Refuge-related Purchases by Alternative

	Employment (# full and part time jobs)	**Labor income (Thousands, $2011)**	**Value Added (Thousands, $2011)**
Alternative 1			
Direct effects	2	$76.5	$100.1
Secondary effects	1	$46.4	$79.2
Total economic impact	*3*	*$122.9*	*$179.3*
Alternative 2			
Direct effects	5	$177.4	$212.9
Secondary effects	3	$103.7	$176.3
Total economic impact	*8*	*$281.1*	*$389.2*
Alternative 3			
Direct effects	9	$326.9	$385.5
Secondary effects	6	$209.7	$348.9
Total economic impact	*15*	*$536.6*	*$734.4*
Alternative 4			
Direct effects	4	$165.4	$199.2
Secondary effects	3	$95.1	$162.3
Total economic impact	*7*	*$260.5*	*$361.5*

6.6.5 Summary of Economic Impacts for Alternative 1 (Status Quo)

Table 6-14 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 1. Under Alternative 1, management activities directly related to Refuge operations would generate an estimated 21 jobs, $616.0 thousand in labor income, and $979.5 thousand in value added in the local economy. Including direct, indirect, and induced effects (i.e., secondary effects), all Refuge activities generate a total economic impact of 35 jobs, $1.1 million in labor income, and $1.8 million in value added. In 2009, for the local two-county area, total labor income was estimated at $14.8 billion, and total employment was estimated at 367.7 thousand jobs (2009 IMPLAN data). Thus, total economic impacts associated with Refuge operations under Alternative 1 represent less than 0.01 percent of total income and total employment in the overall economy of the two-county area. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public-use-related economic activity occur. For more information about local effects, see Appendix A of the Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge located in Appendix M.

Table 6-14. Summary of All Refuge Management Activities for Alternative 1

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	2	$77.8	$101.9
Total effects[b]	7	$265.9	$436.8
Nonlocal Public Use Activities			
Direct effects	19	$538.2	$877.6
Total effects[b]	28	$847.8	$1,423.8
Aggregate Impacts			
Direct effects	21	$616.0	$979.5
Total effects[b]	35	$1,113.6	$1,860.6

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

6.6.6 Summary of Economic Impacts for Alternative 2 (Preferred Alternative)

Table 6-15 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 2. Under Alternative 2, management activities directly related to Refuge operations would generate an estimated 24 jobs, $722.7 thousand in labor income, and $1.1 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 43 jobs, $1.3 million in labor income, and $2.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (2009 IMPLAN data). Thus, total economic impacts associated with Refuge operations under Alternative 2 represent less than 0.01 percent of total income and total employment in the overall economy of the two-county area. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public-use-related economic activity occurs. For more information about local effects, see Appendix A of the Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge located in Appendix M.

Table 6-15. Summary of All Refuge Management Activities for Alternative 2

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	5	$178.8	$214.7
Total effects[b]	14	$474.2	$737.3
Nonlocal Public Use Activities			
Direct effects	19	$543.9	$887.1
Total effects[b]	29	$858.4	$1,441.6
Aggregate Impacts			
Direct effects	24	$722.7	$1,101.8
Total effects[b]	43	$1,332.6	$2,178.9

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

Table 6-16 summarizes the change in economic effects associated with Refuge operations under Alternative 2 as compared to Alternative 1. Due to increases in visitation and administration, Alternative 2 would generate eight more jobs, $219.0 thousand more in labor income, and $318.3 thousand more in value added as compared to Alternative 1.

Table 6-16. Change in Economic Impacts under Alternative 2 Compared to Alternative 1

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	+3	+$101.0	+$112.8
Total effects[b]	+7	+ $208.3	+$300.5
Nonlocal Public Use Activities			
Direct effects	no change	+$5.7	+$9.5
Total effects[b]	+1	+$10.6	+$17.8
Aggregate Impacts			
Direct effects	+3	+$106.7	+$122.3
Total effects[b]	+8	+ $219.0	+$318.2

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

6.6.7 Summary of Economic Impacts for Alternative 3

Table 6-17 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 3. Under Alternative 3, Refuge management activities directly related to Refuge operations would generate an estimated 22 jobs, $706.1 thousand in labor income, and $1.0 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 40 jobs, $1.3 million in labor income, and $2.1 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (2009 IMPLAN data). Thus, total economic impacts associated with Refuge operations under Alternative 3 represent less than 0.01 percent of total income and total employment in the overall economy of the two-county area. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public-use-related economic activity occurs. For more information about local effects, see Appendix A of the Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge located in Appendix M.

Table 6-17. Summary of All Refuge Management Activities for Alternative 3

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	9	$328.3	$387.4
Total effects[b]	21	$729.8	$1,082.5
Nonlocal Public Use Activities			
Direct effects	13	$377.8	$616.6
Total effects[b]	19	$600.1	$1,008.2
Aggregate Impacts			
Direct effects	22	$706.1	$1,004.0
Total effects[b]	40	$1,329.9	$2,090.7

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

Table 6-18 summarizes the change in economic effects associated with Refuge operations under Alternative 3 as compared to Alternative 1. Due to substantial increases in Refuge administration (including the construction of a boardwalk), Alternative 3 would generate five more jobs, $216.2 thousand more in labor income, and $230.1 thousand more in value added as compared to Alternative 1.

Table 6-18. Change in Economic Impacts under Alternative 3 Compared to Alternative 1

	Employment (# full and part time jobs)	Labor Income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	+7	+$250.5	+$285.5
Total effects[b]	+14	+$463.9	+$645.7
Nonlocal Public Use Activities			
Direct effects	-6	-$160.4	-$261.0
Total effects[b]	-9	-$247.7	-$415.6
Aggregate Impacts			
Direct effects	+1	+$90.0	+$24.4
Total effects[b]	+5	+$216.2	+$230.1

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

6.6.8 Summary of Economic Impacts for Alternative 4

Table 6-19 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 4. Under Alternative 4, Refuge management activities directly related to Refuge operations would generate an estimated nine jobs, $331.3 thousand in labor income, and $469.3 thousand in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 20 jobs, $716.8 thousand in labor income, and $1.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (2009 IMPLAN data). Thus, total economic impacts associated with Refuge operations under Alternative 4 represent less than 0.01 percent of total income and total employment in the overall economy of the two-county area. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public-use-related economic activity occurs. For more information about local effects, see Appendix A of the Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge located in Appendix M.

Table 6-19. Summary of All Refuge Management Activities for Alternative 4

	Employment (# full and part time jobs)	Labor Income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	4	$166.8	$201.0
Total effects[b]	13	$453.6	$709.5
Nonlocal Public Use Activities			
Direct effects	5	$164.5	$268.3
Total effects[b]	7	$263.2	$441.8
Aggregate Impacts			
Direct effects	9	$331.3	$469.3
Total effects[b]	20	$716.8	$1,151.3

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

Table 6-20 summarizes the change in economic effects associated with Refuge operations under Alternative 4 as compared to Alternative 1. Due to substantial decreases in visitation, Alternative 4 would generate 15 less jobs, $396.8 thousand less in labor income, and $709.4 thousand less in value added as compared to Alternative 1.

Table 6-20. Change in Economic Impacts under Alternative 4 Compared to Alternative 1

	Employment (# full and part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing and Refuge Administration[a]			
Direct effects	+2	+$89.0	+$99.1
Total effects	+6	+$187.7	+$272.7
Nonlocal Public Use Activities			
Direct effects	-14	-$373.7	-$609.3
Total effects	-21	-$584.6	-$982.0
Aggregate Impacts			
Direct effects	-12	-$284.6	-$510.2
Total effects	-15	-$396.9	-$709.3

[a] Staff salary spending and work-related purchases. [b] Total effects encompass direct, indirect, and induced effects.

6.7 Cumulative Effects

The Council on Environmental Quality (CEQ) regulations for implementing the provisions of NEPA define several different types of effects that should be evaluated in an EIS including direct, indirect, and cumulative (40 C.F.R. 1508.7-1508.8). Direct and indirect effects are addressed in the resource-specific sections of this Draft CCP/EIS (Sections 6.1-6.4). This section addresses cumulative effects.

According to the CEQ, cumulative effects can result from the incremental effects of a project when added to other past, present, and reasonably foreseeable future projects in the area, regardless of the entity undertaking the action. Cumulative impacts can result from individually minor but cumulatively significant actions over a period of time. This analysis is intended to consider the interaction of activities at Deer Flat NWR and with other actions occurring over a larger spatial and temporal frame of reference.

It should be noted that the cumulative effects analysis has essentially been completed by virtue of comprehensive nature by which direct and indirect effects associated with implementing the various alternatives has been presented in the previous sections of this chapter and in the compatibility determinations (Appendix B). The analysis in this section primarily focuses on effects associated

with reasonably foreseeable future events and/or actions regardless of what entity undertakes that action.

6.7.1 Potential Effects from Climate Change

If snowpacks decline and temperatures rise (see Section 3.2 for more detail), lower lake levels may be seen during the spring and summer months. These lower levels could negatively impact on-water nesting birds, spawning fish, and other wildlife that rely on emergent vegetation for feeding, resting, nesting, or breeding. If water levels and vegetation patterns change, protections under the Preferred Alternative would be able to adapt to the change by shifting with wildlife use. Protections under Alternatives 3 and 4 are stationary and could end up protecting unproductive habitat as water levels fall.

Lower river levels, hotter temperatures, and the potential for more frequent wildland fires could negatively impact the upland and riparian vegetation on the Refuge. Increases in invasive and undesirable exotic species may be seen, as well as loss of native vegetation. The cheatgrass-infested uplands of Lake Lowell Unit would burn rapidly and the increase in temperature would make it even more difficult for native plants to outcompete the invasives during fire rehabilitation. All alternatives propose the use of fire breaks to reduce the amount of damage caused by wildfires at the Lake Lowell Unit.

Higher water levels in the fall and winter should have a negligible impact to most wildlife species. However, deer using the Refuge for cover may move to adjacent private lands as water levels rise and dry upland habitat becomes limited.

Lower water levels would also shorten the boating season and negatively affect shoreline fishing access. Depending on the amount of water available in the lake, fishing and wildlife observation docks proposed in the action alternatives may reduce the impacts to these uses. However, extremely low water and high water temperature can result in increased mortality of sportfish in the lake.

If water levels increase in the fall, current uplands may be inundated on the south side of the lake. This could negatively impact deer hunting and upland game hunting (in Alternatives 1 and 2) by reducing the area available for these activities. Higher water levels may also negatively impact waterfowl hunting on the south side by making it more difficult to reach the open water of the lake through inundated riparian zones.

6.7.2 Effects from Reasonably Foreseeable Events and Activities from Others

Throughout this analysis, effects to resources of concern have been considered. The overall effect of an alternative stemming from the combination of individual actions included in that alternative was assessed. For example, the cumulative effects of the hunt program are covered where applicable in previous sections of this chapter. If no effect from an activity (such as hunting) is listed or discussed (e.g., as in Section 6.5.11, Effects from Public Use and Public Use Management Actions on Water-based Nonwildlife-dependent Recreation), this means that in our judgment, that activity is not considered to have any effect on the resource in question.

6.7.2.1 Effects from Increased Development and Population Growth

As described in Chapter 4, cumulatively, there has been a substantial modification to native habitats of the Treasure Valley over the past 100 years, including changes to hydrology, vegetation (especially the influx of invasive species), and fire regimes. As described in Section 6.3.2, regional human populations are expected to continue to grow throughout the life of the CCP. Given these trends, region-wide biological integrity may be at risk. Over time, the Refuge, although relatively small, may become increasingly valuable for the persistence of native wildlife and habitat. The lack of increased management in many habitats under Alternative 1 could cause future degradation of Refuge habitats, leaving the Refuge less able to accommodate increasing wildlife needs as surrounding lands are developed. Active improvement of riparian, open water, mudflat, upland, and wetland habitats in the action alternatives would increase or maintain the value of Refuge lands and waters for a wide variety of native wildlife.

The increase in regional population is expected to be mirrored by an increase in Refuge visitation under Alternatives 1 and 2. The lack of public use regulations under Alternative 1 would be expected to make it increasingly difficult for wildlife, especially nesting waterbirds, to use the Refuge successfully. The increase in visitation without adequate increases in recreation management could reduce the number and/or diversity of wildlife and leave the Refuge less capable of accommodating increasing wildlife needs. All action alternatives increase public use management to reduce disturbance to wildlife during their most sensitive life stages (e.g., migrating, wintering, breeding, and nesting).

The action alternatives emphasize habitat improvements for waterfowl, other migratory birds and other wildlife, and would improve the ability of the Refuge to provide nesting habitat for migratory waterbirds, passerines, and raptors; feeding areas for shorebirds and other seasonal migrants; and habitat improvements for other native species. However, actions proposed under the Draft CCP/EIS would not reverse or halt the regional trend toward reduced biological integrity within the region. Under all alternatives, biological diversity (the number of species present on the Refuge) would probably remain about the same, with some potential reduction possible in Alternative 1.

6.7.2.2 Effects from Public Use Programs

Although mortality would occur to some wildlife under the Refuge's hunt program, the analysis presented previously in this chapter supports the conclusion that there would be no adverse population-level impacts to hunted or nonhunted wildlife species, even when added to other hunt programs regionally or nationally.

6.7.2.3 Effects from Water Quality

As discussed above, Lake Lowell is an impaired water body with multiple inlets coming from surrounding agricultural land containing high concentrations of fertilizers and chemicals associated with farming practices. Without intervention, we can reasonably expect continued inflow and accumulation of sediments and contaminants. The recently published TMDL (IDEQ 2010) will attempt to improve water quality through voluntary actions on private lands. Several CCP strategies are included in all action alternatives to work with partners toward investigating and improving Lake Lowell water quality issues. If water quality continues to deteriorate, increases in phosphorus, sedimentation, and other contaminants may cause increasing negative impacts to visitors and wildlife. If these increases result in a threat to human health (e.g., blue-green algae blooms)

recreation may need to be curtailed. Increasing contaminants and sedimentation may reduce nesting success, destroy nesting habitats, or impact food resources for wildlife.

6.7.2.4 Effects from New Boat Trailer Parking Facilities

Canyon County Parks, Recreation, and Waterways is planning to expand the availability of boat trailer parking at the Lake Lowell Park across from the east Upper Dam boat launch. Additional parking may increase on-water use, especially in the East Pool. The lack of public use regulations under Alternative 1 would be expected to make it increasingly difficult for wildlife, especially nesting waterbirds, to use the Refuge successfully. The increase in visitation without adequate increases in recreation management could reduce the number and/or diversity of wildlife and leave the Refuge less capable of accommodating increasing wildlife needs. The no-wake zones and closures provided under the action alternatives should reduce impacts from this increase in use. The increase in visitation could also reduce the quality of visitor experiences because of increased crowding.

6.7.2.5 Effects from the Snake River Canyon Scenic Byway

The Snake River Canyon Scenic Byway committee developed a Corridor Management Plan (CMP) in 2009. The Byway emphasizes agricultural heritage, and includes portions of the Snake River Islands Unit of the Refuge along the Byway Loop, as well as a Super Side Trip to the Lake Lowell Unit. Implementation of the Byway CMP during the life of the CCP would be expected to include potential facilities development (e.g., overlooks), marketing, and signage that could increase awareness of and visitation to both units of the Refuge. Increases in recreation management proposed under the action alternatives should reduce impacts from the potential increase in use.

6.7.2.6 Effects from the Snake River Water Trail

Canyon County Parks, Recreation, and Waterways and many other partners have recently developed a plan for implementing a Snake River Water Trail from Glenns Ferry, Idaho, to Farewell Bend, Oregon, which completely includes the Snake River Islands Unit of the Refuge. A water trail is a water route that provides recreational and educational opportunities for motorized and nonmotorized boaters and commercial opportunities for river communities. The plan includes proposals for facilities development as well as marketing and promotion of the trail. Implementation of the Water Trail may increase awareness of and visitation to Refuge islands, including clarification of Refuge regulations on Water Trail signage and publications. The extension of closures on islands with goose, heron, and/or gull nesting should help to reduce negative impacts to wildlife during their most sensitive life stages.

6.8 Other Effects

6.8.1 Potential Impacts on Adjacent Lands and their Associated Natural Resources

6.8.1.1 Effects from Increased Invasive Species

Alternative 1 would continue maintenance of most Refuge habitats with current management approaches. Over time, the lack of increased invasive species removal, introduction of new treatment techniques, and targeted removal programs would be expected to cause an increase in invasive species and a decrease in the abundance of native vegetation on the Refuge. On-refuge invasive species would also be expected to spread to adjacent lands and impact Refuge neighbors or lands downstream of the Snake River Islands Unit. Under all action alternatives, increased efforts would be made to reduce invasive species populations on the Refuge, even though they may become more prevalent on surrounding lands.

6.8.2 Potential Impacts to Nearby Residents

6.8.2.1 Effects from Public Use Management

The Service would improve the availability and quality of wildlife-dependent recreation, but within a regional context there would be little cumulative difference in recreational opportunity. Given that Lake Lowell is the only large lake in Canyon County, the removal of nonwildlife-dependent recreation from Alternative 4 is expected to make a difference in the availability of on-water activities in the county. Although the other alternatives limit the scope of nonwildlife-dependent use, none remove the uses entirely from the Refuge and are therefore not expected to create a cumulative difference in recreational opportunity.

Gopher Snake
Addison Mohler, USFWS

Appendices A-P

Appendix A. Appropriate Use Determinations

A.1. Introduction

The Appropriate Refuge Uses Policy (603 FW 1 [2006]) outlines the process that the Service uses to determine when general public uses on refuges may be considered. Priority public uses previously defined as wildlife-dependent uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) under the National Wildlife Refuge System Improvement Act of 1997 are generally exempt from appropriate use review. Other exempt uses include situations in which the Service does not have adequate jurisdiction to control the activity, as well as refuge management activities.

In essence, the appropriate use policy provides refuge managers with a consistent procedure to first screen and then document decisions concerning a public use. When a use is determined to be appropriate, refuge managers must then decide if the use is compatible before allowing it on a refuge. The policy also requires review of existing public uses.

During the comprehensive conservation process (CCP) process, the Refuge Manager evaluated all existing and proposed uses at Deer Flat National Wildlife Refuge (NWR) using the following guidelines and criteria as outlined in the appropriate use policy:

- Do we have jurisdiction over the use?
- Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?
- Is the use consistent with applicable executive orders and Department of the Interior (Department) and U.S. Fish and Wildlife Service (Service) policies?
- Is the use consistent with public safety?
- Is the use consistent with goals and objectives in an approved management plan or other document?
- Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?
- Is the use manageable within available budget and staff?
- Will this be manageable in the future within existing resources?
- Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?
- Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D of the appropriate use policy for description of recreational uses) compatible, wildlife-dependent recreation into the future.

The Refuge Manager also determined the following Refuge uses were appropriate and directed that compatibility determinations be completed for each appropriate use: individuals biking, jogging, and horseback riding; farming; grazing; recreational boating; research; swimming; beach use; picnicking; and walking with pets.

Document continues on next page.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Boating at No-wake Speeds at Lake Lowell Unit

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 2/16/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Boating at No-wake Speeds at Lake Lowell Unit

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Boaters using Lake Lowell must comply with all State and Federal boater safety requirements.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. We are currently at the maximum boating visits identified in the 1990 Master Plan, as updated in 1996 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes. This use is currently manageable in partnership with the Canyon County Sheriff's Department.

(h) Will this be manageable in the future within existing resources?

Yes, as long as we continue to partner with the Canyon County Sheriff's Department.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. This mode of transportation allows fishermen, wildlife observers, and other wildlife-dependent recreationists to access to wildlife and environments that could not be reached otherwise. This access increases their enjoyment of the Refuge and appreciation of its wildlife and habitats. Boating at no-wake speeds, in the areas provided by the Preferred Alternative, should cause less disturbance to wildlife than high-speed boating. Motorized boats can also cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting more area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (DeLong 2002; Huffman 1999). Boats traveling at no-wake speeds do cause some level of disturbance to wildlife but the slow speed, low noise levels, and low approach velocity minimizes the adverse effects associated with boat use in no-wake zones while allowing wildlife-dependent recreationists access to wildlife and environments that could not be reached otherwise.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. This use increases access for wildlife-dependent recreationists. As stated above, boats traveling at no-wake speeds do cause some level of disturbance to wildlife but the slow speed, low noise levels, and low approach velocity of boats at no-wake speeds minimize the adverse effects associated with boat use in no-wake zones while allowing wildlife-dependent recreationists access to wildlife and environments that could not be reached otherwise.

Conclusion

Boating at no-wake speeds is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility.

References

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Huffman, K. 1999. San Diego South Bay survey report—effects of human activity and water craft on wintering birds in South San Diego Bay. USFWS.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Large-group Cycling (>10)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager: _____ Date: 2/16/12

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Large-group Cycling (>10)

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR/

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. Refuge paths and roads are not designed for high-speed bicycling by groups of individuals. There is a potential for riders to be struck by vehicles on the winding entrance road or to strike pedestrians on narrow and/or winding Refuge trails. Recent requests for group bicycling activities include use of Refuge parking areas for start and finish lines and "watering" stops. Use of potentially busy parking areas for these activities would be dangerous and an impediment to other Refuge visitors' safe enjoyment and use of Refuge facilities.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

No. A compatibility determination from 1994 does not allow "organized competitive race events."

(g) Is the use manageable within available budget and staff?

No. There is no staff available to direct traffic and ensure the safety of riders and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No. There will be no staff available to direct traffic and ensure the safety of riders and the rest of the visiting public.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that riders are focused on competing or training and riding as quickly as possible, they are not able to take the time to appreciate the Refuge's resources. Noise caused by bicycling groups and the speed at which they travel may actually negatively impact Refuge wildlife. According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors, including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level.

Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than other means of transportation. Stalmaster and Newman (1978) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Bicycling in a group of four to 10 riders (e.g., a family outing) may be allowed under special conditions provided in a special use permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be utilized by wildlife-dependent recreationists. This use increases the potential for wildlife disturbance through high-speed movement and noise created by a group, potentially negatively impacting wildlife observers and other wildlife-dependent users.

Conclusion

Because bicycling in groups creates a potential public safety issue, negatively impacts wildlife-dependent recreationists and wildlife, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Fernández-Juricic, E., P.A. Zollner, C. LeBlanc, and L.M. Westphal. 2007. Responses of nestling black-crowned night herons (*Nycticorax nycticorax*) to aquatic and terrestrial recreational activities: a manipulative study. Waterbirds 30(4):554-565.

Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the North American Wildlife and Natural Resources Conference 56:238-247.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Pease, M.L., R.K. Rose, and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. Wildlife Society Bulletin 33(1):103-112.

Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42:506-513.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Large-group Jogging (>10 individuals)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Large-group Jogging (>10 individuals)

(a) Do we have jurisdiction over the use?

Yes. This use is conducted on the upland portions of Lake Lowell Unit and falls under the jurisdiction of Deer Flat NWR.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

No. A compatibility determination from 1994 does not allow “organized races and competitions.”

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that joggers are focused on competing or training, they are not able to take the time to appreciate the Refuge's resources. Noise caused by jogging in groups and the speed at which the group is traveling may actually negatively impact Refuge wildlife. According to Knight and Cole (1991), there are three wildlife responses to human disturbance: 1) avoidance; 2) habituation; and 3) attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance, as well as the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995).

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be used by wildlife-dependent recreationists. This use increases the potential for wildlife disturbance through high speed movement and noise created by a group, potentially negatively impacting wildlife observers and other wildlife-dependent users.

Conclusion

Since competitive and group jogging, has been denied by a previous compatibility determination, can negatively impact wildlife-dependent recreationists and wildlife, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

Fernández-Juricic, E., P.A. Zollner, C. LeBlanc, and L.M. Westphal. 2007. Responses of nestling black-crowned night herons (*Nycticorax nycticorax*) to aquatic and terrestrial recreational activities: a manipulative study. Waterbirds 30(4):554-565.

Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the North American Wildlife and Natural Resources Conference 56:238-247.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Group Rowing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive and Group Rowing

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to direct traffic and ensure the safety of rowers and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that competitive rowers are focused on competing or training, they are not able to take the time to appreciate the Refuge's resources.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be utilized by wildlife-dependent recreationists. In addition, competitive rowing events would exclude the general public and reduce the quality of wildlife-dependent activities by concentrating many users in the race location. The proposed racing location along the Lower Dam is a popular fishing spot for boat and shoreline anglers.

Conclusion

Because competitive and group rowing would require additional budget and staff, can negatively impact wildlife-dependent recreationists, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Cycling and Jogging by Individuals and Small Groups (4-10 individuals)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Cycling and Jogging by Individuals and Small Groups (4-10 individuals)

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Individual cyclists and joggers should not create public safety concerns. Allowing cycling only on wider multiuse trails (Kingfisher Trail, Gotts Point Trail, East Dike Trail, and the Observation Hill Trail System) should reduce safety conflicts with pedestrian users. Also, multiuse trail etiquette signage would require cyclists to yield to pedestrians and equestrians. Only pedestrian uses would be allowed on more narrow trails and trails used by environmental education groups (Nature Trail, Centennial Trail, and Murphy's Neck Trail).

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use would be allowed on select multiuse trails giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where joggers and bicyclists are absent, the use is not inconsistent with current goals, objectives, and plans

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes and no. Bicycling and jogging are not defined as wildlife-dependent activities, although individuals could be engaged in wildlife observation while jogging or cycling. The speed and noise created by bicycling and or jogging may in fact negatively impact wildlife. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than other means of transportation. Slow-moving cyclists that view wildlife while cycling or wildlife-dependent users that access viewing areas via bicycle may increase their appreciation of the Refuge.

Bicycling or jogging in a group (four to 10 individuals) may be allowed under special conditions provided in a special use permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes and no. This use increases the potential for wildlife disturbance through high-speed movement and noise, potentially negatively impacting wildlife observers and other wildlife-dependent users on multiuse trails. Because this use is only allowed on multiuse trails, wildlife-dependent users would have the opportunity to use walking trails (Nature Trail, Centennial Trail and Murphy's Neck Trail) and the Lower Dam Recreation Area without interacting with joggers and cyclists. Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities would allow wildlife-dependent users to view wildlife and habitats in areas where cyclists and joggers are absent.

Bicycling or jogging in a group (four to 10 individuals) may be allowed under special conditions provided in a Special Use Permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

Conclusion

Limiting cycling and jogging only to multiuse trails and allowing only individuals and small groups (with a special use permit) would limit the disturbance to wildlife and other visitors. Any disturbance created by this use is expected be intermittent and short term in nature. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for horseback riding appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of cycling and jogging will be studied and alterations and changes to the use will be made if necessary.

References

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Pease, M.L., R.K. Rose, and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. Wildlife Society Bulletin 33(1):103-112.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Farming and Grazing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Farming and Grazing

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. See section (i) below.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Grazing has been shown to be beneficial for single species management such as for foraging geese. Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Greenwalt (1978) explained that

some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese. Pasture grasses serve as an important source of amino acids and carbohydrates to meet the energy and nutrient requirements of geese (Baldassarre and Bolen 2006). Grazing by livestock simulates some of the effects of natural disturbances by removing woody vegetation, reducing thatch, and encouraging the production of young shoots, which are preferred forage for Canada and cackling geese (Raveling 1979). Grazing can be used to set back succession and help maintain diversity and has also been shown to increase native annual forb species and cover, as well as decrease vegetation height and litter depth, all of which are beneficial to foraging Canada geese (Hayes and Holl 2003).

The farming program provides high carbohydrate forage for wintering and migrating waterfowl. Crop fields planted to small grains such as winter wheat can indirectly benefit some other bird species by provide some foraging habitat for a variety of seed-eating migratory bird species. The Refuge's farmed and grazed lands provide areas of high-energy grain crops and green forage grasses to meet the energy needs of waterfowl and other wildlife and reduce crop depredation in nearby agricultural lands.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Production of wildlife food and creation of quality goose pasture is likely to draw wildlife to the Refuge and provide a greater opportunity for wildlife-dependent recreation.

The public occasionally encounters farming operations while recreating on Refuge lands. Although some aspects of farming operations—including noise, dust, spraying, sight of grazing animals, and temporary traffic congestion—may be occasional annoyances to members of the public, conflicts and impacts are expected to remain minor over the life of the plan.

Conclusion

Farming and grazing are beneficial to the Refuge's natural resources and help achieve Refuge purposes by controlling invasive and exotic species, improving quality of grassland and wetland habitat, and provide important food resources used by waterfowl and other migratory birds. Therefore, farming and grazing are considered to be appropriate uses subject to stipulations necessary to ensure safety and compatibility.

References

Baldassarre, G.A. and E.G. Bolen. 2006. Waterfowl ecology and management. 2nd edition. Malabar, FL: Krieger Publishing Company.

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McLandress, M.R. and D.R. Raveling. 1981. Changes in diet and body composition of Canada geese before spring migration. Auk 98:65-79.

Raveling, D.G. 1979. The annual energy cycle of the cackling Canada goose. Pages 81-93 in: R.L. Jarvis and J.C. Bartonek, eds. Management and biology of Pacific Flyway geese. Corvallis, Oregon: OSU Book Stores.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Float Plane (landing and taking off)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Float Plane (landing and taking off)

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

No. Under the Code of Federal Regulations (50 C.F.R. 27.34) the "unauthorized operation of aircraft … at altitudes resulting in the harassment of wildlife, or the unauthorized landing or take-off on a national wildlife refuge, except in an emergency is prohibited."

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes.

(d) Is the use consistent with public safety?

No.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to ensure the safety of pilots and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. The Federal Aviation Administration (FAA) has worked with other Federal agencies including the U.S. Air Force, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Department of Agriculture APHIS Wildlife Services to address aircraft-wildlife strikes in the United States. A Regional Memorandum of Understanding among these parties states that "civil and military aviation communities widely recognize that the threat to human health and safety from aircraft collisions with aircraft-wildlife strikes is increasing." A focus of the cooperation between these Federal agencies is to identify, separate, and mitigate bird air strike hazards by providing separate areas for airplanes and wildlife to exist.

According to the FAA Wildlife Strike Database (FAA 2012), there have been over 120,000 air strikes nationally between 1990 and 2010. Most bird strikes occur during daylight hours between July and October.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. Landing and take-off of float planes may disturb wildlife-dependent recreationists because of the noise and speed of the aircraft.

Conclusion

Because the use of aircraft is contrary to the purpose, goals, and objectives of the Refuge, would be in violation of the Code of Federal Regulations, is widely recognized as a threat to birds, and would be a safety concern for other Refuge visitors, it would not be considered an appropriate use of the Refuge.

References

FAA (Federal Aviation Administration). 2012. Wildlife strike database. Available at: http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Traditional Geocaching (burial or placement of a physcial cache)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Traditional Geocaching (burial or placement of a physical cache)

(a) Do we have jurisdiction over the use?

Yes. This use is conducted on the upland portions of Lake Lowell Unit and falls under the jurisdiction of Deer Flat NWR.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

No. The use is not consistent with the Code of Federal Regulations; 50 C.F.R. Part 27.63 prohibits search for and removal of valued objects and 50 C.F.R. Part 27.93 prohibits abandonment of property on national wildlife refuges.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. While geocachers are walking to a designated location, they may take the time to appreciate the Refuge's resources. However, caches can be attractive and potentially dangerous to wildlife. In addition, these treasures are placed in such a way to present a challenge to locate, and exuberant searchers can have a profound effect on soils, vegetation, and local wildlife within the immediate vicinity of the cache.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. Geocachers may disturb wildlife-dependent recreationists (hunters, anglers, wildlife observers, and photographers) close to an area where a cache has been stashed.

Conclusion

Because geocaching violates the Code of Federal Regulations, this use has been found to be not appropriate at Deer Flat NWR.

References

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: High-speed Watercraft at Lake Lowell Unit

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: High-speed Watercraft at Lake Lowell Unit

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. Although the Refuge Manual (8 RM 9.6) states that "waterskiing will not be allowed on refuge-controlled waters, except where mandated," current policies derived from the 1997 amendments to the National Wildlife Refuge System Administration Act of 1966 provide that uses may be allowed if they are found to be both appropriate and compatible with the purpose for which the Refuge was established.

(d) Is the use consistent with public safety?

Yes. Boaters using Lake Lowell must comply with all State and Federal boater safety requirements. Under the Preferred Alternative, no races or other nonwildlife-dependent group activities are allowed, providing a safer boating experience for visitors.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. We are currently at the maximum boating visits identified in the 1990 Refuge Management Plan, as updated in 1996 (USFWS 1996). As structured in the Preferred Alternative, high-speed boating should have a limited impact on the purpose of the Refuge.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes. This use is currently manageable in partnership with the Canyon County Sheriff's Department.

(h) Will this be manageable in the future within existing resources?

Yes, as long as we continue to partner with the Canyon County Sheriff's Department.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No and yes. Boating at high speeds does not contribute to the public's understanding and appreciation of the Refuge, and it is not beneficial (and can actually be detrimental) to the Refuge's resources. Motorized boats can also cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting more area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (DeLong 2002; Huffman 1999). Boating at high speeds is mostly used for recreation purposes (such as tow-behind activities). One disturbance study showed that motorboats were more likely to elicit a response in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). High-speed boating displaces western and Clark's grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (pers. comm., D. Anderson, as cited in Ivey 2004), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Shaw 1998; Storer and Nuechterlein 1992).

Some wildlife-dependent visitors boat at high speeds to reach their ultimate destination. Once at their destination, they may be able to gain a greater appreciation of the Refuge through involvement in wildlife-dependent activities, but it is unlikely that appreciation is gained while boating at high speeds.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No and yes. As described above, given the tendency of birds to flush when subjected to a high intensity of disturbance, wildlife viewing opportunities would be expected to be poor in high-speed watercraft areas between April and September.

Fishing could be both negatively and positively impacted by high-speed watercraft. Using watercraft at high speeds would allow anglers to reach their fishing area more quickly, allowing more time to fish. However, Refuge personnel have received complaints from anglers about noise and wake from high-speed watercraft.

Conclusion

Limiting high-speed watercraft to the center of the lake will limit the disturbance to wildlife (especially nesting wildlife) and other wildlife-dependent visitors. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for high-speed watercraft appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of high-speed watercraft use will be studied and alterations and changes to the use will be made if necessary.

References

Burger, A.E. 1997. Status of the western grebe in British Columbia. Wildlife Working Report WR-87. B.C. Ministry of Environment, Lands, and Parks. Victoria, British Columbia. 40 pp.

DeLong, A.K. 2002. Managing visitor use and disturbance of waterbirds—a literature review of impacts and mitigation measures. Prepared for Stillwater National Wildlife Refuge. Appendix L in: Stillwater National Wildlife Refuge Complex Final Environmental Impact Statement for the Comprehensive Conservation Plan and Boundary Revision (Volume II). Department of the Interior, Fish and Wildlife Service, Region 1, Portland, Oregon. 114 pp. Available at: http://www.fws.gov/pacific/planning/main/docs/NV/stillwater/4%20Volume%20II/Appendix%20L/App%20L%20final%20lit%20review.pdf. Accessed May 18, 2012.

Huffman, K. 1999. San Diego South Bay survey report—effects of human activity and water craft on wintering birds in South San Diego Bay. USFWS.

Ivey, G.L. 2004. Conservation assessment and management plan for breeding western and Clark's grebes in California. Prepared For The American Trader Trustee Council, an Interagency Group Comprised of Representatives from the California Department of Fish And Game, National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service. [Available at: Gary L. Ivey, PO Box 2213, Corvallis, Oregon 97339-2213]

Shaw, D.W.H. 1998. Changes in population size and colony location of breeding waterbirds at Eagle Lake, California between 1970 and 1997. Thesis. California State University, Chico.

Stalmaster, M.V. and J.L. Kaiser. Flushing responses of wintering bald eagles to military activity. Journal of Wildlife Management 61(4):1307-1313.

Storer, R.W. and G.L. Nuechterlein. 1992. Western grebe (*Aechmorphorus occidentalis*) and Clark's grebe (*Aechmorphorus clarkia*). In: A. Poole and F. Gill, eds. Birds of North America, No. 26. Philadelphia, PA., Academy of Natural Sciences and American Ornithologists' Union. 24 pp.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Horseback Riding by Individuals

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Horseback Riding by Individuals

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Individual horseback riders should not create public safety concerns.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use would be allowed on select multiuse trails giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where horses will be absent, the use is not inconsistent with current goals, objectives, and plans

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Slow-moving riders that view wildlife and wildlife-dependent users that use horses to gain access to viewing areas may increase their appreciation of the Refuge, without additional disturbance to wildlife. In fact, observations by Owen (1973) and others suggest that many species of wildlife are habituated to livestock and are less likely to flee when approached by an observer on horseback than by an observer on foot. In one study (Owen 1973), equestrians could approach geese up to a distance of 150 feet without noticeable behavioral changes in the geese. This is compared to a suggested hiking trail distance of 250 feet (Miller et al. 1998). Wildlife impact will depend on the way in which each horse is ridden. Allowing horseback riding only on multiuse trails and not allowing trotting, galloping, or cantering should reduce disturbance to Refuge wildlife and provide sufficient areas for wildlife away from potential disturbance.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Fast-moving riders may increase the potential for wildlife disturbance, which in turn could reduce the quality of wildlife-dependent recreation occurring in the same vicinity as horseback riding. The frequency of horseback riding on the Refuge is currently very intermittent, and these riders are rarely seen moving at fast speeds for extended periods. If this frequency and type of use is maintained, wildlife-dependent users can expect to encounter horseback riders infrequently on the multiuse trails. Because this use is only allowed on multiuse trails (Observation Hill Trails, Kingfisher Trail, East Dike Trail, and Gotts Point Trail), wildlife-dependent users would have the opportunity to use walking trails (Nature Trail, Centennial Trail, and Murphy's Neck Trail) and the Lower Dam Recreation Area without interacting with horses. Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities would allow wildlife-dependent users to view wildlife and habitats in areas where horses are absent.

Not allowing trotting, galloping, or cantering should reduce disturbance to Refuge wildlife and increase the safety of the nonriding public.

Conclusion

Limiting horseback riding only to multiuse trails and slow speeds would limit the disturbance to wildlife and other visitors. Any disturbance created by this use is expected be intermittent and short term in nature. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for horseback riding appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of horseback riding will be studied and alterations and changes to the use will be made if necessary.

References

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Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications 8(1):162-169.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl 24:123-130.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Ice Skating

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		
(g) Is the use manageable within available budget and staff?		
(h) Will this be manageable in the future within existing resources?		
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Ice Skating

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. Safety is a major concern for recreational users that rely on the structural integrity of the ice on Lake Lowell to enjoy their sport. According to the National Weather Service (accessed online at http://www.rssweather.com/climate/Idaho/Boise/), average monthly high temperatures in the Treasure Valley do not reach freezing levels. Combining this with high winds and long fetch makes the freezing of the water on Lake Lowell very unpredictable and any frozen areas of the lake unsafe. Signs are posted near recreation areas warning the public to stay off the ice because systematic ice evaluations by qualified personnel are not conducted on Lake Lowell.

Conclusion

The National Wildlife Refuge Administration Act, as amended, states that

> the Secretary shall not initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety. The Secretary may make the determinations referred to in this paragraph for a refuge concurrently with development of a conservation plan under subsection (e) of this section. (16 United States Code [U.S.C.] 668dd-3)

Because local weather conditions largely preclude ice skating from being a safe recreation activity and in accordance with the aforementioned law, this use has been found to be not appropriate at Deer Flat NWR.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Radio-controlled Planes

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Radio-controlled Planes

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. According to the Academy of Model Aeronautics (AMA) National Model Aircraft Safety Code, "All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others…. At all flying sites a safety line(s) must be established in front of which all flying takes place" (AMA 2011). Therefore, flying planes in general public use areas where other visitors are present would not be safe.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to establish and monitor appropriate safety lines and other requirements of the AMA National Model Aircraft Safety Code (AMA 2011) to ensure the safety of pilots and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that radio-controlled aircraft pilots are focused on flying their aircraft, they are not able to take the time to appreciate the Refuge's resources. In addition, operation of radio-controlled aircraft is not beneficial (and can actually be detrimental) to the Refuge's resources. Radio-controlled aircraft are fast-moving and loud, two attributes that are directly associated with wildlife disturbance. For example, rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. If proper safety protocols were followed (AMA 2011), this activity would require that a flying area be established with a safety line preventing other public access in the area of flight. Such a designated flight area would take up space that could otherwise be used by wildlife-dependent recreationists. In addition, the speed and noise of radio-controlled aircraft would disturb wildlife and thus reduce the quality of wildlife observation and photography experiences for other Refuge users.

Conclusion

Because the operation of radio-controlled aircraft would not be safe, would require additional budget and staff, can negatively impact wildlife and wildlife-dependent recreationists, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

AMA (Academy of Model Aeronautics). 2011. National model aircraft safety code. Available at: http://www.modelaircraft.org/files/105.pdf. Accessed May 18, 2012.

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Research

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing

uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings will contribute to resource management and that the project cannot be conducted off of Refuge lands. The investigator(s) must identify in advance the methods/strategies required to minimize or eliminate potential impact(s) and conflict(s). Data collection techniques would generally have minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of nonindigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection would have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) would be collected for identification and/or experimentation and statistical analysis. Where possible, researchers would coordinate and share collections to reduce sampling needed for multiple projects.

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel. Spread of invasive species would be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a project (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) would usually be localized and temporary in nature.

Projects would contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. As a result, these projects would help fulfill Refuge purposes; contribute to the mission of the National Wildlife Refuge System (NWRS); and maintain the biological integrity, diversity, and environmental health of the Refuge.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings will contribute to resource management and that the project cannot be conducted off of Refuge lands. The investigator(s) must identify methods/strategies in advance required to minimize or eliminate potential impact(s) and conflict(s).

Conclusion

Because of the long-term contributions that research can have to the adaptive management of Refuge resources and the ability to manage resource to reduce conflicts and disturbance, this use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Swimming and Beach Use

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Swimming and Beach Use

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Although there have been several drowning-related incidents (mostly near-drownings, but there was one swimming fatality in Fiscal Year 2011) at Lake Lowell in the past few years, the Refuge is hopeful that limiting swimming to small areas that are easily accessible to rescue personnel would help to minimize safety issues. There would be no lifeguards stationed at the swimming areas.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Swimming and beach use (including picnicking) do not contribute to the public's understanding and appreciation of Refuge resources. Although this use does not contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or benefit the Refuge's natural or cultural resources, this use should not cause undue harm because swimmers would only be allowed in designated swimming areas, which would reduce interaction with high concentrations of wildlife and provide ample quantities of sanctuary where wildlife can find cover. Because picnicking and other uses associated with beach use mostly occur in developed public use areas, they should also have little impact on wildlife.

Although swimming areas often include erratic movement and elevated human noise levels, the designated swimming areas on Lake Lowell are not of great concern for wildlife concentrations. Keeping shoreline swimming contained to designated areas would reduce the amount of wildlife disturbance associated with the activity.

Allowing visitors to swim and picnic also may provide the opportunity to engage members of the public that may not normally visit refuges where swimming is not allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Because swimming would be limited to areas with minimal wildlife use and minimal use by wildlife-dependent recreationists, the use can continue without impairing existing or future wildlife-dependent activities. Picnicking by individuals and small groups should not interfere with other recreationists. Events such as birthday parties and weddings would require Special Use Permits, which would ensure that other recreationists would not be inconvenienced.

Conclusion

Limiting swimming to designated swimming areas will reduce disturbance to wildlife and wildlife-dependent recreationists and increase safety for swimmers. Because most picnicking takes place in developed public use areas and events would require a Special Use Permit, disturbance to wildlife and other recreationists should be minimal. In addition, allowing swimming and picnicking gives the Refuge the opportunity to engage members of the public that may not normally visit refuges. Thus, the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for swimming or beach use appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Conditions created by the continuation of swimming and beach use (especially the safety of Refuge swimmers) will continue to be watched and alterations or changes to the use will be made if necessary.

Document continues on next page.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Deer Flat National Wildlife Refuge

Use: Walking with Pets

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

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Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Walking with Pets

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. Although there is a Canyon County Ordinance (03-05-021) that states that canines are not allowed in "any public parks within the county … except when such an animal is kept confined in a vehicle or trailer," discussion with Deputy Tweedy of the Canyon County Sheriff's office provided information that local authorities are acting on a contradictory code (04-01-21) that allows pets in public areas as long as they are on a leash that is 6 feet in length or less (Sterling Codifiers Inc. 2011).

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Pets controlled on leashes on multiuse trails are not expected to cause a public safety concern.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use would be allowed on select multiuse trails giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where pets would be absent, the use is not inconsistent with current goals, objectives, and plans.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes. It is possible that agreements with Canyon County and the State of Idaho could increase the law enforcement presence and the ability of non-Refuge law enforcement personnel to enforce Refuge regulations. The Refuge currently allows on-leash dogs; however, this requirement is often ignored

by visitors. Because the on-leash and on-trail requirements are vital to minimizing wildlife disturbance, the Refuge would monitor the level of compliance that visitors with pets exhibit toward trail use and leash requirements. If compliance monitoring indicates that visitors with dogs routinely disregard leash and trail requirements, the Refuge would evaluate other options for minimizing adverse effects associated with pet/wildlife interactions, including the possibility of prohibiting pets on the Refuge.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. This use does not contribute to the public's appreciation of Refuge resources and may actually be detrimental to Refuge wildlife. Authors of many wildlife disturbance studies conclude that dogs with people, on-leash dogs, or loose dogs provoke a more pronounced disturbance reaction from wildlife than humans alone (Sime 1999). The disturbance effects of human intrusion increased when people were accompanied by dogs in studies of different species including shorebirds (Hoopes 1993; Yalden and Yalden 1989, 1990), passerines (Knight and Miller 1996), upland game birds (Baydack 1986), and small mammals (Mainini et al. 1993). Another study suggests that harassment of wildlife by domestic dogs is opportunistic and is associated with the concentration of wildlife in a given area (Jones & Stokes 1977). A follow-up study suggests that dog-induced wildlife flushes increase with an increased density of dogs (Abraham 2001). Free-running and feral dogs have been known to kill quail, rabbits, and deer (Bowers 1953; Lowry and McArthur 1978; Nelson and Woolf 1987). Pure-bred dogs trained to hunt can also ferret out ground-nesting birds and small game animals when left to roam free (Bowers 1953).

Domestic dogs can introduce diseases like parvovirus, canine distemper, and plague to wildlife populations. Diseases like giardia infection and rabies can be transmitted to wildlife and to humans. Muscle cysts can be transmitted through dog feces to ungulate species including mule deer (Sime 1999). Dog waste is also known to host endo- and ecto-parasites, and wildlife can contract diseases from contact with dogs or dog wastes (Sime 1999). To reduce this effect on wildlife and people, pet owners would be required to pick up their pet's feces and dispose of it properly, as is also required by county and city ordinances.

Nussear et al. (2008) inadvertently showed that unleashed dogs increase the zone of coverage (or zone of influence) beyond what it would be by solely the handler, thereby increasing the potential to disturb or harm wildlife. When wildlife react by moving away from the disturbance or alter behavior by hiding they will be less likely to be observed. Users of a national wildlife refuge should be able to expect to see wildlife during their visit. Because expectations of seeing wildlife and the amount of wildlife actually seen factor into the quality of experience for wildlife-dependent users (Hammitt et al. 1993), the reduction in observable wildlife that would be caused by allowing nonwildlife-dependent uses could result in avoidance of the Refuge by wildlife-dependent users. To reduce this potential negative effect on wildlife and wildlife-dependent visitors, dogs would still be required to be leashed on the Refuge. Visitors and law enforcement staff have reported dogs fighting in public use areas. These fights can cause damage to the pets as well as visitors who try to separate the dogs. Small children can easily be knocked over or injured by unleashed pets, and unleashed pets have a greater opportunity to bite or harass other visitors. Feeling personally threatened by dogs or other pets may reduce the enjoyment for other visitors. The NWRS Improvement Act (Public Law 105-57) requires that priority consideration be given to wildlife-dependent users, and the presence of pets is not necessary for nonhunting, wildlife-dependent recreational activities.

Although this use does not contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or benefit the Refuge's natural or cultural resources, this use should not cause undue harm as detailed in the Compatibility Determination for Walking with Pets. Pets would only be allowed on a leash no more than 6 feet long and on designated trails to reduce their interaction with high concentrations of wildlife and people and to provide ample quantities of sanctuary where wildlife can find cover.

Allowing visitors to walk with pets also may provide the opportunity to engage members of the public that may not normally visit refuges where pets are not allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Although this use increases the potential for wildlife disturbance adjacent to multiuse trails and would impact wildlife-dependent visitors using these trails, this use is being allowed on select multiuse trails (Observation Hill Trails, Kingfisher Trail, East Dike Trail, and Gotts Point Trail), thereby allowing wildlife-dependent users the opportunity to use walking trails (Nature Trail, Centennial Trail, and Murphy's Neck Trail) and the Lower Dam Recreation Area in the absence of dogs. Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities would allow wildlife-dependent users to view wildlife and habitats in areas where pets are absent. Allowing visitors to walk pets under the above noted conditions would not impair existing wildlife-dependent recreation or reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

Conclusion

Because pets would only be allowed on a leash that is 6 feet or less and only on multiuse trails, the impact to wildlife and wildlife-dependent users would be minimized. In addition, allowing walking with pets also gives the Refuge the opportunity to engage members of the public that may not visit refuges where pets are not allowed. Thus, the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for walking with pets appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Conditions created by the continuation of walking with pets will be studied and alterations and changes to the use will be made if necessary.

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Appendix B. Compatibility Determinations

Introduction

The compatibility determinations (CDs) developed during the comprehensive conservation planning process evaluate uses projected to occur under Alternative 2, the Preferred Alternative in the comprehensive conservation plan/environmental impact statement (CCP/EIS) for the Deer Flat National Wildlife Refuge.

The evaluation of funds needed for management and implementation of each use also assumes implementation as described under Alternative 2. Chapter 6 of the CCP/EIS also contains a cumulative effects analysis of the impacts related to wildlife, habitats, and public uses.

Uses Evaluated at This Time

The following section includes CDs for all refuge uses that are required to be evaluated at this time. According to Service policy, CDs will be completed for all uses proposed under a CCP. Existing wildlife-dependent recreational uses must also be re-evaluated and new CDs prepared during development of a CCP or every 15 years, whichever comes first. Uses other than wildlife-dependent recreational uses are not explicitly required to be re-evaluated in concert with preparation of a CCP, unless conditions of the use have changed or unless significant new information relative to the use and its effects have become available or the existing CDs are more than 10 years old. However, the Service planning policy recommends preparing CDs for all individual uses, specific use programs, or groups of related uses associated with the proposed action. Accordingly, the following CDs are included in this document for public review.

Refuge Use	Compatible	Next Year Due for Re-evaluation	Page
Farming and grazing	Yes	2023	B-5
Fishing	Yes	2028	B-17
Horseback riding, jogging, and bicycling	Yes	2023	B-31
Hunting deer	Yes	2028	B-43
Hunting waterfowl and upland birds	Yes	2028	B-51
Recreational boating	Yes	2023	B-65
Research	Yes	2023	B-77
Swimming, beach use, and picnicking	Yes	2023	B-85
Walking with pets	Yes	2023	B-95
Wildlife observation, photography, interpretation, and environmental education	Yes	2028	B-103

Compatibility—Legal and Historical Context

Compatibility is a tool refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation, the primary focus of refuges. Compatibility is not new to the National Wildlife Refuge System (NWRS or Refuge System); the concept dates back to 1918. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 directed the Secretary of the Interior to allow only those public uses of refuge lands that were "compatible with the primary purposes for which the area was established" (16 U.S.C. 460k-460k-4). If a general public use is determined to be

appropriate, the use must then undergo a compatibility review. A compatibility review is required for all appropriate public uses, including wildlife-dependent recreational uses.

The term *compatible use* is defined as a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Refuge Manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.

The National Wildlife Refuge System Administration Act (Administration Act) defines *sound professional judgment* as a finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to other applicable laws. Included in this finding, determination, or decision is a refuge manager's field experience and knowledge of the particular refuge's resources.

Part 603 FW 2 of the Fish and Wildlife Service Manual sets forth the policy and guidelines for determining compatibility of proposed uses and provides procedures for documentation and periodic review of existing uses. In addition, the policy requires an opportunity for public review and comment on all CDs. When prepared in conjunction with a CCP, CDs are distributed for public review along with the draft CCP/EIS.

Under compatibility policy, each use is defined as a recreational, economic/commercial, or management use of a refuge by the public or a non-Refuge System entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to CDs. The Service does not prepare CDs for uses over which the Service does not have jurisdiction. For example, the Service may have limited jurisdiction over refuge areas where property rights are vested by others; where legally binding agreements exist; or where there are treaty rights held by Tribes. In addition, aircraft overflights, emergency actions, some activities on navigable waters, and activities by other Federal agencies on "overlay refuges" are exempt from the compatibility review process.

New compatibility policy, developed in response to the 1997 amendments to the Administration Act, was adopted by the Service in October 2000 (http://refuges.fws.gov/policymakers/nwrpolicies.html). The policy requires that a use must be compatible with both the mission of the System and the purposes of the individual refuge. This standard helps to ensure consistency in application across the Refuge System.

The Service recognizes that CDs are complex. For this reason, refuge managers are required to consider "principles of sound fish and wildlife management" and "best available science" in making these determinations (House of Representatives Report 105-106). Evaluations of the existing uses on Deer Flat National Wildlife Refuge are based on the professional judgment of refuge personnel including observations of refuge uses and reviews of appropriate scientific literature.

The Refuge Manager has the authority to determine, by exercising sound professional judgment, what is a compatible use. In addition to determining if a use would materially interfere with or detract from the fulfillment of the System mission or the purposes of the refuge, the Refuge Manager must also evaluate the direct and indirect impacts of a use on refuge resources. Further, the cumulative impacts of the use when conducted in conjunction with other existing or planned uses of the refuge must also be considered. After evaluating the anticipated impacts of a proposed use and determining if any stipulations (terms or conditions) are needed to avoid or minimize potential

adverse impacts, the Refuge Manager will determine whether or not the use is compatible. This determination is documented in writing and is available for review by the public.

A proposed use can be denied without determining compatibly under certain circumstances, such as instances in which:

1) a proposed use would conflict with other applicable laws or regulations;
2) the use would result in conflicts with the goals or objectives of an approved CCP; or
3) a use is determined to be inconsistent with public safety.

Refuges are closed to all public uses until officially opened. Regulations require that adequate funds be available for administration and protection of refuges before opening them to any public uses. However, wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) are to receive enhanced consideration and cannot be rejected simply for lack of funding resources unless the refuge has made a concerted effort to seek out funds from all potential partners. Once found compatible, wildlife-dependent recreational uses are deemed the priority public uses at a refuge. If a proposed use is found not compatible, the use must be modified to be compatible or if the use cannot be modified to be compatible, then the use may not be allowed. Economic uses that are conducted by or authorized by the refuge also require CDs.

References

House of Representatives Report 105-106 (on National Wildlife Refuge System Improvement Act):
http://refuges.fws.gov/policyMakers/mandates/HR1420/part1.html

Compatibility regulations, adopted by the Service in October 2000:
http://refuges.fws.gov/policymakers/nwrpolicies.html.

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B.1 Compatibility Determination for Farming and Grazing

RMIS Database Use: Farming and Grazing

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge (NWR or Refuge) was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (Executive Order [E.O.] 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

The discussion below is applicable only to the Lake Lowell Unit of the Refuge and is not applicable to the Snake River Islands Unit.

Farming. Deer Flat NWR currently uses production methods that include cooperative agreement farming, which involves a negotiated agreement between the Refuge and a private farmer (the cooperator) to produce crops for both parties. The cooperator is responsible for all the costs of production except for maintenance of underground irrigation systems and pumps. In return for producing a specified amount of crops for the Refuge, the cooperator is allowed to harvest and sell the remaining crops. In the current cooperative farming program, the cooperative farmers keep 75 percent of the crop and leave the remaining 25 percent for wildlife. All crop selections are agreed to by the Refuge, and special conditions are documented in each cooperative agreement.

Currently, 255 acres are in cooperative farming programs on Deer Flat NWR. The agriculture fields on the Refuge are referred to as Farm Field 1, Farm Field 5, and the Marsh Field, and all of them are on the north side of Lake Lowell. Crops are grown in concert with proper timing for the particular type of crop. The typical growing season varies from 120 to 200 days. Crops grown include cereal grains and green forage for migratory and wintering waterfowl use. Grain crops grown to meet the high energy demands of migratory and wintering waterfowl consist of corn and wheat. Green forage crops, which provide for the fall, winter, and spring Canada goose population, consist of alfalfa and winter wheat.

Farming operations that surround the Refuge participate in "clean farming," in which fields are tilled in the fall to reduce the amount of invasive weeds and to ready the field for spring planting outside of the wet season. This practice limits the amount of waste grains available in the area to migrating waterfowl. Areas farmed by the cooperator for their share provide additional benefit (not included in the Refuge share) to waterfowl by providing waste grains and/or green forage in harvested fields.

Grazing. The only area where grazing is currently permitted on the Refuge is the Leavitt Tract. The previous land owner historically used the Leavitt Tract to graze his personal cattle. The cooperator is charged a fee based on the number of Animal Unit Months (AUM) that are grazed. An AUM equals the amount of forage required by an animal unit (e.g., one cow or a cow-calf pair) multiplied by the number of months that the animal unit is allowed to graze on the Refuge. The cooperator is allowed to graze 25 and 30 head of cattle from mid-April through September and occasionally 15 to 20 head of horses in the winter. Much of the tract is flooded from a failing irrigation system and backwater from Lake Lowell. Cattle drink from the flooded portion of the field or a runoff ditch also located on the parcel.

Wintering Canada geese benefit from this use because grazing is an effective way to maintain short grasses. Geese prefer young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). To provide high-quality forage for wintering and migrating geese, the Refuge has managed grazing to ensure that young shoots less than 6 inches tall are available by early October each year and to reduce the accumulation of thatch, which can reduce the number of shoots.

Proposed Use

Farming. Under the Preferred Alternative, cooperative farming would continue under similar conditions. Other than increasing the focus on best management practices, only two major changes are proposed: an additional well on Farm Field 5 and the reimplementation of a shoreline planting program. At one time, approximately 400 acres were farmed on the Refuge, which included planting millet along some of the lake shorelines. Because lakeshore plantings can be less labor intensive and do not require irrigation, they can be a less costly option than expanding cooperative farming in upland areas. However, according to Refuge Narratives, historic attempts at shoreline plantings have been mixed in their success due to the unpredictability of moisture. This strategy was eliminated due to budget constraints at the time. As housing development continues to increase and foraging space is becomes even more limited around the lake, this strategy may be implemented to achieve Refuge goals and objectives.

Special conditions currently in place would continue (see Stipulations section below), including restrictions on pesticide uses, the use of best management practices, limits to the types of crops grown, no grass-crop harvesting from April 15 through June 15 (to reduce the risk of destroying nests of ground-nesting birds), and a requirement to have 6 inches of green browse by October 1.

Grazing. Proposed changes to the grazing program consist of herd rotations as a mechanism to reduce soil compaction and control invasive/undesirable plant species in grazing lands, cleaning and updating irrigation infrastructure (cleaning ditches, redoing corrugations, and replacing irrigation checks) to provide better water control, re-establishing permanent goose pasture by seeding cool season perennial grasses, changing the grazing period to April 1 through August 15, and managing short grasses by activities such as haying, mowing, and burning.

These changes would be highlighted in cooperative land management agreements and grazing plans that would be completed. The Refuge would also conduct a grazing fee market analysis to aid in evaluation of current grazing fees.

Availability of Resources

The following funding for annual costs would be required to administer and manage cooperative agreement farming and grazing, as described above.

Most of the costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-1). The farming and grazing programs could continue in their current state without additional upgrades. However, these programs would be enhanced greatly by these potential projects. The farming and grazing programs can be managed with current funds. Additional projects to upgrade the programs would require new funding sources. The Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Because there would be a minimal expansion in farmed/grazed acreage, the program would continue to be managed by current staff.

Table B-1. Costs to Implement Improvements to the Farming and Grazing Programs

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Install new well in Farm Field 5	$80,000-$100,000	
Update irrigation in Leavitt Tract	$12,000	
Interseed grass in Leavitt Tract	$48,000	
Plant crops on shoreline		$70,000
Maintain short grass in Leavitt Tract		$12,000
Total	**$140,000-$160,000**	**$82,000**

Anticipated Impacts of Uses

The discussion below analyzes impacts of the use as proposed under the Preferred Alternative.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from farming and grazing would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Impacts from Farming

Deer Flat NWR is located within the Columbia Basin, which was once dominated by shrub-steppe habitat. The basin is now dominated by cropland farming, which represents approximately 25 percent of the total upland area on the Refuge.

Direct impacts of cropland management include exposure of soils to wind erosion and impacts from machinery. In general, tillage and cropping that leaves soil bare for portions of the year negatively affect soil quality indicators (Nelson et al. 2006) such as aggregate stability, infiltration rates, and available water capacity. Compaction can result from the use of farming equipment for seeding, causing undesirable increases in bulk density, while tilling may also prevent the accumulation or accelerate the decomposition of organic matter and can diminish earthworm populations (Natural Resources Conservation Service [NRCS] 2012).

Farming may also result in the use and introduction into the environment of chemical agents from pesticide usage and the potential exacerbation of weed issues through ground disturbance and field-to-field movement of cultivating and harvesting equipment. In addition, small mammals, reptiles, and amphibians may be occasionally subject to mortality from farm machinery, and nesting birds may be occasionally disrupted and nests destroyed.

One study claims that globally, due to habitat loss, farming is already the greatest extinction threat to birds (the best known taxon), and its adverse impacts are likely to increase with the growing human

population and demand for food (Green et al. 2005). The same study advocates for wildlife-friendly farming that encourages wildlife use but results in lower yields, similar to the Refuge's cooperative farming program.

Farming activities such as plowing, haying, and cultivating can create a disturbance to migratory birds and other resident wildlife. Timing pasture management activities appropriately provides Canada geese, other migratory birds, and wildlife optimum habitat conditions when they most need it, in the fall through winter seasons.

Impacts from Grazing

The impacts of grazing depend on many factors including timing, habitat type, and stocking rate. Numerous studies, gathered in a review of grazing literature, found that grazing has negative impacts on various grassland birds, nesting waterfowl, and small mammals (Fleischner 1994). These species are not only subject to injury and mortality from trampling during the nesting season, but the conversion of tall pasture grasses to short-cropped grasses results in habitat loss for some species. Fleishcher (1994) also enumerated other negative impacts of grazing such as altering species composition, decreasing density and biomass of individual species, reducing species richness, and changing community organization. Vavra (2005) found similar results also showing that grazing can alter species composition.

Negative impacts from grazing are mostly associated with difficulties in containing the cattle that are attracted to water and can therefore damage sensitive wetland areas if they gain access to those sites. In a review of grazing impacts, Kauffman and Krueger (1984) pointed to studies that showed cattle can cause damage in riparian forest sites and waterways by trampling the understory, compacting soils, degrading water quality, and making areas undesirable for other wildlife. Overgrazing can lead to bank instability, increased runoff, and erosion (Behnke and Raleigh 1978).

Grazing has been shown to be beneficial for single-species management such as for foraging geese. Some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese (Greenwalt 1978). Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Pasture grasses serve as an important source of amino acids and carbohydrates to meet the energy and nutrient requirements of geese (Baldassarre and Bolen 2006). Grazing by livestock simulates some of the effects of natural disturbances by removing woody vegetation, reducing thatch, and encouraging the production of young shoots, which are preferred forage for Canada and cackling geese (Raveling 1979). Grazing can be used to set back succession and help maintain diversity and has also been shown to increase native annual forb species and cover, as well as decrease vegetation height and litter depth, all of which are beneficial to foraging Canada geese (Hayes and Holl 2003).

Refuge-specific Impacts

The introduction and spread of weeds are expected to be mitigated partly through such practices as equipment cleaning, mowing to prevent seed set and dispersal, and treatments to any source populations that have the potential to infest agricultural fields (usually windborne seed dispersal). Cooperators would be required to follow the same procedures as Refuge equipment operators by cleaning equipment before moving between fields when working in areas of weed infestations to minimize the spread of undesirable plants as per cooperative land use agreements. The Refuge would

continue to monitor farming and grazing sites for invasive weeds and would maintain an aggressive approach to invasive plant control and restoring sites to vegetation with high wildlife value. In addition, the Refuge would continue to work with Canyon County Weed Control to prevent, identify, and eradicate new infestations.

For weed species that are or become established, mechanical, cultural, and biological controls methods would be evaluated. If these methods are not expected to be effective or would have undesirable consequences (such as impacting nests of grassland-nesting birds), then the Refuge may decide to use an herbicide. Chemical usage would be subject to provisions of the Refuge Integrated Pest Management (IPM) Plan (Appendix G). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water, and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a level of concern for surrogate species, as established by the Environmental Protection Agency. All applications of herbicides would conform to the specific pesticide label requirements. Employment of this approach would provide for a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix G).

Activities associated with farming practices may have some impact on birds using farm fields. For example, silage activities in the Upper Dam Marsh field may cause geese to move from the immediate area where the farming equipment is operating. However, because these disturbances are short-term and localized, geese, other migratory birds, and wildlife can easily move to an adjacent undisturbed location. Both farming and grazing can have an impact on nesting birds and cause habitat degradation and soil compaction as indicated above. Refuge-specific studies to determine the timing of local birds using farm fields to nest would be conducted in order to reduce impact. Impacts to habitat and soil would also be monitored as noted in stipulations listed below.

Positive effects are also anticipated. In addition to providing high-carbohydrate forage for wintering and migrating waterfowl, per the purpose of the farming program, crop fields planted in small grains such as winter wheat can indirectly benefit a variety of seed-eating migratory bird species by providing some foraging habitat. The Refuge's farmed and grazed lands provide areas of high-energy grain crops and green forage grasses to meet the energy needs of waterfowl and other wildlife and reduce crop depredation in nearby agricultural lands.

Impacts to Priority Public Uses

Currently, the public occasionally encounters farming operations while recreating on Refuge lands. Although some aspects of farming operations—including noise, dust, spraying, sight of grazing animals, and temporary traffic congestion—may be occasional annoyances to members of the public, conflicts and impacts are expected to remain minor over the life of the CCP.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Cooperative land management agreements would contain the following special conditions to ensure compatibility.

Farming Stipulations

- The cooperative farmer is required to perform habitat maintenance work to sustain the field conditions for the benefit of wildlife. Work may include mechanical weed control and fertilization.
- By October 1, alfalfa must be cut to a maximum of 6 inches tall, and winter wheat cut to 3 to 6 inches tall.
- The agreement does not imply or establish a use precedent. Future use of the area would be based on the most satisfactory use of the land for wildlife benefits, cooperator performance, habitat management needs, and administrative needs.

- The cooperative farmer would exercise care to prevent fire and would assume responsibility for fire, which may result from his/her operations.
- No Refuge equipment would be provided for use by the cooperator.
- At the end of the permit period, cooperator is responsible for removing all equipment from Refuge lands.
- The cooperator shall be responsible for repairing damage to Refuge facilities or habitat beyond normal wear and tear resulting from his/her operation.
- Cropland farming would be done under an approved cooperative land management plan and annual cropland management plan per agency policy.
- Pest plants and weeds would be controlled by crop rotations, mechanical treatments, and biological controls where practical; herbicides must be approved by the Refuge Manager on a case-by-case basis.
- Pesticide use must be in compliance with the Service policy requirements for completing an approved pesticide use proposal, and pesticide use must meet other State and Federal requirements.
- The cooperator would provide a record of herbicides used including chemical name, amount used, date, location, and how applied.
- Pesticide applicators must meet all State, Federal, and agency requirements.
- Diligence shall be exercised in the control of County-listed invasive weeds.
- Monitoring of the cropland farming program would be performed by qualified Refuge staff.
- The share of crops left for wildlife would be at least 25 percent.

Grazing Stipulations

- Fencing and ditching would be used to contain cattle and focus grazing on specific pastures during the dry season.
- Season of use shall be from April 1 to August 15 to minimize disturbance to waterfowl and to avoid grazing under wet soil conditions. The Refuge reduces impacts of pasture management by limiting grazing operations and restricting the introduction of cattle during the breeding season in areas where significant impacts to nesting birds would occur.
- The permittee shall remove all cattle, equipment, and materials from the Refuge by the end of the grazing season.
- The selected grazing cooperator must deliver cattle to the Leavitt Tract by way of the Tio Lane entrance.
- Permittees shall be required to leave fields with 2 or more inches of grass and forbs growth at season's end.
- The agreement does not imply or establish a use precedent. Future use of the area would be based on the most satisfactory use of the land for wildlife benefits, cooperator performance, habitat management needs, and administrative needs.
- Subleasing is prohibited. Animals must be the property of the cooperator.
- At the end of the permit period, the cooperator shall be responsible for removing all livestock from Refuge lands.
- The cooperator shall be responsible for repairing damage to Refuge facilities or habitat beyond normal wear and tear resulting from his/her operation.
- Stocking rates of livestock may be altered should pasture conditions warrant, dependent upon judgment of the Refuge Manager.

- The cooperator would notify the Refuge Manager or designee at least three days in advance of the date cattle are to be turned in or removed from the Refuge. Any changes in the number of animals shall be immediately reported to the Refuge Manager, or designee. All changes would be documented in writing by the cooperator and provided to the Refuge Manager or designee at the end of the season. Livestock would be contained in assigned units, and fences must be maintained by the cooperator.
- The cooperator is responsible for removing dead livestock carcasses from the Refuge within 24 hours of discovery.
- The cooperator shall comply with the livestock regulations of the State of Idaho relating to health and sanitation requirements.
- Monitoring of the grazing program would be performed by qualified Refuge staff, including surveys to determine if grazing is adversely impacting ground-nesting birds.
- Before using grazing as a tool to rehabilitate cheatgrass-infested uplands, more study would be completed, and experts in this area would be contacted. If grazing is used in upland rehabilitation, a small area would be used as a test area before grazing is allowed in large sage-steppe areas.

Justification

The Refuge farm fields are an important food source for waterfowl and other wildlife when natural foods are limited. With the exception of the smartweed beds, Lake Lowell contains minimal submerged aquatic food for feeding waterfowl. Current crops provide food for wintering waterfowl (primarily geese), quail, pheasant, deer, and mourning doves. Ducks and pheasant use or have historically used Refuge alfalfa fields for nesting. The crops on the Refuge provide a consistent food source for the wintering waterfowl and therefore are important to continue. The conversion from agriculture to low-density development, and changes to local agricultural practices in the area surrounding the Refuge have resulted in food loss for wintering waterfowl. These changes to local agriculture include growing higher-valued specialty crops such as seed alfalfa, onions, and mint; using more efficient harvesting equipment so little waste grain remains in the field; and fall plowing and tilling often by mid-November, which is prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue in the future, cropland management would be essential for waterfowl management in future years. Although wintering waterfowl numbers have declined over time, numerous waterfowl still winter at Deer Flat NWR.

As a management tool, cooperative land management use is a beneficial Refuge operation in meeting purposes of the Refuge as well as goals and objectives established in the CCP. The farming and grazing activities within the cooperative land management program contribute to achieving Refuge purposes and goals identified in the CCP as well as the National Wildlife Refuge System mission by providing valuable foraging areas for wintering and migrating waterfowl. The combination of management practices and stipulations identified above would ensure that farming and grazing contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. Therefore, farming and grazing are considered to be compatible Refuge uses.

Grazing contributes by economically providing weed control and other habitat maintenance functions that are not feasible for limited Refuge staff to accomplish. A grazed short-grass pasture will

complement the marsh habitat on the Leavitt Tract and providing forage and resting habitat for migrating and wintering geese.

The cooperative land management plan will be written after the CCP is complete and will include a description of the agreement between the Refuge and the private farmer to manage the land for both parties. The grazing management plan will better define the objectives of grazing, the amount of stock grazed, and any time restrictions necessary to meet biological management goals. These management plans will also identify what habitat and/or wildlife will be monitored to determine the benefits and/or impacts of the grazing program. Monitoring would prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. Thus, allowing farming and grazing to occur with stipulations would not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

References

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.2 Compatibility Determination for Fishing

RMIS Database Use: Fishing

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Fishing is allowed on both the Lake Lowell and the Snake River Islands Units and is the most popular of the priority wildlife-dependent recreational activities. Fishing from above mean high water level on the Snake River Islands is not closely monitored and is thought to be infrequent. Fishing from boats in the Snake River is outside of the jurisdiction of the Service. The Lake Lowell Unit received approximately 46,000 fishing visits in Fiscal Year (FY) 2011.

At the Lake Lowell Unit, the majority of fishing occurs from boats and is allowed from April 15 through September 30. Fishing from open shoreline is allowed any time except during waterfowl hunting season when shoreline fishing is restricted to Fishing Areas A and B, 200 yards in front of the Lower and Upper Dams. During that time, fishing from human-powered boats is also allowed in Fishing Areas A and B. Fishing from the Snake River Islands Unit is allowed from June 1 through January 31.

At the Lake Lowell Unit, spring and summer fishing are focused on fishing for large and smallmouth bass from boats. The majority of bank fishing is focused on catfish with some anglers fishing for perch, crappie, and bluegill.

There are five boat launches (three of which are improved and maintained) on the Lake Lowell Unit from which fisherman can launch motorized boats. Individuals can also launch human-powered boats from a variety of formal and informal locations along the shore. Current and proposed boating regulations are described in the Recreational Boating Compatibility Determination.

In 2011, four Special Use Permits (SUPs) were issued for fishing tournaments, with tournaments occurring from April 15 through September 30, excluding May 14 through July 9. Fishing tournaments are allowed only every other weekend to provide opportunities for nontournament anglers. Tournaments range in size from small club tournaments of five to 10 boats, to a maximum of 100 boats. Participants in tournaments are required to abide by all no-wake zones, area closures, and State fishing regulations. All bass tournaments must launch from the Lower Dam Recreation Area. The Refuge charges a fee of $100 for each bass tournament.

Proposed Changes to Described Uses

Under the Preferred Alternative, the Refuge would improve and expand facilities and programming to enhance these opportunities as follows.

- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands would be clearly delineated in Refuge brochure.
- Access to Lake Lowell Unit:
    - To protect nesting birds, access would be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 yards on either side of trails accessing the lakeshore. Off-trail travel would be allowed August 1 through January 31.
    - Anglers would be allowed off-trail in the East Side Recreation Area all year.
    - Anglers would be allowed off-trail at Gotts Point from February 1 through September 30.

    - Gotts Point would be fully open to vehicle access upon completion of a memorandum of understanding with Canyon County to resolve law enforcement issues
    - Lower Dam Recreation Area would be open from April 15 through September 30.
- The following seasonal closures would be implemented and clearly marked at the Lake Lowell Unit as necessary to protect sensitive wildlife habitat:
    - 300-yard buffer around eagle nests February 15 through July 15.
    - Winter waterfowl closure at Gotts Point October 1 through January 31.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1
    - 100-yard closure around shorebird feeding areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- Provide designated, ADA-accessible fishing access trails, for example:
    - From parking areas at Gotts Point.
    - At Parking Lots 4 and 7.
    - From proposed 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck.
- Provide multipurpose (e.g., fishing, observation), ADA-accessible docks or platforms, for example:
    - At north end of Lower Dam Recreation Area near existing Environmental Education Building.
    - Just west of boat launch at east end of the Upper Dam.
    - Along proposed 2-mile ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3.
- Remove walk-through access to Murphy's Neck from Orchard Avenue after installing Murphy's Neck Trail with fishing access from Lower Dam Recreation Area to provide alternate, safer access.
- Provide fishing line receptacles.

Availability of Resources

Deer Flat NWR is open to all of the priority, wildlife-dependent recreational activities, including fishing, and the infrastructure is there for all of these user groups. Even though fishing is the most popular visitor activity, to date only a limited number of facilities have been developed specifically for fishing. Most of the costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-2). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CD for activities using the same resource. For instance, installing new docks would benefit fisherman, but the docks may also be used by visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that may use the new docks.

Table B-2. Costs to Implement Improvements to the Fishing Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install new docks	$44,600	
*Install seasonal public use regulation signs	$1,400	
*Install public use in hunt area signs	$200	
*Open Gotts Point to vehicles and create accessible trails to water	$62,400	
*New trail at Murphy's Neck	$95,200	
*Print/reprint general Refuge brochures	$3,200	$800
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	
*Install buoys for seasonal closures and permanent no-wake areas	$4,300	
*Buoy and dock maintenance		$7,400
*Replace 25% of regulatory and directional signs		$5,200
*Maintain Murphy's Neck and Gotts Point Trails		$1,000
*Visitor contact station	$480,000	$1,600
*Install and maintain comfort station and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$1,215,500-$1,220,500**	**$81,400**

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use as proposed under Preferred Alternative 2.

General Impacts to Habitat

A number of studies have investigated the impacts of boats on aquatic plants, including reduced biomass, shorter canopies, reduced overall coverage, and increased scours compared to sites with restricted boat use (Asplund and Cook 1997; Wagner 1991; Zieman 1976). While exclusion zones and closures may not prevent habitat degradation, they can have an effect on minimizing damage to this important habitat (Asplund and Cook 1997). Boating can also have effects on shoreline erosion (Johnson 1994; Nanson et al. 1994), resuspension of sediments leading to water clarity issues (Garrad and Hey 1987; Johnson 1994; Yousef et al. 1980), and water pollution (Mastran et al. 1994).

Shoreline fishing has been shown to have environmental consequences in the way of soil compaction, degradation of plant communities, and increased contribution to pollution in the form of litter (O'Toole et al. 2009). Shoreline activities, such as human noise, can cause some birds to flush and go elsewhere. In addition, vegetation trampling and deposition of human waste and litter are expected to commonly occur (Liddle and Scorgie 1980). Disturbance and destruction of riparian vegetation, and impacts to bank stability and water quality, may result from high levels of bank fishing activities.

General Impacts to Wildlife

Recreational angling has the potential to cause disturbance to birds and other wildlife using the open waters and flooded emergent vegetation of the Refuge. Fishing activities may influence the composition of bird communities, as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985; Bouffard 1982; Cooke 1987; Edwards and Bell 1985; Tydeman 1977). In one study, an increase in the number of anglers and associated shoreline activity discouraged waterfowl from using otherwise suitable habitat (Jahn and Hunt 1964). Anglers can also influence the numbers, behavior, and diurnal distribution of avian scavengers (Knight et al. 1991).

Boating associated with fishing can alter bird distribution, reduce use of particular habitats or entire areas by waterfowl and other waterbirds, alter feeding behavior and nutritional status, and cause premature departure from areas. Impacts of motorized boating can occur even at low densities, given their noise and speed (Knight and Cole 1995). Both motorized and nonmotorized boating have been shown to change wildlife distribution and use of particular habitats, alter feeding behavior and nutritional status, and cause premature departure from desirable habitat (Bouffard 1982; Kaiser and Fritzell 1984; Korschgen et al. 1985). Studies have also shown that boating disturbance may cause increased flight time and flushing distances in waterfowl species (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Wildlife species that are more sensitive to recreation-related disturbances (e.g., bald eagles, shorebirds, grebes) may find it increasingly difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented by disturbance (Burger 1997; Pfister et al. 1992; Skagen et al. 1991).

Motorized boats can cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting a greater area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (Huffman 1999). However, canoes and kayaks can cause measurable disturbance effects because they can access shallower and more densely vegetated areas of a marsh (Speight 1973). Slow-moving boats in close proximity to nesting great blue herons can cause temporary nest abandonment (Vos et al. 1985), and Huffman (1999) found that nonmotorized boats within 30 meters (98 feet) of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore. There have been several studies documenting impacts to birds native to Deer Flat NWR. One study showed a decrease in use of a bald eagle feeding site when human activity (including motorized boating) occurred within 200 meters (Skagen 1980). Another disturbance study showed that motorboats were more likely to elicit response in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). Rodgers and Schwikert (2002) measured flushing distances from motorized watercraft for 23 waterbird species, of which the great blue heron was one of the more sensitive, flushing between distances of 8 and 137 meters.

Fishing also results in the direct take of fish. Fishing regulations and harvest are coordinated with the Idaho Department of Fish and Game (IDFG) to avoid excess pressure on populations. The State also conducts the stocking program on Lake Lowell. Fishing would be permitted by angling only unless an SUP is issued. Outreach materials such as fishing brochures, informational panels, and public education on best fishing practices would help educate anglers on fishing regulations and ethical behavior. Working in cooperation with the State of Idaho and requiring the anglers to comply with State regulations would ensure that harvesting of fish does not harm long-term populations and fits well within the public's expectations and local fishing culture.

Local Impacts

Many of the wildlife species that frequent Deer Flat NWR rely on aquatic vegetation. Herons and egrets forage in smartweed beds; grebes make their nests from and in emergent vegetation and ducks raise their broods in the protection that its cover provides. The shallow water and marshy habitat are vital to the survival of wildlife species that call Deer Flat NWR home.

Colonial-nesting birds may be among the most sensitive species subjected to potential disturbance from fishing and fishing-associated boating. Lake Lowell is one of only three lakes in Idaho that routinely sees colonies of nesting western and Clark's grebes whose breeding population is considered imperiled in the state (IDFG 2005). IDFG has printed pamphlets for public distribution that provide information on conflicts between boaters and grebes and the importance of responsible boating. Anglers at Lake Lowell often fish in the shallow, heavily vegetated areas that birds prefer and may negatively impact distribution and abundance of breeding grebes. It is inevitable that there would be some impact to wildlife species from fishing. However, the overall effect of this impact is anticipated to be adequately mitigated by implementing the stipulations listed below.

According to a recent visitor use study done on Lake Lowell (see Appendix L), 38 percent of boaters on the lake were actively engaged in fishing activities during the time of the survey. Between 83 percent and 100 percent of boaters located in the emergent bed or on the edge of the emergent bed were actively involved in fishing. The estimated number of angling visits at the Refuge has increased in recent years (from 33,500 in FY07 to 46,000 in FY11). However, the 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation showed that between 1996 and 2006, the number of state-resident anglers decreased by 28 percent (USFWS and U.S. Census Bureau 2007). Because both the national and Idaho State trends appear to show a decline in participation in fishing, it is anticipated that future levels of fishing would not materially interfere with the purposes of the Refuge.

In 2011 the estimated number of annual shoreline or dock fishing visits to Deer Flat NWR was 18,300. The impact of these visitors is not monitored, but there is evidence in the way of social trails and litter. Popular shoreline fishing areas have well-worn paths through the vegetation, which fragment and impact habitat in the surrounding area. Careless anglers also leave trash that can have an impact on wildlife. For instance, discarded tangled fishing line can be attractive to a nesting bird that attempts to use it and instead becomes ensnared. By maintaining closed areas, increasing law enforcement, and working with local advocacy groups, these impacts can be reduced. It is anticipated that by implementing the stipulations listed below, this use can coexist with wildlife needs.

Refuge staff would monitor the number of anglers and their effects on wildlife, especially nesting birds. Ongoing monitoring of angling activities on Deer Flat NWR would allow managers to apply adaptive management and address issues as they come up. Monitoring efforts will be a part of an overall fisheries management plan that will help guide fisheries management on the Refuge into the future.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog

could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from fishing would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Impacts to Other Priority Public Uses

Fishing is considered a priority public use under the 1997 Refuge Improvement Act (Public Law 105-57). Conflicts between anglers and hunters are not common as they typically happen in separate seasons. The majority of Lake Lowell is closed to fishing during most of the hunting season. Wildlife photographers and observers may have limited contact with bank anglers, but a majority of fishermen are in boats. Groups involved with environmental education and interpretation are typically located around the Visitor Center and are removed from anglers. Conflicts between fisherman and nonwildlife-dependent recreational boaters are more common.

Under the Preferred Alternative, fishing would continue as it has historically, with a few minor changes. There would be more no-wake zones where anglers would have to slow down sooner to get to popular fishing areas. Sensitive wildlife areas would also be closed off to any entry including anglers. These areas would change annually based on wildlife surveys, which would present a moving target for anglers to keep track of.

Trash associated with fishing activities leaves an unsightly environment that is unpleasant for other Refuge visitors. Placing trash receptacles and restroom facilities in strategic locations, placing fishing docks in high use areas, and creating improved trails to popular spots are planned in the Preferred Alternative. These improved facilities would mitigate negative impacts associated with concentrated shoreline fishing and allow other areas with limited access to receive reduced angler use and minimal disturbance to wildlife. An appropriate level of cooperative law enforcement would also provide layers of protection for trust resources.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Refuge staff would monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data will be used to modify these stipulations if necessary to ensure continued compatibility of these activities.
- All fishing on the Refuge would require the appropriate State license and would occur consistent with applicable Refuge and State regulations designated by IDFG or Oregon Department of Fish and Wildlife (ODFW) as appropriate.
- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands would be clearly delineated in the Refuge brochure.
- Use would be restricted to official daylight hours only.
- Access to Lake Lowell Unit:
    - To protect nesting birds, access would be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 yards on either side of trails accessing the lakeshore. Off-trail travel would be allowed August 1 through January 31.
    - Anglers would be allowed off-trail in the East Side Recreation Area all year.
    - Anglers would be allowed off-trail at Gotts Point from February 1 through September 30.
    - Gotts Point would be fully open to vehicle access upon completion of a memorandum of understanding with Canyon County to resolve law enforcement issues
    - Lower Dam Recreation Area would be open from April 15 through September 30.

- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- No live, nonnative aquatic bait would be allowed as per Service policy (605 FW 3).
- Fishing line receptacles would be provided.
- Fishing tournaments allowed during boating season (April 15 through October 1) except May 14 through July 9. All no-wake zones, area closures, and State fishing regulations must be followed (except catch-and-release before end of June). Bass tournaments only allowed every other weekend (to provide opportunities for nontournament anglers). All bass tournaments must launch from the Lower Dam Recreation Area. The fee would be $100, and there would be a limit of 100 boats.
- No live, nonnative aquatic bait would be allowed as per Service policy (605 FW 3).
- Open fires would be prohibited.
- Ice fishing would be prohibited.

Justification

Fishing, when compatible, is considered a priority public use for the National Wildlife Refuge System. Angling brings visitors to the Refuge and often enhances their appreciation of natural resources. Parts of Deer Flat NWR are closed to all public use to provide areas of undisturbed habitat for fish and wildlife. The stipulations listed above would provide protections that reduce disturbances to colonial water birds and other wildlife. The combination of closed areas, seasonal use areas, minimally used areas, and seasonal high use areas, allows quality fishing opportunities and high-quality fish and wildlife habitat to coexist on the Refuge.

Fishing is a priority wildlife-dependent use for the National Wildlife Refuge System through which the public can develop an appreciation for fish and wildlife (E.O. 12996, March 25, 1996) and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and to ensure that they receive enhanced attention during planning and management. Although these activities can result in disturbance to wildlife and habitat, disturbances on the Refuge related to fishing are expected to be intermittent and minor and are not expected to diminish the value of the Refuge for its stated purposes. The stipulations stated above would ensure proper control of the use and provide management flexibility should detrimental impacts develop. Facilitating this use on the Refuge would increase visitor knowledge and appreciation of fish and wildlife resources. This enhanced understanding would foster

increased public stewardship of natural resources and support for the Service's management actions in achieving the Refuge purposes and the mission of the National Wildlife Refuge System.

It is anticipated that wildlife populations would find sufficient food resources, nesting and breeding areas, and resting places such that their abundance and use of the Refuge would not be measurably lessened from allowing fishing at Lake Lowell and from islands in the Snake River Unit. The relatively limited number of individuals expected to be adversely affected due to fishing would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted. Thus, allowing fishing would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the Refuge was established.

Mandatory Re-evaluation Date

2028 Mandatory 15-year Re-evaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

Document continues on next page.

B.3 Compatibility Determination for Horseback Riding, Jogging, and Bicycling

RMIS Database Uses: Horseback Riding, Jogging, and Bicycling

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future

generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Uses

These uses rarely, if ever, occur on the Snake River Islands Unit. Several trails at the Lake Lowell Unit of Deer Flat NWR are used extensively by the public for activities including horseback riding, jogging, and bicycling. Existing trails used for these activities are primarily on the north side of the lake and include the East Dike and Kingfisher Trails in the East Side Recreation Area, the Gotts Point Trail, and the Observation Hill Trail System and the Centennial and Nature Trails in the North Side Recreation Area. While trails on the south side do exist, they are short, go directly from the parking lots to the lake edge, and are typically not used by joggers, cyclists, or horseback riders. Horseback riders do sometimes use the fire breaks in the South Side Recreation Area. Refuge trails are maintained gravel roads and single-track dirt paths, with the exception of the concrete Centennial Trail. Trails are easily accessed from existing parking areas. Spring and summer months have the highest rates of these kinds of usage. Refuge counts estimate the number of walkers/joggers in 2010 at around 16,500, but there are no data for equestrians or cyclists. All three of the uses described in this CD were addressed and deemed compatible in previous CD.

Proposed Uses

Under Preferred Alternative 2, the Refuge would continue to allow horseback riding, jogging, and bicycling on designated trails with stipulations to maintain public safety, reduce conflicts between wildlife-dependent user groups, and ensure compatibility with the purpose of the Refuge and National Wildlife Refuge System mission. The Refuge would manage these uses in a manner so as to reach out to nontraditional Refuge user groups to learn about the National Wildlife Refuge System. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, multiple-use trails may provide an introduction to a national wildlife refuge.

Each of the proposed uses is described in more detail below.

Horseback Riding. Horseback riding would be allowed only on designated trails (the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System) to prevent soil erosion and trail widening that commonly occurs with equestrian trails. In addition to enforcing Refuge restrictions, the Refuge staff would seek the cooperation of users and develop partnerships with interested groups to ensure compliance with compatibility stipulations and protection of Refuge resources.

Groups of more than four horses and riders would be required to obtain an SUP. Groups larger than 10 people would not be allowed to use the Refuge; large groups could restrict use for other wildlife-dependent users because of limited space both on trails and in parking lots. Special group events such as competitions, poker rides, and the like would not be allowed on the Refuge. Riders would not be allowed to tie a horse to any physical structure or vegetation and must remain with their horses at all times. The Refuge would not provide support facilities such as trailer parking, hitching posts, and water access. Per multiuse trail etiquette, pedestrians and bicyclists must yield to equestrians.

Jogging. Jogging would be allowed on all trails in open areas. Special group events such as competitions, training, and practice meets would not be allowed on the Refuge because they are not

wildlife-dependent events and would have the potential of impacting visitors trying to participate in wildlife-dependent recreational activities.

Bicycling. Bicycling would be allowed only on designated trails including the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System. Based on limited survey data, bicycling is not a common use on Refuge trails, and conflicts with other users have not been reported. However, bicycling sometimes has occurred off-trail, a use that is not allowed.

Special events such as racing (or other competitions) and/or practice would not be allowed on the Refuge. In addition, bicycling competitions would not be allowed to use Refuge parking areas for race preparations, starting lines, finish lines, or refreshment areas because the resulting congestion limits access by wildlife-dependent users and because of automobile/bicycle safety concerns. Groups of more than four cyclists would be required to obtain an SUP. Groups larger than 10 people would not be allowed to use the Refuge; large groups may restrict use for other wildlife-dependent users because of limited space on trails. Bikes must be ridden at a safe speed, and cyclists must yield to horses and pedestrians. Refuge staff would seek the voluntary cooperation of users and would also rely on law enforcement to ensure compliance with these stipulations and to ensure safety of all user groups on trails.

Availability of Resources

Most of the costs associated with carrying out the improvements, as described in the Preferred Alternative, are one-time expenses (see Table B-3). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Increased volunteer assistance, strengthened existing partnerships, and new partnerships would be sought to support these programs in an effective, safe, and compatible manner. Refuge staff would increase volunteer recruitment efforts. When provided appropriate training, volunteers, interns, and various user groups can assist the Refuge with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, upgrading the fire break to a multiuse trail would benefit horseback riding, jogging, and bicycling, but the trail could also be used by visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that would use the new trail facility.

Table B-3. Costs to Implement Improvements Necessary to Allow Horseback Riding, Jogging, and Bicycling

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install multiple-use trail regulation signs	$7,800	$300
*Upgrade fire break	$37,000	$800
Safety upgrade to Tio Lane walk-through	$1,000	
*Print/reprint general Refuge brochures	$3,200	$800
*Human/wildlife interaction disturbance studies	$140,000	
Miscellaneous management		
Total	**$189,000**	**$1,900**

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use as proposed under Preferred Alternative 2.

Impacts to Habitat

Unpaved or unsurfaced trails are susceptible to a variety of trail impacts from horseback riding, jogging, and bicycling, including vegetation loss due to trampling and soil compaction and erosion (Adkison and Jackson 1996; Dale and Weaver 1974; Leung and Marion 2000). Trail widening and creation of side trailing (social trailing) increases the area of disturbed land (Liddle 1975). Horses, pedestrians (including joggers), and cyclists can all cause structural damage to plants and increase soil compaction and erosion (DeLuca et al. 1998; Whittaker 1978). Vegetation and soil compaction and erosion impacts can be much more pronounced from horses than hikers (Bainbridge 1974; Hammitt and Cole 1987; Hendee et al. 1990), with soil compaction as much as 1,500 pounds per square inch exerted on the soil surface with each step (Hendee et al. 1990). Hikers tend to flatten vegetation while horses tend to chum up soil, thus cutting plants off at the rootstalk (Whittaker 1978). Trail widening is also a consideration as horses tend to walk on the downslope sides of trails (Whitson 1974), creating a much wider area of disturbance and increasing trail maintenance problems. This can increase the spread of previously established nonnative species by providing loose, disturbed soil for germination and spreading reproductive plant structures.

These impacts are unlikely to occur on the well-defined, gravel surface of the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System trails, which is why they have been designated for these uses. Although equestrians, cyclists, and joggers would be required to remain on designated trails, if some users travel off-trail to access the lakeshore, a scenic vista, or other points of interest, then the habitat impacts noted above would result from development of social trails. Use of social trails would also cause wildlife disturbance.

Control of invasive plant species on the Refuge is a difficult and never-ending challenge. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Horse droppings are a source of nonnative plant seeds that are capable of germination and growth on disturbed sites (Campbell and Gibson 2001). Bicycles are another potential seed dispersal mechanism. Refuge visitors can inadvertently carry propagules from invasive plants on their clothing or equipment, spreading those plants to new areas. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants on or near these trails would be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Impacts to Wildlife

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species

have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from these uses would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

General Response of Wildlife to Disturbance

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Burger (1999) as cited by Oberbillig (2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) conclude that a buffer zone of 330 feet would minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommend buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails. Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance.

Horseback Riding. Horseback riding may influence the behavior of various wildlife species. Observations by Owen (1973) and others suggest that many species of wildlife are habituated to livestock and are less likely to flee when approached by an observer on horseback than by an observer on foot. In one study (Owen 1973), equestrians could approach geese up to a distance of

150 feet without noticeable behavioral changes in the geese. This is compared to a suggested hiking trail distance of 250 feet (Miller et al. 1998).

Jogging. As cited in Bennett and Zuelke (1999), joggers and landscapers caused birds to flush more than fishermen, clammers, sunbathers, and some pedestrians, possibly because the former groups move quickly (joggers) or create more noise (landscapers). The latter groups tend to move more slowly or stay in one place for longer periods, and thus birds likely perceive these activities as less threatening (Burger 1981, 1986; Burger et al. 1995; Knight and Cole 1995). However, joggers tend to spend less time in a particular area than pedestrians and are less likely to directly approach or otherwise disturb wildlife. The effects of human disturbance can be reduced by restricting jogging to an established trail because wildlife show greater flight response to humans moving unpredictably than to humans following a distinct (and repeated) path (Gabrielsen and Smith 1995). Joggers would be restricted to an established, designated trail to prevent significant disturbance.

Bicycling. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than did other means of transportation. Stalmaster and Newman (1978) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Bicycling on designated trails is not anticipated to disturb wildlife because riders tend to stay on the trail and the noise source is predictable. In addition, group size would be limited by prohibiting special events and training on the Refuge, thereby reducing the potential for substantial disturbance to wildlife.

Potential Impacts to Priority Public Uses

Trails on public lands often attract a variety of user groups with conflicting needs. For instance, slow-moving uphill hikers may reduce the quality of experience of cyclists who enjoy the speed on a downhill single-track trail. Some trail users who meet horses or see, smell, or step in evidence of their use say it detracts from their experience (Watson et al. 1993), while some trail users may enjoy seeing and meeting horses. The number of encounters that create conflict at Deer Flat NWR is unknown. Horseback riding is an occasional use at Deer Flat NWR currently, and available parking for horse trailers would continue to limit its use. Should increased equestrian use of the Refuge result in conflicts for parking space, we will reassess the number of horses allowed on the Refuge at any given time.

Bicycles and horses using the same trail as pedestrians can sometimes create safety hazards for other visitors. Although user groups are not physically separated on the trails designated for bicycles and horses, the designated trails proposed for bicycles and horses are wide (between 12 and 20 feet), have good visibility, and should accommodate safe, shared use by pedestrians and joggers, as well as equestrians and bicyclists traveling at a safe speeds. If the number of trail users increases significantly, the potential for accidents or user group conflicts may also increase. Measures to reduce potential conflicts between equestrians and other user groups would include providing information at the trailhead kiosks, and in the Refuge's brochure that clearly indicates permitted users and rules of conduct. Providing signs that clearly indicate which users have the right-of-way would help mitigate conflict and is successfully utilized on other public lands in the area (e.g., Military Park in Boise). Trail etiquette signing would clearly state proper hierarchy of yields and other rules of the trail.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Horseback riding, jogging, and bicycling would be allowed only on designated trails to minimize disturbance to wildlife and pedestrian users. Designated trails would be:
    - Observation Hill Trail System in the North Side Recreation Area.
    - East Dike and Kingfisher Trails in the East Side Recreation Area.
    - Gotts Point Trail
- The Refuge would not improve designated trails or provide additional trails or facilities to accommodate increased use by equestrians, joggers, or cyclists.

- Horses and cyclists would be required to maintain safe speeds conducive to multitrail use. Pedestrians and bicyclists must yield to equestrians.
- Organized horseback, bicycling, or jogging groups of more than four riders may be permitted under an SUP issued to the group leader. Groups larger than 10 people would not be allowed to use the Refuge. Groups involved in competitive events or training for competitive events (e.g., cross-country training or cross-country meets) would not be allowed.
- Equestrians would be required to remain with their horses at all times and not tie a horse to any physical structure or vegetation while on the Refuge.
- Use would be restricted to daylight hours only.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff would monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, and conflicts between user groups. Monitoring data would be used to modify these stipulations or remove the use if necessary to ensure continued compatibility of these activities.

Justification

Horseback riding, jogging, and bicycling are not wildlife-dependent public uses of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.). However, these uses of the existing trails are secondary uses that can facilitate wildlife-dependent uses. Managed under the stipulations listed above, these uses are expected to result in only minor additional impacts to wildlife. Restricting the disturbance to an established trail would increase predictability of public use patterns on the Refuge, allowing wildlife to habituate to nonthreatening activities.

Although horseback riding, jogging, and bicycling can result in disturbance to wildlife, disturbance is expected to occur in limited areas of the Refuge. There are adequate amounts of undisturbed habitat available to wildlife for escape and cover.

It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge would not be measurably lessened from these activities. The relatively limited number of individuals expected to be adversely affected due to disturbance would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted. Thus,

allowing these uses to occur with stipulations would not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by:	_____	_____
	(Signature)	(Date)
Refuge Manager/ Project Leader Approval:	_____	_____
	(Signature)	(Date)

Concurrence:

Refuge Supervisor:	_____	_____
	(Signature)	(Date)
Regional Chief, National Wildlife Refuge System:	_____	_____
	(Signature)	(Date)

Document continues on next page.

B.4 Compatibility Determination for Hunting Deer

RMIS Database Uses: Hunting (deer)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge, respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assumed the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Hunting is considered a wildlife-dependent public use of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.) and must be given priority over nonwildlife-dependent uses. Despite the direct and indirect impacts associated with sport-hunting, regional deer populations are not likely to be affected significantly by hunting on the Snake River Islands or Lake Lowell Unit of the Refuge.

Deer hunting takes place between Parking Lot 8 and the New York Canal on Lake Lowell Unit and on all islands in the Snake River Islands Unit. A limited number of doe and buck tags are issued to hunters for use at Lake Lowell Unit. These hunters are also required to follow special conditions outlined in their Refuge hunt permit. The Snake River Islands fall within several big game hunting units and follow hunting regulations published by Oregon Department of Fish and Wildlife (ODFW) and Idaho Department of Fish and Game (IDFG) for the unit in which each island is located.

Proposed Changes to Described Uses

There are no changes proposed to the deer hunting program as described above.

Availability of Resources

The proposed deer hunt would not require any additional infrastructure. Hunter access to the proposed hunt area would be accommodated at existing Parking Lots 1 to 8 and from on-water access to the islands. Permanent blinds, additional trails, and roadway pullouts would not be constructed to support the hunt program. Hunter access would be restricted to pedestrian access only; all terrain vehicles (ATVs) and pack animals are not permitted.

Administration of the hunt program would add workload for existing staff. The Refuge would incur the annual expense of editing and producing media related to the deer hunting opportunity. Monitoring efforts would need to be increased to determine the program's impacts to Refuge deer populations and other Refuge resources. The simple administration of the program would add annual workload to the biological, management, and public use staff. It is expected that the Service and IDFG law enforcement personnel would assist with any enforcement-related problems. The Refuge has adequate staff and base funding to cover the additional workload and costs. For a breakdown of anticipated cost of the deer hunting program, see Table B-4.

Table B-4. Costs to Implement Improvements to the Deer Hunting Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Coordination with IDFG and program management		$5,000
Deer monitoring, resource monitoring, hunt plan updates, coordination, program management		$5,000
Coordination with IDFG and patrols		$5,000
*Outreach, production of media, program management	$7,000	$5,000
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Maintain signage		$300
Total	**$222,000-$227,000**	**$82,700**

Anticipated Impacts of the Use

Impacts to Habitat

Foot travel associated with deer hunting could potentially result in trampling of vegetation and minor impacts to subcanopy riparian cover. Since deer hunting would involve small numbers of spatially dispersed hunters, and primarily take place during the time of year when most understory plants are dormant, this activity would likely have little direct impact on any native plant species. Although impacts to habitats within the hunt area are expected to be minor, as noted above, other habitats could be impacted from increased grazing and browsing should deer move away from the hunt zone. The redistribution of deer from the hunting zone may increase deer density within other nearby suitable habitat areas. Through trampling and direct herbivory, habitat conditions could be reduced within riparian, shrub-steppe, and agricultural areas. Higher densities over prolonged times can have impacts to habitat structure as young plants are consumed, suppressing the number of potential recruits into older age classes.

Impacts to Soil and Water

Minimal disturbance is anticipated to soils and water due to the dispersed nature of the activity. Additionally, the hunt uses existing infrastructure for parking and pedestrian access.

Impacts to Wildlife

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species, only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from hunting would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Impacts of Hunting on Deer

Hunting by its nature results in the direct take of individual animals, as well as wounding and disturbance. In all cases, the Refuge would seek to minimize needless deer mortality, while providing a quality hunt experience. With regional deer populations exceeding 55,000 animals (McDonald 2011), deer hunting on Deer Flat NWR would not result in negative cumulate impacts to deer populations.

Deer hunting can have indirect impacts to habitat by reducing populations or redistributing deer, thereby changing densities of deer in a given area. Mule deer are largely dependent upon the fat stored during the spring, summer, and fall to survive winter. Even in the best winter range, deer lose

weight throughout the winter. A main strategy for winter survival is securing habitat with adequate thermal cover to conserve energy by becoming sedentary. Energy loss would be minimized by the presence of sufficient food resources in close proximity to cover habitat (IDFG 2010). Due to the limited number of hunters using the Snake River Islands for deer hunting and the existence of areas of Lake Lowell that are off limits to deer hunting, deer would continue to find adequate thermal cover.

Impacts to Nontarget Species

The activity of hunting deer on the Refuge could also disturb some wildlife species. Periodic firearm discharge in close proximity to wetlands or other waterfowl roosting and feeding areas can result in behavioral responses by waterfowl and other wetland birds. This disturbance would be limited in scope by the limited number of hunters in an area at any given time. The rate of gunfire disturbance is expected to be infrequent and random, based upon opportunistic individual shots or shot clusters at deer in range. The frequency of gunfire may be only a few shots per day causing temporary and short-term disturbance to wintering waterfowl and waterbirds.

The controlled deer hunt season may impose some short-term effects to wintering bald eagle use within hunted areas. Wintering populations of bald eagles have shown susceptibility to disturbance, resulting in disrupted foraging behavior and changes in social dynamics between other species in the avian scavenger guild (Skagen et al. 1991) and avoidance of areas with high disturbance (Stalmaster and Newman 1978). Stalmaster and Newman (1978) also found that recreational activities occurring within 250 meters of roosting and foraging areas resulted in changes in distribution patterns by displacement to areas of lower human activity. With regard to hunting, Stalmaster and Newman (1978) found that gunshots were the only noises that elicited overt escape behavior by eagles in their study. The areas open to hunting incorporate riparian woodlands that could serve as roosting habitat for wintering eagles. The hunted area at Lake Lowell is adjacent to an area that is used by bald eagles for foraging, potentially placing hunters within 250 meters of roosting and foraging eagles. As a result of hunting disturbance, perches and foraging areas within closed areas or islands with lower hunting pressure may see a higher frequency of eagle use during the hunt season.

Site selection and nesting activity for bald eagle nests and heron colonies may initiate in late January. The general hunting seasons are complete before this timeframe. If a late-season depredation hunt occurred at Lake Lowell Unit, a regulated number of hunters may be introduced to suitable habitat during this period. The depredation season is anticipated to have low hunter density, producing only few shots per depredation permit. The impact to nesting eagles and herons is not likely to be major. The framework of the depredation hunt additionally allows the Refuge to selectively close areas, as detected, to protect sensitive wildlife resources within the hunt area with spatial buffers. Resource buffers would be employed using current research to sufficiently safeguard nests or colonies from abandonment. As closures are implemented, the Refuge would supply hunt permit holders maps of closures to hunting activity.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Deer Flat NWR General Deer Hunt Stipulations

- Hunters must comply with the applicable provisions of State and Federal laws, as well as the hunting regulations of the State of Idaho.
- No permanent structures would be constructed on Service lands.
- Use of dogs to hunt or pursue big game is prohibited.
- No person including, but not limited to, a guide, guide service, outfitter, club, or other organization would provide assistance, services, or equipment on the Refuge to any other person for compensation unless such guide, guide service, outfitter, club, or organization has obtained a Special Use Permit from the Refuge.
- Hunting by aid of or distribution of any feed, salt, other mineral, or electronic device, including game cameras, is prohibited.

- Deer hunters may enter the Refuge no earlier than two hours before shooting time and must leave the Refuge within two hours after shooting time. Unless retrieving a deer, retrieval times extend five hours past shooting time.

Lake Lowell Unit Deer Hunt Stipulations

- Deer hunting is permitted only in the areas between the shoreline of Lake Lowell and the Refuge's southern boundary, and extending from Parking Lot 8 southeasterly to the New York Canal.
- The use of flagging, blazing, or trail-marking devices to locate hunting area(s) or for any other purpose is prohibited.
- Hunters must obtain a Refuge-specific permit to hunt deer on the Lake Lowell Unit of the Refuge, which must be signed and carried in the field while hunting.
- Deer hunting would be limited to short-ranged weapons, as allowed in IDFG Game Management Unit 38. These weapons currently include muzzleloaders, archery equipment, crossbow, shotgun using slugs or shot of size #00 buck or larger, or a handgun using straight-walled cartridge not originally developed for rifles.
- All Lake Lowell Unit deer hunting would be from temporary tree stands.
- Each hunter is allowed to install non-damaging portable tree stands up to the maximum number allowed under 50 C.F.R. 32. The tree stands may be erected on, or after, the first day of their hunting season and must be removed by the last day of their season. Hunters must permanently affix their name, contact phone number, and address to their deer stand(s).
- Use of nails, wires, screws, or bolts to attach a stand to a tree, or hunting from a tree into which a metal object has been driven, is prohibited.
- Lake Lowell Unit deer hunters must use a Fall-Arrest System (FAS)/Full Body Harness meeting Treestand Manufactures Association (TMA) standards while using a tree stand. It shall be unlawful to use a tree stand without permission of the owner.
- Lake Lowell Unit deer permit holders would be limited to designated parking areas. Access would be walk-in only from existing Parking Lots 1 through 8.
- Lake Lowell Unit hunting permit holders must be accompanied by a Refuge employee or State Game Warden to retrieve a wounded or expired deer from a Closed Area.
- Terrestrial-based stalking and/or still hunting is not permitted at any time. Shooting (firearm or bow) from the ground is not permitted, except to dispatch wounded deer.
- Deer drives are prohibited.

Justification

Hunting, when compatible, is defined as one of the priority public uses of the Refuge System by the National Wildlife Refuge System Improvement Act of 1997. The Refuge hunt program will be designed to provide a quality hunt and a safe experience, with a reasonable opportunity to harvest game species. No habitat degradation would be anticipated by continuing the deer hunt program; disturbance to birds and other wildlife, if any, would be temporary and localized, and ample amounts of additional quality habitat for these wildlife species exist on the Refuge. Thus, it is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge and local area would not be measurably lessened from hunting activities. The number of individuals expected to be removed from the deer population due to hunting would not impair the physiological condition and production of hunted species.

The Refuge environment includes wildlife, soils, vegetation, air quality, and water quality. Some disturbance to the Refuge environment is anticipated, but impacts would be minor due to the dispersed nature of the activity, entailing a limited number of participants over the duration of the hunt season. State and Federal regulations and Refuge-specific special conditions would help reduce or eliminate any unwanted impacts of the use to nontarget species. The Refuge would implement, as needed, spatial and/or temporal closures to protect sensitive nontarget wildlife resources such as eagle nests or wintering waterfowl. The proposed hunt is not anticipated to have any impact on threatened or endangered species, as none are known to occur in the hunting area.

Specific Refuge regulations help safeguard Refuge habitat and adjoining private property. Disturbance to other wildlife would occur, but this disturbance is generally short term, with sufficient habitat being present in adjacent areas. The deer harvest would not significantly affect the regional population of deer. For these reasons, deer hunting would not prevent the Refuge from fulfilling the purposes of the Fish and Wildlife Act, Executive Order 7655, the Migratory Bird Conservation Act, the Refuge Recreation Act, or the mission of the National Wildlife Refuge System for conserving, managing, restoring, and protecting wildlife resources. In addition, the proposed hunt is anticipated to have a positive benefit to adjoining agricultural lands by alleviating localized depredation impacts.

In summary, deer hunting at Deer Flat NWR would not have any significant impacts to hunted species, to the regional populations of these species, to the Refuge environment, to adjacent lands, or to nearby residents. By allowing public hunting, the Refuge is fulfilling the mission of the National Wildlife Refuge System by administering Refuge resources for the benefit of present and future generations. For these reasons, we have determined that deer hunting would not materially interfere with or detract from fulfilling Refuge purposes and the mission of the National Wildlife Refuge System.

Mandatory Re-evaluation Date

2028 Mandatory 15-year Re-evaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

References

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Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42:506-513.

Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.5 Compatibility Determination for Hunting Waterfowl and Upland Birds

RMIS Database Uses: Hunting (waterfowl), Hunting (upland bird), Hunting (other migratory birds)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future

generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Hunting is considered a wildlife-dependent public use of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.) and must be given priority over nonwildlife-dependent uses. Waterfowl, upland game bird, and other migratory bird hunting are defined as priority public uses under the National Wildlife Refuge Improvement Act of 1997 (Public Law 105-57). Despite the direct and indirect impacts associated with sport-hunting waterfowl, upland game birds, and other migratory birds, flyway populations are not likely to be affected significantly by the hunting program on the Refuge. Changes in regional land uses (e.g., agriculture versus housing) are more likely to influence population trends than localized hunting programs.

Waterfowl and upland game bird hunting is open on both units of the Refuge during the general seasons designated by the Idaho Department of Fish and Game (IDFG) or Oregon Department of Fish and Wildlife (ODFW) as appropriate. Regulations for these hunts generally follow the respective state's rules. Where the Snake River is the boundary between Idaho and Oregon, hunters from either state may hunt the islands according to the regulations of the state for which they are licensed. Hunters are allowed off-trail use within designated Refuge hunting areas. Nontoxic shot is required, and hunters may not possess lead shot in the field. While hunter use of these areas has not been closely monitored, the 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation showed that between 1996 and 2006, the number of state-resident hunters decreased by 33 percent (USFWS and U.S. Census Bureau 2007). Given this trend, it is unlikely that hunting would increase substantially in the near future. However, the number of hunters and their impacts would be monitored, and, if necessary, additional measures will be developed in coordination with IDFG and ODFW to protect Refuge resources.

Waterfowl Hunting on the Lake Lowell Unit

The Lake Lowell Unit falls completely within a goose hunting closure area designated by IDFG. Waterfowl hunting (duck, coot, and common snipe but excluding goose) takes place in the South Side Recreation Area between Parking Lots 1 and 8 and in the East Side Recreation Area from the Leavitt Tract to the east side of Gotts Point. Waterfowl seasons are consistent with the State season and typically start the first of October and run through the end of January. Lake Lowell is closed to recreational boaters during the hunting season. Walk-in hunting is allowed in both areas, and hunters may use a human- or electric-powered boat up to 200 yards from the shore in the South Side Recreation Area. An estimated 2,518 acres (24 percent) of the Lake Lowell Unit is open to waterfowl hunting. Hunters may use Parking Lots 1 through 8 to access the South Side Recreation Area. To access the East Side Recreation Area, hunters can use the Tio Parking Lot at the end of Tio Lane and park at the end of Greenhurst Road near Gotts Point. There were approximately 5,100 waterfowl hunting visits to the Refuge in the 2010 to 2011 hunting season.

Waterfowl Hunting on the Snake River Islands Unit

Currently all islands in the Snake River Islands Unit (approximately 1,200 acres) are open to waterfowl hunting (ducks, geese, coot, and common snipe). Waterfowl seasons are consistent with the State season and typically start the first of October and run through the end of January. No facilities are offered on any of the islands, but hunters are permitted to launch their boats from

various access points along both of the outer banks of the Snake River. Other public uses of the Snake River Islands Unit are thought to be low and would not conflict with this use.

Upland Game Bird Hunting on the Lake Lowell Unit

Upland game bird hunting (dove, ring-necked pheasant, California and bobwhite quail, and chukar and gray partridge) is allowed in both the South Side and East Side Recreation Areas at the Lake Lowell Unit. An estimated 2,518 acres of the Lake Lowell Unit is open to upland game bird hunting, though some portions are seasonally flooded. Seasons are consistent with the State seasons and typically start the first of September (for dove) and run through the end of January (for partridge). Hunters may use Parking Lots 1 through 8 to access the South Side Recreation Area. To access the East Side Recreation Area hunters can use the Tio Parking Lot at the end of Tio Lane and park at the end of Greenhurst Road near Gotts Point. Hunting is allowed in both the South Side Recreation Area and the East Side Recreation Area. Kingfisher Trail in the East Side Recreation Area is frequented by visitors other than hunters, which may cause minor conflicts. There were approximately 1,200 upland game bird hunting visits to the Refuge in the 2010 to 2011 hunting season.

Upland Game Bird Hunting on the Snake River Islands Unit

Upland game bird hunting (dove, ring-necked pheasant, California and bobwhite quail, and chukar and gray partridge) is allowed on all islands in the Snake River Islands Unit. Seasons are consistent with the State seasons and typically start the first of October and run through the end of January. No facilities are offered on any of the islands, but hunters are permitted to launch their boats from various access points on the Snake River. Other public uses of the Snake River Islands Unit are thought to be low and would not conflict with this use.

Proposed Changes to Described Uses

Under Preferred Alternative 2, hunting on Deer Flat NWR would not change from current conditions except for the following:

- Hunters would be required to stay out of any seasonal closures around important wildlife areas (e.g., shorebird feeding areas).
- Waterfowl hunting:
    - A limit of 25 shotgun shells per day per hunter would be implemented.
    - The waterfowl hunt season on Snake River Islands would be shortened if it is shown to be necessary by analysis/study of goose nesting.
    - The addition of a youth hunt would be allowed in a designated area east of Parking Lot 1.
    - An ADA-compliant hunting blind would be provided at appropriate location(s) available to parties with at least one IDFG-issued disabled hunt licensed hunter.

Availability of Resources

Deer Flat NWR is open to all of the priority, wildlife-dependent recreational activities, including hunting, and the infrastructure is there for all of these user groups. Improvements and projects described in the Preferred Alternative should increase the quality and safety of the Refuge hunt program. Most of the costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-5). Because the Service has limited capacity to staff

and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, installing a new accessible dock would benefit hunters, but the dock may also be used by visitors engaged in wildlife observation, photography, interpretation, and fishing. This same cost has been shown in all CDs that may use the new dock.

Table B-5. Costs to Implement Improvements to the Hunting Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install hunt area signs	$1,100	$300
*Install and maintain accessible hunting dock	$25,000	$2,000
*Install and maintain vault toilet at Parking Lot 1	$60,000	$1,500
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$301,000-$306,100**	**$66,200**

Anticipated Impacts of the Use

The discussion below analyzes impacts of the proposed use under Preferred Alternative 2.

General Impacts to Habitat

The primary impact hunters have on habitat is the trampling of vegetation and creation of social trails. Trail widening and creation of social trails increases the area of disturbed land (Adkison and Jackson 1996; Dale and Weaver 1974; Liddle 1975). Pedestrians can potentially cause structural damage to plants and increase soil compaction and erosion (DeLuca et al. 1998; Whittaker 1978). These impacts are unlikely to occur on the well-defined, gravel surface of Refuge trails; however, social trails associated with off-trail use remain an issue for refuge managers because plants are trampled and wildlife is disturbed. Because hunting requires off-trail use in the pursuit and/or recovery of game, this concern is difficult to mitigate.

Control of invasive plant species on the Refuge is a difficult and never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Propagules of nonnative plants can be transported into new areas on hunters' boots, clothing, dogs, and equipment. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants would be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Local Impacts to Waterfowl Habitat

The impact of waterfowl hunters on the waterfowl habitat of both Refuge units is expected to be minor. The hunting season starts and ends outside of the growing season of most plants, so trampling and the spread of invasive plants are not major issues. There is a possibility of boats used for waterfowl hunting aiding in the spread of aquatic invasive species into the waters of the Refuge. Informational media in hunting brochures, placards at Refuge launch areas, periodic inspections, and early detection monitoring help reduce the likelihood of infestation. The creation of social trails in

the soil may be more of an issue but is still expected to be minor because most hunters spread out in available habitat as a way to reduce overcrowding. Impacts to the water in waterfowl hunting come mostly from the deposition of trash (including shell casings) by hunters; this problem would be mitigated through proper law enforcement.

Local Impacts to Upland Bird Habitat

At current levels, impacts to upland bird habitat are expected to be minor. Neither unit of Deer Flat NWR is considered a destination hunt for upland bird hunters, and local use is relatively low compared to the surrounding area. The hunting season starts and ends outside of the growing season of most plants, so trampling and the spread of invasive plants are not expected to be major issues. The creation of social trails may be more of an issue but is still expected to be minor because most hunters follow the irregular patterns of their quarry.

Impacts to Wildlife

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from hunting would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

General Impacts to Wildlife

Hunting, by its nature, results in the intentional take of individual animals, as well as wounding and disturbance (DeLong 2002). It can also alter behavior (e.g., foraging time), population structure, and distribution patterns of wildlife (Bartelt 1987; Madsen 1995; Owens 1977; Raveling 1979; Thomas 1983; White-Robinson 1982). In addition to loss of individual target species, hunting causes disturbance to nontarget species because of noise (most notably the report of a firearm), human presence, and general disturbance associated with the activity. Hunting results in the increase of nontarget species being injured or killed (accidentally or intentionally) in addition to target species being crippled or killed and not retrieved. Disturbances to waterfowl caused by human activity (including hunting) are manifested by alertness, fright (obvious or unapparent), flight, swimming, disablement, or death in nontarget species (Korschgen and Dolgren 1992).

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more

difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain (as hunters do) than to humans following a distinct (and repeated) path.

Hunting can contribute indirectly to the well-being of wildlife by providing financial, educational, and sociological benefits to hunters. Hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of wildlife and habitat conservation, which ultimately contributes to the NWRS mission. The hunting community remains the largest support base for funding wildlife management programs, and refuges provide an opportunity for a high-quality waterfowl hunting experience to all citizens regardless of economic standing. Many individual refuges have developed extensive public information and education programs bringing hunters into contact with refuge activities and facilitating awareness of wildlife issues beyond hunting. Hunting is one of the six priority public uses of the NWRS.

Impacts of Hunting on Waterfowl

Waterfowl are wary, seeking refuge from all forms of disturbance but particularly those associated with loud noise and rapid movement (Korschgen and Dolgren 1992). Numerous studies show human activities associated with hunting (boating, vehicle disturbance, human presence) cause increased flight time in waterfowl species, which requires a considerable amount of energy (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Human disturbance compels waterfowl to change feeding habits, so that they may feed only at night or may desert feeding areas entirely, resulting in weight loss (Korschgen and Dolgren 1992).

The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi, and Atlantic). Idaho is included in the Pacific Flyway. A review of the policies, processes, and procedures for waterfowl hunting is covered in a number of documents.

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds be closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 C.F.R. 20) establishing the Migratory Bird Hunting Frameworks. The

frameworks are essentially permissive, in that hunting of migratory birds would not be permitted without them. Thus, in effect, annual Federal regulations both allow and limit the hunting of migratory birds. The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for states to select from, which should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (e.g., Flyway Study Committees, Flyway Councils, Service Regulations Committee) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, annual assessments used in establishing the Frameworks include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada. This survey is used to establish an annual Waterfowl Population Status Report. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program and the Parts Survey (in which biologists gather at "wing bees" to identify duck wings and goose tails submitted by hunters). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols determine the choice (package) of predetermined regulations (appropriate levels of harvest) that make up the framework offered to states that year. Each state's wildlife commission then selects season dates, bag limits, shooting hours, and other options from their respective Flyway package. Their selections can be more restrictive but cannot be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each state increases or decreases each year in accordance with the annual status of waterfowl populations.

Season dates and bag limits for national wildlife refuges open to hunting are never longer or larger than the state regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the state allows. Each national wildlife refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on migratory bird hunting.

Local Impacts to Waterfowl

Hunting on refuges as a whole or on Deer Flat Refuge specifically is not likely to have an adverse effect on the status of any recognized waterfowl population in North America. Several points support this contention: (1) the proportion of national waterfowl harvest that occurs on national wildlife refuges is small; (2) there are no waterfowl populations that occur wholly or exclusively on national wildlife refuges; (3) annual hunting regulations within the United States are established to levels consistent with the current population status; (4) refuges cannot permit more liberal seasons than provided for in Federal frameworks; and (5) there are sufficient sanctuaries that exist on the Lake Lowell Unit to allow for undisturbed feeding and resting.

Waterfowl hunting on the north side of Lake Lowell is allowed only in the East Side Recreation Area. There are two sanctuaries, one on the southeastern end of the lake and the other on the northeastern side of the West Pool. These are closed to public entry (with the exception of a small

number of permitted deer hunters in the southeastern sanctuary) throughout the year. These established sanctuaries on the Lake Lowell Unit in Refuge wetlands and fields ensure that wintering and migrating waterfowl, upland game birds, and other migratory birds, as well as nontarget species, can find food and rest areas on the Refuge even during the hunting season. Hunt regulations and sanctuary would be continually monitored and evaluated to ascertain their value in balancing the disturbance caused by allowing hunting on the Refuge. Under the stipulations outlined above, this activity does not materially detract from meeting Refuge purposes or the Refuge System mission. Refuge-specific regulations are designed to minimize impacts and would be evaluated for their effectiveness annually.

Population and Harvest Data: The Federal Harvest Information Program estimates that 16,800 hunters in Idaho spent an average of 102,700 days hunting and harvested 225,100 ducks annually from 2001 through 2010. Over that same time period, the harvest information program estimates Idaho hunters harvested 59,800 Canada geese annually. This is the third highest total in the Pacific Flyway, behind Oregon and Washington, respectively. The number of waterfowl harvested on Deer Flat NWR is unknown; however, it is thought to be a small percentage of total numbers harvested in the state and even smaller in the Flyway.

Wintering Populations: Waterfowl use in and around the Refuge has been well documented and has seen some changes over time. Long-time residents fondly recall when the skies around Lake Lowell used to be "black with ducks." Annual Refuge narratives mirror these sentiments with photos and documentation of duck numbers in excess of half a million during the peak of migration. Those numbers have not been seen in the Treasure Valley since the late 1970s, probably due to the advent of "clean farming," conversion of farmland to housing development, natural shifts in the Flyway, and/or a variety of other factors. Numbers of ducks and geese in the valley continue to provide a quality hunting experience, and Deer Flat NWR is a waterfowl hunting destination for both local and out-of-state hunters.

The staff at Deer Flat NWR has performed winter waterfowl surveys since 1951, including ground-based point counts on the Lake Lowell Unit and aerial surveys on both units. Because birds can move long distances over short periods of time during the winter migration, these surveys are not considered an accurate measurement. Regional and local population surveys like the one performed at the Refuge are best understood as an index (best used to measure trends over time) and not a true census at any particular time. In recent years (from 2001 to 2010) peak numbers of geese (typically seen in November) on the Lake Lowell Unit averaged 11,892 annually. In the same decade, peak numbers of ducks (typically seen in December) averaged 61,535 on Lake Lowell annually.

Local Impact to Upland Birds

Population and Harvest Data: IDFG personnel perform surveys for California quail, pheasant, chukar, and grey partridge and assist in the mourning dove call counts. IDFG's 2010 Upland Game Progress Report notes that populations of the species of upland game birds that are legal to hunt on Deer Flat NWR are considered stable. The Refuge does not contribute any significant harvest numbers to the total estimated for the southwest region of the state and even less statewide. Of the previously listed species, mourning doves and California quail are thought to be hunted most, because the other species are here intermittently due to marginal habitat or are escaped farmed birds that do not survive the hunting season or the winter. Refuge staff does not currently perform any inventory or monitoring for any of the upland game bird species.

Impacts to Nontarget Species

It is expected that impacts to nontarget species would be minimal because hunting seasons do not coincide with nesting seasons, so reproduction would not be reduced by hunting. Disturbance to the daily activities, such as feeding and resting, of wintering nonhunted birds might occur. Because the Refuge maintains sanctuary areas where no hunting is permitted, this effect is likely a minor negative effect. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any nontarget wildlife is not permitted. Although ingestion of lead shot by nonhunted wildlife could be a cumulative impact, it is not relevant at the Refuge because nontoxic shot would be required.

Potential Impacts to Priority Public Uses

Trails on public lands attract a variety of user groups who often have conflicting needs. During the scoping period, some of the public expressed safety concerns with hunters using the same trails and small public use areas that are also accessed by wildlife observers and photographers. However, it is believed that this conflict is not a major concern. Even though nonhunters use the same trails as hunters, the proposed designated trails for the former are wide (between 12 and 20 feet) and have adequate visibility. If the number of nonhunters using trails open to hunting increases significantly, the potential for accidents or user group conflicts may also increase. There is also the potential for conflict between nonhunters, waterfowl hunters, and upland hunters using the same off-trail areas. Conflicts between hunters and nonhunters and between different types of hunters would be monitored and addressed if necessary. Measures to reduce potential conflicts between hunters and other user groups would include providing information at the trailhead kiosks, and in the Refuge's brochure that clearly indicates permitted users and rules of conduct.

No significant effects to roads, trails, or other infrastructure from the hunting program are foreseen. Normal road, trail, and facility upkeep and maintenance would continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- All hunting on the Refuge would require the appropriate State license and would occur consistent with applicable regulations designated by IDFG or ODFW as appropriate.
- Waterfowl and upland hunting would be allowed in the East Side and South Side Recreation Areas of the Lake Lowell Unit. Walk-in hunting would be allowed in both areas, and hunters may use a human- or electric-powered boat up to 200 yards from the shore in the South Side Recreation Area. Waterfowl hunting would not be allowed on foot from the ice.
- Waterfowl and upland hunting would be allowed on all islands in the Snake River Islands Unit. Where the Snake River is the boundary between Idaho and Oregon, hunters from either state may hunt the islands according to the regulations of the state for which they are licensed.
- Hunters would be required to stay out of any seasonal closures around important wildlife areas (e.g., shorebird feeding areas).
- Hunters are allowed off-trail use within designated hunting areas.
- Hunting would be provided on a first-come, first-served basis. Hunters would be allowed to operate motorized vehicles only on designated roads and parking areas.
- Nontoxic shot is required, and hunters may not possess lead shot in the field.
- Dogs may be used for waterfowl and upland game hunting. Dogs must be leashed unless actively hunting and remain under strict voice control at all times.
- To improve safety and minimize conflict with other priority uses, signs would be posted at Refuge access points to notify Refuge users when a hunt is underway.
- Waterfowl hunting:
    - Although use of permanent blinds is prohibited, portable blinds are allowed if they are removed at the end of each day. Temporary blinds may be constructed from

natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis.
    - A limit of 25 shotgun shells per day per hunter would be implemented.
    - There may be a shortened waterfowl season on Snake River Islands if it is shown to be necessary by analysis/study of goose nesting.
    - Youth hunt would be allowed only in designated area east of Parking Lot 1.
    - Use would be restricted to waterfowl hunting shooting hours designated by IDFG or ODFW as appropriate.
    - There would be an evaluation to determine whether to charge a fee and/or institute a more structured hunt opportunity.
- Upland game bird hunting:
    - Use would be restricted to upland game bird hunting shooting hours designated by IDFG or ODFW as appropriate.
    - There would be an evaluation to determine whether to implement more restricted hunting hours to reduce conflicts with waterfowl hunters.
- Open fires would be prohibited.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff would monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data would be used to modify these stipulations if necessary to ensure continued compatibility of these activities. Adjustments to timing of upland hunting or the use of hunt areas by nonhunters may be needed to ensure the use remains safe and compatible.

Justification

By following established State guidelines, implementing stipulations, and maintaining closed areas, this waterfowl and upland game bird hunting program would not interfere with the Refuge achieving its purposes of providing sanctuary and as a refuge and breeding grounds for migratory birds and other wildlife. It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge would not be measurably lessened from allowing hunting to occur on the Refuge. The relatively limited number of individuals expected to be adversely affected due to hunting would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be

negatively impacted. Thus, allowing hunting to occur with stipulations would not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Re-evaluation Date

2028 Mandatory 15-year Re-evaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.6 Compatibility Determination for Recreational Boating

RMIS Database Use: Boating (motorized, human powered, electric, and wind-driven)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

This CD addresses the subject uses for the Lake Lowell Unit of the Refuge. The Service's jurisdiction over surface water uses on the Snake River Islands Unit is limited to areas above mean high water. Since there are no navigable areas above mean high water, recreational boating is not allowed on the Snake River Islands Unit.

Types of Boating

Recreational boating addressed in this CD includes use of motorized (jetboats, outboard and inboard motorboats, personal watercraft), human-powered (kayaks, canoes, paddleboards, rowboats, float-tubes), and electric/wind-driven (boats powered by trolling motors, sailboats, windsurfing boards, and kiteboards) craft on all waters of the Lake Lowell Unit. Tow-behind activities (e.g., waterskiing, wake boarding) are allowed in areas open to wake (see below) activities.

Boating itself is not considered a wildlife-dependent public use. However, it occurs as an integral part of wildlife-dependent public uses such as hunting, fishing, wildlife observation, and photography.

Current Location of Use

Boating producing a wake is allowable anywhere in the lake during the summer season (see below). Only no-wake boating may occur in the zone east from the line between Parking Lot 1 and the shore to the northeast. No boats are allowed in a closed area around the osprey nesting platform south of the Visitor Center.

Associated Facilities

There are five boat launches, consisting of the launches at Upper Dam East, Upper Dam West, Lower Dam Recreation Area, and Parking Lots 1 and 7. Individuals can also launch human-powered boats from a variety of formal and informal locations along the shore.

Number of Visitors and Seasonal Patterns

In it is estimated that there were 76,400 nonwildlife-dependent recreational boating visits to Lake Lowell in FY11 with a majority of these being motorized boats. In FY11, approximately 35 percent of the boaters were anglers, and the rest were participating in other recreational activities.

Boating is allowed on the Refuge between April 15 and September 30, during daylight hours only. Lake Lowell is closed to recreational boating during the winter waterfowl season to provide refuge to migrating waterfowl in closed areas and high-quality hunts in open areas. Motorized boat use peaks in July before tapering off in the fall. Declining water levels often require closure of the Upper Dam West and Lower Dam Recreation Area boat launches in July or August. The water quality of the lake is also a concern to recreationists and partially accounts for falling use in August and September, since green and potentially toxic blue-green algae blooms are frequent in the late summer and early fall.

Proposed Uses

Under the Preferred Alternative 2, the Refuge would continue to provide recreational boating opportunities with an emphasis on supporting wildlife-dependent priority public uses. Boating would be allowed as follows (see Map 5):

- The no-wake zone on the east end of the lake would be expanded to go east from a line between Parking Lot 1 and Gotts Point rather than east from a line between Parking Lot 1 and the shore to the northeast.
- To protect emergent beds for nesting grebes and other wildlife, institute the following no-wake zones or closures:
    - Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.
    - No-wake area in Narrows between East Pool and West Pool (see Map 5).
    - Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony would be reopened. Upland portions of the closures would be open to use from October 1 through January 31.
- The following seasonal closures would be implemented at the Lake Lowell Unit as necessary to protect sensitive wildlife habitat:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - Winter waterfowl closure at Gotts Point from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- To protect mudflat habitat and migrating shorebirds, institute the following closures.
    - Shorebird area at northern shoreline of the East Pool east of Tio Lane access (see Map 5) would be open to boating April 15 through July 14 and closed seasonally (July 15 through September 30) when water level falls below 2,522 feet in elevation.
- Tow-behind activities (e.g., waterskiing, wake boarding) would be allowed in areas open to wake activities.
- Kiteboarders and windsurfers would be allowed to launch from any open shoreline but must comply with speed limit in no-wake zones.
- A kayak/canoe launch at Gotts Point would be provided for access to prime wildlife-observation areas.

Availability of Resources

Deer Flat NWR is open to a variety of recreational boating opportunities under the Preferred Alternative. Most of the costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-6). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Currently, most on-water law enforcement and boating-related dock maintenance is provided by the Canyon County Sheriff's Department. If the Sheriff's Department ever decided to discontinue this

assistance, there would be additional costs associated with maintaining this use. Because the Sheriff's Department is not currently able to provide law enforcement for Refuge specific regulations, it will be important for the Refuge to increase its law enforcement presence and/or work with Canyon County to enable County deputies to enforce these regulations.

Funding would be sought through the Service budget process. Other sources would be sought through strengthened partnerships, grants, coordination with other law enforcement agencies, and additional Refuge operations funding to support a safe, quality public use program. Increased volunteer assistance, strengthened existing partnerships, and new partnerships would be sought to support these programs in an effective, safe, and compatible manner. Refuge staff would increase volunteer recruitment efforts. When provided appropriate training, volunteers, interns, and various user groups can assist the Refuge with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, rehabilitating the Lower Dam Recreation Area would benefit boaters but it would also benefit picnickers, swimmers, fisherman, and other visitors. This same cost has been shown in all CDs that may use the new Lower Dam Recreation Area.

Table B-6. Costs to Implement Improvements to the Recreational Boating Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Visitor contact station	$480,000	$1,600
*Install and maintain comfort station and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Print/reprint general Refuge brochures	$3,200	$800
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	$5,200
*Install and maintain buoys for seasonal closures and permanent no-wake areas	$4,300	$500
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$1,197,700**	**$76,200**

Anticipated Impacts of Use

The discussion below analyzes impacts of the use as proposed under Preferred Alternative 2.

The Lake Lowell Unit of Deer Flat National Wildlife Refuge provides valuable nesting, foraging, and resting habitat for migratory birds, including wintering waterfowl, shorebirds, secretive marsh birds, and other waterbirds. The lake is open to recreational use during critical nesting times for a variety of avian species.

General Impacts to Wildlife

Disturbance Effects: Both motorized and nonmotorized boating have been shown to change wildlife distribution and use of particular habitats, alter feeding behavior and nutritional status, and cause premature departure from desirable habitat (Bouffard 1982; Kaiser and Fritzell 1984; Korschgen et al. 1985). Studies have also shown that boating disturbance may cause increased flight time and flushing distances in waterfowl species (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Wildlife species that are more sensitive to recreation-related disturbances (e.g., bald eagles, shorebirds, grebes) may find it increasingly difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented by disturbance (Burger 1997; Pfister et al. 1992; Skagen et al. 1991).

Motorized boats can cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting a greater area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (Huffman 1999). However, canoes and kayaks can cause measurable disturbance effects because they can access shallower and more densely vegetated areas of a marsh (Speight 1973). Slow-moving boats in close proximity to nesting great blue herons can cause temporary nest abandonment (Vos et al. 1985), and Huffman (1999) found that nonmotorized boats within 30 meters (98 feet) of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore. There have been several studies documenting impacts to birds native to Deer Flat NWR. One study showed a decrease in use of a bald eagle feeding site when human activity (including motorized boating) occurred within 200 meters (Skagen 1980). Another disturbance study showed that motorboats were more likely to elicit responses in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). Rodgers and Schwikert (2002) measured flushing distances from motorized watercraft for 23 waterbird species, of which the great blue heron was one of the more sensitive, flushing between distances of 8 and 137 meters.

Effects to Water Quality

In addition to noise and speed, motorized boats pollute waters with gas and oil. Older two-stroke engines, in which the gas and oil are combined, can discharge as much as 25 percent of the unspent mixture gas directly into the water. Hydrocarbons in gas and oil float on the surface of the water and bioaccumulate in the food web, posing a threat to sensitive shallow lacustrine habitats (Tjarnlund et al. 1995). Hoffman (1998) reviewed several studies, concluding that petroleum hydrocarbons can also be transferred to eggs from the plumage of incubating birds and can be toxic even in small amounts.

There is a possibility of boats aiding in the spread of aquatic invasive species into the waters of the Refuge. Informational media in hunting brochures, placards at launch sites (including Refuge launches), registration requirements, systematic and periodic inspections, and early detection monitoring help reduce the likelihood of infestation. The Idaho State Department of Agriculture is at the forefront of preventing the spread of aquatic invasive species into the waters of Idaho and works in concert with various agencies including the Service.

Refuge-specific Impacts

This section evaluates the likely impact at the Refuge, considering the scientific studies discussed above and considering the uses within the context of Deer Flat Refuge.

Loss of Habitat from Facility Construction: In the Preferred Alternative, the addition of three fishing docks and one shorebird viewing blind is expected to affect approximately 5 acres or less of open water habitat.

Vegetation, Soil, and Water Impacts: As described above, the potential for water quality impacts and contaminants in the food web stemming from the release of gas and oil hydrocarbons into Refuge waters would continue to exist. The Refuge would promote the use of CARB star-rated motors at the level of two stars and above to reduce impacts from petroleum hydrocarbons. A total maximum daily load (TMDL) assessment for the Lake Lowell watershed was prepared by the Idaho Department of Environmental Quality (IDEQ) that explored water quality concerns in Lake Lowell. Petroleum hydrocarbon pollution from boats was not explored in the TMDL because the focus was on pollution loads associated with agriculture runoff and other nonpoint sources. Even though oil and grease are listed as pollutants of concern in the Boise River (Lower) Subbasin Hydrologic Subunit, dissolved oxygen, sediment, and nutrients are the focus of the TMDL, because the presence of these pollutants at current levels likely render hydrocarbon levels insignificant (IDEQ 2010).

Disturbance Effects to Wintering and Migrating Wildlife: The wintertime closure is expected to adequately protect wintering and migrating birds using Lake Lowell. It is critical for waterfowl to conserve energy during migration and the cold winter months. Closed areas provide unmolested space for birds as they are resting and refueling for the journey ahead of them.

Disturbance Effects to Colonial-nesting Birds: Colonial-nesting birds at Lake Lowell may be among the most sensitive species subjected to potential disturbance from boating. Lake Lowell is one of only three lakes in Idaho that routinely hosts colonies of nesting western and Clark's grebes, whose breeding population is considered imperiled in the state (IDFG 2005). Idaho Fish and Game has printed pamphlets for public distribution that provide information on conflicts between boaters and grebes and the importance of responsible boating. High-speed boating displaces grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (pers. comm. D. Anderson, as cited in Ivey 2004), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Shaw 1998; Storer and Nuechterlein 1992).

Disturbance Effects to Other Species: The Lake Lowell Unit includes riparian forest, emergent vegetation, and open water habitats that are used extensively by a variety of bird species. The disturbance effects to wildlife described in the General Impacts section above applies to the anticipated effects to wildlife on Deer Flat NWR. It is anticipated that wildlife species using the open water and emergent plant habitats of the Refuge would benefit from the reduced disturbances that restricted use areas would provide.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is

currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from boating would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Impacts to Priority Public Uses

Boating, whether motor-, wind-, or human-powered, may provide additional wildlife-dependent recreational opportunities by opening up areas of the Refuge inaccessible to foot traffic. However, as described above, given the tendency of birds to flush when subjected to a high intensity of disturbance, wildlife viewing opportunities would be expected to be poor in wake zones between April and September.

The majority of habitats used by priority species on the Refuge can be protected from undue impacts by separating boat use from wildlife use in time and space. During winter, nearly the entire lake would be protected from motorized boating use, providing protection during this season. During the breeding season, an adequate amount of habitat would be available to the majority of waterfowl and other wetland birds because nesting areas for the most sensitive wildlife species would be closed to boating; some additional areas used for nesting, feeding, and resting would be encompassed in no-wake zones. The Stipulations section below also provides parameters under which this use can be allowed in order to ensure compatibility.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____	Use is Not Compatible
X	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Boaters must abide by all applicable Refuge, U.S. Coast Guard, and State of Idaho laws.
- Boaters would not be allowed to anchor or pull onto land adjacent to closed areas.
- No competitive or group activities are allowed.
- To minimize disturbance to shoreline vegetation and on-water nesting species, no internal or external wake generating devices (e.g., ballasts) would be allowed on motorized boats.
- Boats that are specifically designed to operate in mud or emergent vegetation, using above-water propulsion devices (e.g., boats equipped with "mud motors" or air boats) are not permitted on the Refuge.
- To reduce the likelihood of introducing invasive species, the use of internal or external ballasts would not be allowed.
- To minimize noise disturbance to wildlife, Idaho State noise ordinances would be enforced on Lake Lowell.
- Promote the use of CARB star-rated motors at the level of two stars and above.
- Use would be restricted to daylight hours only.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- Refuge staff would monitor impacts of boating activities annually to assess compliance with these stipulations, impacts to waterfowl, shorebirds, waterbirds (especially *Aechmophorus*

grebes), and other migratory birds as well as wildlife habitat, and conflicts between user groups. Monitoring data would be used to modify these stipulations if necessary to ensure continued compatibility of these activities.

Justification

Providing opportunities for priority wildlife-dependent recreational activities is in keeping with provisions under the National Wildlife Refuge System Administration Act of 1966 as amended. Although boating itself is not a wildlife-dependent recreational activity, wildlife-dependent activities like fishing and wildlife observation may be enhanced with boating.

A significant proportion of Lake Lowell Unit visitors are boaters. Educational programs targeting boaters on Lake Lowell are expected to help reduce the negative impacts associated with boating activities. Nonwildlife-dependent boating visitors provide the opportunity for the Refuge to reach out to nontraditional Refuge user groups and to encourage boating users to observe wildlife and to learn about the National Wildlife Refuge System. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many people, boating at Lake Lowell may provide an introduction to a national wildlife refuge.

Although motorized boating has been documented to impact wildlife and the habitats on which they rely, implementing the stipulations described above would reduce these impacts. It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge would not be measurably lessened from allowing boating to occur on the Refuge. With the proposed protections in place, number of individuals expected to be adversely affected due to boating would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted. Thus, allowing boating to occur with stipulations would not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.7 Compatibility Determination for Research

RMIS Database Use: Research

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

The Refuge staff receives periodic requests from non-Service entities (e.g., universities, State or Territorial agencies, other Federal agencies, nongovernmental organizations) to conduct research, scientific collecting, and surveys on Refuge lands. These project requests can involve a wide range of natural and cultural resources as well as public-use management issues including basic absence/presence surveys, collection of new species for identification, habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, bioprospecting, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific or Refuge-specific, or they may evaluate the relative contribution of the Refuge lands to larger landscapes (e.g., ecoregion, region, flyway, national, international), issues, and trends.

The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses (603 FW 1.10D(4)) policies indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to Refuge-specific needs for resource and/or wilderness management goals and objectives, where applicable, would be given a higher priority over other requests.

Availability of Resources

Refuge staff responsibilities for projects by non-Service entities would be primarily be limited to the following: review of proposals, prepare SUPs and other compliance documents (e.g., for Section 7 of the Endangered Species Act of 1973, Section 106 of the National Historic Preservation Act), and monitor project implementation to ensure that impacts and conflicts remain within acceptable levels (compatibility) over time. Additional administrative, logistical, and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare a SUP) and annually reoccurring tasks by Refuge staff and other Service employees would be determined for each project. Sufficient funding in the general operating budget of the Refuge must be available to cover expenses for these projects. In cases where the Refuge staff is asked to act as a cooperator on research projects, funding may be cost-shared or specially designated funds may be used for the operation and administration of the projects. The terms and conditions for funding and staff support necessary to administer each project on the Refuge would be clearly stated in every SUP.

The Refuge has the following staffing and funding to administratively support and monitor research that is currently taking place on Refuge lands (see Table B-7). Any substantial increase in the number of projects would create a need for additional resources to oversee the administration and monitoring of the investigators and their projects. Any substantial additional costs above those itemized below may result in finding a project not compatible unless expenses are offset by the investigator(s), sponsoring agency, or organization.

New costs associated with carrying out the enhanced research, inventory, and assessment programs includes annual costs to hire a biological technician to carry out Refuge projects, and one-time costs that would be provided to contractors tasked with specific projects. New research, inventory, and assessment needs as described in the Preferred Alternative are listed in Table B-7. Because the

Service has limited capacity to fund new positions and projects, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities that would be affected by the research. For instance, studies that determine the quality of wildlife-dependent recreation opportunities would help the Refuge better manage these uses and improve programs. Therefore, the cost would also be reflected in the CDs for each of the wildlife-dependent uses.

Table B-7. Costs to Implement Enhanced Research, Inventory, and Assessment Projects

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Hire biological technician, who would conduct: • breeding and migratory bird inventories of shrub steppe and riparian habitats • inventory of wildlife use of wetlands • early detection of and rapid response to new/spreading invasive plants/animals • collecting baseline habitat and wildlife information • waterfowl, shorebird, ground-nesting birds, passerines, and grebe surveys, Biological technician would assist with the following research, monitoring, and information assessment projects: • human/wildlife interaction disturbance studies o prioritization of Refuge islands for wildlife value • analyzing historic biological data to assess long-term population trends • contaminants studies • mule deer studies • cheatgrass removal studies • surveys of wetland topography • soil surveys of shrub steppe and creation of GIS mapping layers		$51,000
*Disturbance studies		
Prioritization of Refuge islands		
Analysis of historical biological data		
Contaminants studies	$450,000	
Mule deer studies		
Cheatgrass removal studies		
Wetland topography surveys		
Soil surveys of shrub-steppe and creation of GIS mapping layers		
*Quality of Wildlife-dependent public use programs	$75,000-$80,000	
Total	**$525,000-$530,000**	**$51,000**

Anticipated Impacts of the Use

Use of the Refuge to conduct research, scientific collecting, and surveys would generally provide information that would benefit fish, wildlife, plants, and their habitats. Scientific findings gained

through these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, wilderness, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings would contribute to resource management and that the project cannot be conducted off of Refuge lands for the project to be compatible. The investigator(s) must identify in advance methods/strategies required to minimize or eliminate the potential impact(s) and conflict(s). If unacceptable impacts cannot be avoided, then the project would not be compatible. Projects that represent public or private economic use of the natural resources of any national wildlife refuge (e.g., bioprospecting), in accordance with 16 U.S.C. 715s, must contribute to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission to be compatible (50 C.F.R. 29.1).

Impacts would be project- and site-specific, where they would vary depending upon nature and scope of the fieldwork. Data collection techniques would generally have minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of nonindigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection would have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) would be collected for identification and/or experimentation and statistical analysis. Where possible, researchers would coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another research examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Investigator(s) obtaining required State and Federal collecting permits would also ensure minimal impacts to fish, wildlife, plants, and their habitats. If after incorporating the above strategies a project would still result in long-term or cumulative effects, the project would not be considered compatible. A Section 7 consultation under the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884, as amended, Public Law 93-205) would be required for activities that may affect a federally listed species and/or critical habitat. Only projects that have no effect or would result in not likely to adversely affect determinations would be considered compatible.

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it would be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. If after all practical measures are taken and unacceptable spread of invasive species is anticipated to occur, then the project would be found not compatible without a restoration or mitigation plan.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a projects (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the

public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) would usually be localized and temporary in nature. When long-term or cumulative unacceptable effects cannot be avoided, the project would not be found compatible.

At least six months before initiation of fieldwork (unless an exception is made by prior approval of the Refuge Manager), project investigator(s) must submit a detailed proposal using a format provided by the Refuge. Project proposals would be reviewed by Refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to benefits of the investigation to Refuge management issues and understanding of natural systems. This assessment would form the primary basis for allowing or denying a specific project. Projects that result in unacceptable Refuge impacts would not be found compatible. If allowed and found compatible after approval, all projects also would be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.

If the proposal is approved, then the Refuge Manager would issue a SUP with required stipulations (terms and conditions) of the project to avoid and/or minimize potential impacts to Refuge resources as well as conflicts with other public-use activities and Refuge field management operations. After approval, projects also are monitored during implementation to ensure impacts and conflicts remain within acceptable levels based upon documented stipulations.

The combination of stipulations identified above and conditions included in any SUP would ensure that proposed projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. As a result, these projects would help fulfill the Refuge's purposes; contribute to the mission of the NWRS; and maintain the biological integrity, diversity, and environmental health of the Refuge.

Projects that are not covered by the CCP (objectives under Goal 6, Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources) would require additional NEPA documentation.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
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- Over 1,000 comments were received

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- Provided informational presentations to 28 local organizations
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- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____	Use is Not Compatible
X	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Each project would require a SUP. Annual or other short-term SUPs are preferred; however, some permits would be a longer period, if needed, to allow completion of the project. All SUPs would have a definite termination date in accordance with 5 RM 17.11. Renewals would be subject to the Refuge Manager's review and approval based timely submission of and content in progress reports, compliance with SUP stipulations, and required permits.

- Projects would adhere to scientifically defensible protocols for data collection, where available and applicable.
- Investigators must possess appropriate and comply with conditions of State and Federal permits for their projects.
- If unacceptable impacts to natural resources or conflicts arise or are documented by the Refuge staff, then the Refuge Manager can suspend, modify conditions of, or terminate an ongoing project already permitted by SUP on the Refuge.
- Progress reports are required at least annually for multiple-year projects. The minimum required elements for a progress report would be provided to investigator(s).
- Final reports are due one year after completion of the project unless negotiated otherwise with the Refuge Manager.
- Continuation of existing projects would require approval by the Refuge Manager.
- The Refuge staff would be given the opportunity to review draft manuscript(s) from the project before manuscripts are submitted to a scientific journal(s) for consideration of publication.
- The Refuge staff would be provided with copies (reprints) of all publications resulting from a Refuge project.
- The Refuge staff would be provided with copies of raw data (preferably electronic database format) at the conclusion of the project.

- Upon completion of the project or annually, all equipment and markers (unless required for long-term projects), must be removed and sites must restored to the Refuge Manager's satisfaction. Conditions for clean-up and removal of equipment and physical markers would be stipulated in the SUP.
- All samples collected on Refuge lands are the property of the Service even while in the possession of the investigator(s). Any future work with previously collected samples not clearly identified in the project proposal would require submission of a subsequent proposal for review and approval. In addition, a new SUP would be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a memorandum of understanding would be necessary.
- Sampling equipment as well as investigator clothing and vehicles (e.g., all-terrain vehicles, boats) would be thoroughly cleaned (free of dirt and plant material) before being allowed for use Refuge lands to prevent the introduction and/or spread of pests. Where necessary, quarantine methods would be used.
- The NWRS, Deer Flat Refuge, Refuge staff and other Service personnel that supported or contributed to the project would be appropriately cited and acknowledged in all written and oral presentations resulting from projects on Refuge lands.
- At any time, Refuge staff may accompany investigator(s) in the field.
- Any proposed project in wilderness areas must comply with provisions of an existing minimum requirements analysis (MRA). Investigators not acting as agents of Service and requesting to conduct projects in wilderness must prepare an MRA consistent with Service Policy and adhere to the requirements of the Wilderness Act of 1964 (16 U.S.C. 1131-1136).
- Investigator(s) and support staff would follow all Refuge-specific regulations that specify access and travel on the Refuge.

Justification

Research, scientific collecting, and surveys on Refuge lands are inherently valuable to the Service because they expand scientific information available for resource management decisions. In addition, only projects that directly or indirectly contribute to the enhancement, protection, use, preservation, and management of Refuge wildlife populations and their habitats generally would be authorized on Refuge lands. In many cases, if it were not for the Refuge staff providing access to Refuge lands and waters along with some support, the project would never occur and less scientific information would be available to the Service to aid in managing and conserving the Refuge resources. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species that could be disturbed during the use would find sufficient food resources and resting places so their abundance and use would not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, would prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects would not materially interfere with or detract from fulfilling the Refuge's purposes (including wilderness); contributing to the mission of the NWRS; and maintaining the biological integrity, diversity, and environmental health of the Refuge.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

X Environmental Impact Statement and Record of Decision

Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.8 Compatibility Determination for Swimming, Beach Use, and Picnicking (including Lower Dam Recreation Area Use)

RMIS Database Use: Swimming and beach use, Picnicking

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future

generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Swimming, sunbathing, and picnicking on easily accessible beaches are popular activities during the summer months at the Lake Lowell Unit. There are two designated, buoyed swimming areas: at the east end of the Upper Dam and at the Lower Dam Recreation Area. At the Upper Dam designated swimming area, the buoy line is stretched between two docks used by swimmers and sunbathers. There is a buoy line running parallel to the beach at the Lower Dam Recreation Area as well. Swimming is common at both of these areas but also occurs from any open shoreline. Visitors also regularly swim from and sunbathe on boats in the open water at Gotts Point and at Parking Lot 7.

The most popular swimming areas at the Upper and Lower Dams are in close proximity to the dams and water control structures associated with those dams. Signs and buoys are posted near these structures to warn swimmers about the dangers of swimming near the outlets or jumping off the control structures.

Proposed Uses

In the Preferred Alternative, swimming and beach use would be allowed in the existing area near the Upper Dam and at a designated swimming area at the Lower Dam Recreation Area. Swimming would also be allowed in the open water of Lake Lowell from boats outside of no-wake zones. In order to separate swimmers and beach users from anglers, who are to be given priority under the National Wildlife Refuge Administration Act of 1966, as amended, and to improve emergency response to swimming-related incidents, swimming from shore would not be allowed outside of the designated swimming areas. Although there have been several drowning-related incidents (mostly near-drownings, but there was one swimming fatality in Fiscal Year 2011) at Lake Lowell in the past few years, the Refuge is hopeful that limiting shoreline access to swimming to designated areas that are easily accessible to rescue personnel would help to minimize safety issues. There would be no lifeguards stationed at the swimming areas. Efforts would also be made at the Upper Dam swim area to further separate swimmers and beach users from anglers by strategic placement of docks and enforcement of designated areas.

Availability of Resources

Deer Flat NWR is open to swimming at the Upper Dam East and Lower Dam Recreation Areas under the Preferred Alternative. Most of the costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-8). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts. Increased volunteer assistance, strengthened existing partnerships, and new partnerships would be sought to support these programs in an effective, safe, and compatible manner. Refuge staff would increase volunteer recruitment efforts. When provided appropriate training, volunteers, interns, and various user groups can assist the Refuge with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses. The Refuge currently maintains swimming buoys within current funding levels.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, rehabilitating the Lower Dam Recreation Area would benefit swimmers and picnickers, but it would also benefit boaters, fisherman, and other visitors. This same cost has been shown in all CDs that may use the new docks.

Table B-8. Costs to Implement Improvements for Lower Dam Recreation Area Users, Swimmers, and Beach Users

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Print/reprint general Refuge brochures	$3,200	$800
*Construct and maintain a visitor contact station	$480,000	$1,600
*Install and maintain comfort station at Lower Dam Recreation Area (LDRA)	$150,000	$1,500
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Construct and maintain a nature play area	$40,000	
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Volunteer coordinator to manage enough volunteers for additional outreach at LDRA		$51,000
*Law enforcement officer		$62,400
Total	**$1,024,200**	**$120,000**

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use as proposed under Preferred Alternative 2.

General Response of Wildlife to Disturbance

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits, to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals

seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Burger (1999 as cited by Oberbillig 2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of 330 feet would minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommended buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails.

Although swimming areas often include erratic movement and elevated human noise levels, the designated swimming areas on Lake Lowell are not of great concern for wildlife concentrations. Keeping shoreline swimming contained to designated areas will reduce the amount of wildlife disturbance associated with the activity. The park-like features of the Lower Dam Recreation Area as well as the open water of the Lake Lowell attract wintering and migrating geese in the fall, winter, and early spring. In order to eliminate impacts to wintering and migrating waterfowl in both of these areas, the lake and Lower Dam Recreation Area are closed to all activities October 1 through April 14, with the exception of hunting and fishing within 200 yards of certain shoreline areas during a portion of the closure.

Impacts to Habitat

With use restricted to designated beaches, there would be only minimal disturbance to habitat. However, illegal activities on designated beaches do pose threats to wildlife. Litter and human waste are expected problems as well as trespass in the form of visitors violating the daylight-hours-only regulation. Wildfires resulting from beach users are another threat, with fire ignitions potentially resulting from campfires, fireworks, or other sources. Campfires and use of fireworks, although prohibited, have historically occurred on the beaches and pose a significant threat to habitat and wildlife resources.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from swimming and beach use would

be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Human Health

Although there have been several drowning-related incidents (mostly near-drownings, but there was one swimming fatality in Fiscal Year 2011) at Lake Lowell in the past few years, the Refuge is hopeful that limiting shoreline access to swimming to designated areas that are easily accessible to rescue personnel would help to minimize safety issues. There would be no lifeguards stationed at the swimming areas.

There are human health concerns related to swimming in Lake Lowell. During certain conditions, blue-green algae, the parasites that cause swimmer's itch, and fecal coliform levels can exceed State health standards. The Refuge would work with the Idaho Department of Environmental Quality (IDEQ) and Southwest District Health (SDH) to monitor water quality and, if necessary, close the swimming beaches. When testing at the swimming beach indicates health concerns, testing would also be conducted at other sites around the lake, and the Refuge would work with IDEQ and SDH to institute warnings and closures about water contact at other locations around the lake.

Impact to Priority Public Uses

Swimming and beach use are not wildlife-dependent or priority public uses as designated by the National Wildlife Refuge Administration Act of 1966, as amended. In areas where swimming and beach use occur regularly, fishing is essentially precluded by the noise and commotion, which are not conducive to catching fish or a quality fishing experience. Wildlife observation, education, and interpretation are priority uses that can also be negatively impacted by the presence of swimmers and other beach users.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
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Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____	Use is Not Compatible
X	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Beach activities, including picnicking, would be permitted only in designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area from April 15 through September 30. Swimming would be allowed in these designated areas as well as in the open waters of Lake Lowell from boats outside of no-wake zones.
- Designated swim beaches would be monitored for water quality affecting human health.
- Nonwildlife-dependent group events (e.g., weddings, birthday parties, memorial services, retreats) would be allowed only at the Lower Dam Recreation Area and by SUP. Permits may include restrictions on tent size, attendance, noise-causing devices, inflatables, or any other items that could impact visitor safety or the ability of other visitors to use the Refuge in an unobstructed way.
- Use would be restricted to daylight hours only.
- Open fires and fireworks would be prohibited.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff would monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, and conflicts between user groups.

Monitoring data would be used to modify these stipulations or remove the use if necessary to ensure continued compatibility.

Justification

Swimming and beach use are not priority public uses as defined by the National Wildlife Refuge System Administration Act of 1966, as amended. Due to the limited area that would be made available for swimming and beach use, these uses are expected to result in a low impact to wildlife and wildlife habitat. It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance, and use of the Refuge would not be measurably lessened from allowing swimming to occur under the prescribed conditions. The relatively limited number of individuals expected to be adversely affected due to swimming would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted. Thus, under these conditions, we do not expect the use to materially interfere with or detract from the mission of Deer Flat NWR or the Refuge System, diminish the purposes for which the Refuge was established, pose significant adverse effects on Refuge resources, or cause any undue administrative burden. Visitor safety would be increased by limiting shoreline swimming to designated beaches. For many visitors, swimming and beach use at Lake Lowell may provide an introduction to a national wildlife refuge and good opportunity to reach out to them.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

Document continues on next page.

B.9 Compatibility Determination for Walking with Pets (other than hunting dogs)

RMIS Database Use: Pets

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future

generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

The Refuge currently allows dogs on-leash at the Lake Lowell Unit. This use currently occurs primarily at the Lake Lowell Unit on all Refuge roads and trails, as well as off-trail in the North Side, East Side, and South Side Recreation Areas. For information about use of dogs while hunting, see the Hunting Compatibility Determination.

The Code of Federal Regulations states that no dog shall be permitted to roam at large on refuge lands (50 C.F.R. 26.21(b)). Refuge regulations would also be consistent with the following local municipal codes for Canyon County that require a dog that is off the property of the owner to be on a physical leash of 6 feet or less. One end of the leash must be attached to the dog, and the other end must be in the hand of a person capable of controlling the dog. (Ord. 83-006, 6-30-83, eff. 7-11-83; Ord. 91-004, 6-24-91). No person owning, harboring, controlling or keeping any dog shall permit the dog to deposit fecal material on any public property without the owner or custodian immediately bagging and removing the material and disposing of it in a proper trash receptacle (City of Nampa Municipal Code 9-5-9).

Proposed Uses

Under the Preferred Alternative, the Refuge would allow people to visit with their leashed pets on designated multi-use trails. Leashed pets would be allowed on designated trails during daylight hours and at times of year when walking access is allowed. Visitors walking with their pets would be required to remove feces from the Refuge. This public use would be monitored to ensure it does not interfere with wildlife-dependent uses or impact wildlife resources. If Refuge personnel observe that visitors with pets are routinely not complying with the above requirements, the Service would evaluate the possibility of prohibiting pet walking. This CD will be revised in 10 years or possibly sooner to incorporate additional data and new information.

Availability of Resources

Most of the costs associated with carrying out the improvements, as described in the Preferred Alternative, are one-time expenses (see Table B-9). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts. Increased volunteer assistance, strengthened existing partnerships, and new partnerships would be sought to support these programs in an effective, safe, and compatible manner. Refuge staff would increase volunteer recruitment efforts. When provided appropriate training, volunteers, interns, and various user groups can assist the Refuge with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, upgrading the fire break to a multiuse trail would benefit people walking with pets, but the trail could also be used by visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that would use the new trail facility.

Table B-9. Costs to Implement Improvements Necessary to Allow Pet Walking on Designated Trails

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install multiple-use trail regulation signs	$7,800	$300
*Upgrade fire break	$37,000	$800
Pet feces removal station	$400	$500
*Print/reprint general Refuge brochures	$3,200	$800
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$188,400**	**$64,800**

Anticipated Impacts of the Use

The discussion below analyzes the impact of this use as proposed under the Preferred Alternative.

Authors of many wildlife disturbance studies conclude that dogs with people, on-leash dogs, or loose dogs provoked a more pronounced disturbance reactions from wildlife than humans alone (Sime 1999). The disturbance effects of human intrusion increased when people were accompanied by dogs in studies of different species including shorebirds (Hoopes 1993; Yalden and Yalden 1989, 1990), passerines (Knight and Miller 1996), upland game birds (Baydack 1986) and small mammals (Mainini et al. 1993). Another study suggests that harassment of wildlife by domestic dogs is opportunistic and is associated with the concentration of wildlife in a given area (Jones & Stokes 1977). A follow-up study suggests that dog-induced wildlife flushes increase with the increased density of dogs (Abraham 2001). Free-running and feral dogs have been known to kill quail, rabbits, and deer (Bowers 1953; Lowry and McArthur 1978; Nelson and Woolf 1987). Pure-bred dogs trained to hunt can also ferret out ground-nesting birds and small game animals when left to roam free (Bowers 1953).

Domestic dogs can introduce diseases like parvovirus, canine distemper, and plague to wildlife populations. Diseases like giardia infection and rabies can be transmitted to wildlife and to humans. Muscle cysts can be transmitted through dog feces to ungulate species including mule deer (Sime 1999). Dog waste is also known to host endo- and ecto-parasites and wildlife can contract diseases from contact with dogs or dog wastes (Sime 1999). To reduce this effect on wildlife and people, pet owners would be required to pick up their pet's feces and dispose of it properly, as is also required by local County and City ordinances.

Nussear et al. (2008) inadvertently showed that unleashed dogs increase the zone of coverage (or zone of influence) beyond what it would be solely by the handler, thereby increasing the potential to disturb or harm wildlife. When wildlife react by moving away from the disturbance or alter behavior by hiding they would be less likely to be observed. Users of a national wildlife refuge should be able to expect to see wildlife during their visit. Because expectations of seeing wildlife and the amount of wildlife actually seen factor into the quality of experience for wildlife-dependent users (Hammitt et al. 1993), the reduction in observable wildlife that would be caused by allowing nonwildlife-dependent uses could result in avoidance of the Refuge by wildlife-dependent users. To reduce this potential negative effect on wildlife and wildlife-dependent visitors, dogs would still be required to be leashed on the Refuge. The National Wildlife Refuge System Administration Act, as amended, requires that priority consideration be given to wildlife-dependent users, and the presence of dogs is not necessary for nonhunting, wildlife-dependent recreational activities.

These studies are important when considering human/dog disturbance on refuges that have a high concentration of wildlife. Because Deer Flat NWR is an urban refuge with potentially high concentrations of dogs, people walking with dogs would only be allowed to use designated trails to reduce their interactions with high concentrations of wildlife and to provide ample quantities of sanctuary where wildlife can find cover.

Although Refuge regulations and Canyon County municipal codes require dogs to be under complete control by an adequate leash, it is common to see unleashed dogs on Deer Flat NWR trails. In fact, the most common violation noted in the Refuge law enforcement logs is "dog(s) off leash."

The potential adverse effects associated with pet/wildlife interactions would be minimized by requiring that dogs always be on leash and on multiuse trails. Visitor safety should be increased and dog fighting and negative pet/visitor interactions should be reduced by requiring that pets be on leash at all times. In addition, pet feces would be required to be removed. Impacts from pets would be monitored and enforced by Refuge staff to ensure it does not interfere or have any undue negative impacts to wildlife resources or compatible, wildlife-dependent uses.

To reduce impacts to visitors engaging in wildlife-dependent activities, especially those involved in environmental education and interpretive programs, pets would not be allowed on the Nature, Centennial, Murphy's Neck, or Boardwalk Trails. These trails are, for the most part, narrower than the patrol road trails (East Dike, Kingfisher, Gotts Point, and Observation Hill Trail System), and therefore do not lend themselves to multiple uses. The Centennial and Nature Trails are currently used for environmental education and interpretive programs. To reduce disturbance to these programs and provide adequate space for multiple uses, on-leash pets would only be allowed on the entrance road and the East Dike, Kingfisher, and Gotts Point Trails, and the Observation Hill Trail System. Keeping pets on designated trails would allow wildlife-dependent visitors the opportunity to use several trails without having to interact with pets.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from pet walking would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Pets would be required to stay on designated multiuse trails, in personally owned vehicles, and in parking lots only. Designated multiuse trails consist of:
    - Observation Hill Trail System in the North Side Recreation Area;
    - East Dike and Kingfisher Trails in the East Side Recreation Area; and
    - Gotts Point Trail.
- Pets would be required to be on a physical leash (6 feet or less) at all times. One end of the leash must be attached to the pet and the other in the hand of a person capable of controlling the pet.
- Visitors walking with a pet on designated trails would be required to immediately bag and remove fecal material and dispose of it in the proper trash receptacles.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.

  - 150-yard seasonal closure around osprey nests from March 15 through August 1.
  - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures will be open to use from October 1 through January 31.
  - 250-yard buffer around heron rookeries from February 1 through July 1.
  - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
  - Wildlife closure at Gotts Point from October 1 through January 31.
  - Wildlife closure at Murphy's Neck from October 1 through March 15.
  - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Use would be restricted to daylight hours only.

Justification

Walking with pets is not generally considered a wildlife-dependent use of a refuge as defined by statute (16 U.S.C. 668dd et seq.). However, this use on Deer Flat NWR facilities is secondary and conducted in conjunction with wildlife-dependent uses like wildlife observation, photography, and interpretation. Potential for wildlife disturbance is minimal when the use is conducted as required by the stipulations, including restricting the use to designated trails, requiring pets to be on-leash, and mandating the removal of pet waste.

Potential for wildlife and habitat disturbance is minimal given the indirect approach of this activity, the enforcement of the short leash rule, and the mandatory removal of pet feces. Restricting the disturbance to established trails would increase the predictability of public use on the Refuge, allowing wildlife to habituate to nonthreatening activities. These impacts would be monitored and if they, or other impacts, are discovered, this CD would be re-evaluated. It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge would not be measurably lessened from allowing pet walking on designated trails. The relatively limited number of individuals expected to be adversely affected due to pet walking would not cause wildlife populations to materially decline, the physiological condition and production of wildlife species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted.

Refuge users with pets provide the opportunity for the Refuge to reach out to nontraditional Refuge user groups and to encourage people walking their pets to observe wildlife and to learn about the National Wildlife Refuge System. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, multiple-use trails may provide an introduction to a national wildlife refuge.

By enforcing Refuge regulations that are consistent with local municipal codes, as well as designating appropriate facilities, this use would not interfere with fulfilling the purposes of Deer Flat National Wildlife Refuge. The potential for minimal impacts to Refuge resources from this use, when carried out as specified in the stipulations above, would not detract from fulfilling the Refuge purposes, vision, and goals or the NWRS mission.

Mandatory Re-evaluation Date

2023 Mandatory 10-year Re-evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

__X__ Environmental Impact Statement and Record of Decision

References

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

B.10 Compatibility Determination for Wildlife Observation, Photography, Interpretation, and Environmental Education

RMIS Database Use: Wildlife Observation, Photography (wildlife), Interpretation and Environmental Education (teaching students)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and re-established the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future

generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Four nonconsumptive wildlife-dependent recreational activities are defined as priority public uses under the National Wildlife Refuge Administration Act of 1966, as amended: wildlife observation, photography, interpretation, and environmental education. These activities can enhance the users' appreciation of the Refuge, the National Wildlife Refuge System, wildlife, their habitats, and the human environment. Because of its proximity to urban areas, Deer Flat NWR is considered an urban refuge and provides an opportunity for many nontraditional refuge users to be exposed to wildlife, habitat, and the National Wildlife Refuge System.

Deer Flat NWR is a popular destination for local visitors as well as tourists from outside the area. In FY11, total Refuge visitation was estimated at 228,000, with the majority of visitation occurring during the summer months. Further broken down, visitation numbers for the four nonconsumptive wildlife-dependent recreational activities are as follows.

- Wildlife observation and photography: 23,900
- Interpretation: 21,000
- Environmental education: 11,000

The Snake River Islands Unit is also open to the public for wildlife observation and photography from June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands would be clearly delineated in the Refuge brochure. The only way to access these islands is with a boat and the amount of use for this activity is unknown.

Wildlife Observation and Photography

On the Lake Lowell Unit, a variety of trails and facilities provide opportunities for visitors who wish to view and photograph wildlife while minimizing disturbance to wildlife, including the East Dike and Kingfisher Trails in the East Side Recreation Area, the Gotts Point Trail, and the Observation Hill Trail System and Centennial and Nature Trails in the North Side Recreation Area. These hiking trails allow visitors to walk in close proximity to riparian, lake, wetland, and upland Refuge habitats. There are wildlife viewing platforms on the Observation Hill Trail and on the Centennial Trail. There is also a bird viewing blind on the Nature Trail where visitors can photograph or observe wildlife. The Refuge also has a 29.5-mile driving tour that highlights birding stops and circumnavigates the Lake Lowell Unit, as well as a 47-mile driving tour that highlights wildlife viewing opportunities at both the Lake Lowell and Snake River Islands Units. When the lake is open to the public, visitors can also observe and photograph wildlife on the open water with the use of motorized and nonmotorized boats. During the winter, visitors can also observe and photograph wildlife from cross-country skis.

Interpretation and Environmental Education

Interpretation and environmental education (EE) opportunities are designed to increase the public's knowledge and understanding of wildlife and wildlife conservation. Many members of the public are not familiar with national wildlife refuges and confuse them with other Federal lands (e.g., National Parks, Bureau of Land Management lands) or with State and County parks. Locally, the Refuge is

commonly referred to as "Lake Lowell," and much of the public does not know that it is a national wildlife refuge that is part of a nationwide system. Providing information through educational programs, written materials, and interpretive panels helps to build an understanding and appreciation of the unique purposes and activities of national wildlife refuges. Providing information regarding the mission of the Service and the purposes of the Refuge, along with specific resource information, to Refuge visitors may alleviate potential negative impacts of visitors on wildlife.

Most interpretive and EE activities occur at or near the Refuge Visitor Center. Guided activities include staff- and volunteer-conducted environmental education programs, teacher workshops, interpretive programs, and special events. Unguided activities include interpretive displays in the Visitor Center, interpretive panels along the Centennial Trail and at Snake River Islands Unit access points, and self-guided trail brochures. The Refuge offers a variety of both on- and off-site hands-on EE programs. The Refuge also puts on an annual BioBlitz festival celebrating biodiversity, a Creepy Critters Halloween event, and a monthly Wild About Life lecture series.

Proposed Uses

Under the Preferred Alternative, the Refuge would improve and expand facilities and programming to enhance wildlife observation, photography, interpretation, and environmental education opportunities as follows:

Wildlife Observation and Photography

- Provide a visitor contact station at the Lower Dam Recreation Area to place a welcome/interpretive facility in an area that currently sees a majority of the Refuge's nonwildlife-dependent users.
- Provide an additional canoe/kayak launch site at Gotts Point to allow users access to an expanded no-wake zone.
- Provide additional trails, for example:
    - 2-mile ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3 to provide better access to riparian and lake habitat not only for people with impaired mobility but also for users requesting easier access through the thick riparian vegetation at Lake Lowell.
    - 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck.
    - 0.6-mile bike/walking path from the entrance to the Visitor Center along the entrance road to provide connectivity to possible bike paths.
    - Interpretive trail through restored native area at Lower Dam Recreation Area.
    - A trail between loops of the existing patrol road west of Visitor Center to provide a loop trail experience during eagle nesting season.
    - A trail or improved trail to the Observation Platform from the entrance road parking lot.
    - Additional trails from parking lots to the lakeshore on the south side of Lake Lowell and at Gotts Point to provide the public increased viewing and educational opportunities in riparian habitat types.
    - 1.5-mile self-guided on-water trail looping to the east from Parking Lot 1.
- Maintain existing observation facilities (e.g., towers, platforms) and develop new facilities, for example:

    - A fishing dock/observation platform at north end of Lower Dam Recreation Area near existing Environmental Education Building.
    - Multipurpose (i.e., Big Six) docks along proposed 2-mile ADA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3.
    - Seasonal shorebird observation/photography blind on the northern shoreline of the East Pool east of Tio Lane access for reservation with an SUP. Implement a fee for use comparable to fees at other refuges.
    - Photography blind at Upper Dam Marsh for reservation with an SUP. Implement a fee for use comparable to fees at other refuges.
- Provide observation opportunities through wildlife webcams, for example:
    - Maintain existing osprey nest webcam; and
    - Add grebe, heron, or eagle webcams.

Environmental Education and Interpretation

- Increase interpretation opportunities for visitors at high-use access points, for example:
    - Use staff and volunteers to facilitate guided/roving interpretive programs (e.g., bird walks, nocturnal walks, canoe/kayak paddles); and
    - Develop a nature play area at Lower Dam Recreation Area.
- Update and replace Visitor Center interpretive materials, for example:
    - Develop Refuge video to show at Visitor Center; and
    - Update and replace existing Visitor Center interpretive signs.
- Provide at least 4 on-site outreach events (e.g., BioBlitz, Creepy Critters, National Wildlife Refuge Week) annually to expand public awareness of interpretive themes.
- Update EE program to match themes identified in the CCP.
- Work with local teachers to identify target grades for Refuge EE programs.
- Focus on moving from off-site to on-site EE programs.

Access

- To improve the quality of the nonconsumptive wildlife-dependent recreational activities provided at the Refuge and reduce disturbance to wildlife, the following changes would be made to Refuge access.
- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands.
- Access to Lake Lowell Unit:
    - Wildlife-dependent users would be allowed off-trail in the East Side Recreation Area all year.
    - Wildlife-dependent users would be allowed off-trail at Gotts Point from February 1 through September 30.
    - To protect nesting birds, access would be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel would be allowed August 1 through January 31.
    - Seasonal closures would be in place surrounding important wildlife areas, such as eagle nests, grebe colonies, osprey nests, heron rookeries, and shorebird feeding

areas.

Availability of Resources

Deer Flat NWR is open to all of the priority, wildlife-dependent recreational activities under the Preferred Alternative. Most of the nonstaff costs associated with carrying out the improvements described in the Preferred Alternative are one-time expenses (see Table B-10). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service would explore all available options to obtain funding to implement these projects, including partnership efforts.

Increased volunteer assistance, strengthened existing partnerships, and new partnerships would be sought to support these programs in an effective, safe, and compatible manner. Refuge staff would increase volunteer recruitment efforts. When provided appropriate training, volunteers, interns, and various user groups can assist the Refuge with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, rehabilitating the Lower Dam Recreation Area would benefit wildlife-dependent visitors but it would also benefit picnickers, swimmers, and other visitors. This same cost has been shown in all CDs that may use the Lower Dam Recreation Area.

Table B-10. Costs to Administer and Manage Updates to Public Use Programs

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Provide and maintain season off-trail use signs	$1,400	$400
*Provide 4.5 miles of new trails for pedestrian access	$396,800	
*Provide and maintain interpretive and directional signage for new trails	$28,900	$1,600
Provide and maintain interpretive and directional signage for new observation/photography blinds	$2,900	$500
*Provide and maintain signs allowing public use in hunt areas	$1,100	$300
Provide and maintain directional signage	$6,500	
*Install and maintain new docks and buoys	$69,600	$7,400
Install new observation/photography blinds	$120,000	
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	$5,200
*Maintain new trails and observation/photography blinds		$4,000
Covered learning facilities	$135,600	
*Construct and maintain visitor contact station	$480,000	$1,600
*Install and maintain comfort stations and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Create LDRA site plan	$40,000	

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Rehabilitate LDRA parking area	$50,000	
*Print/reprint general Refuge brochures	$3,200	$5,200
Update/rehabilitate Visitor Center	$425,000	
Structural evaluation of Visitor Center	$25,000	
*Nature play area	$40,000	
*Volunteer coordinator		$51,000
Environmental education specialist		$51,000
*Law enforcement officer		$62,400
Total	**$2,306,200**	**$196,300**

Anticipated Impacts of Uses

A primary concern for allowing any public use to occur on Deer Flat NWR is to ensure that impacts to wildlife and habitat are maintained within acceptable limits and potential conflicts between user groups are minimized. The discussion below analyzes impacts of the use as proposed under the Preferred Alternative.

General Impacts to Wildlife

After a review of 536 references, Boyle and Sampson (1985) concluded that nonconsumptive outdoor recreation activities often have negative impacts to wildlife and their habitat. Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995a; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Human activities along trails disturb wildlife, often resulting in flushing from roosting, feeding, nesting, or resting areas. Flushing may result in expenditure of energy reserves, abandonment of preferred habitat, and increased exposure to predation during relocation. Wildlife photographers tend to have significant disturbance impacts because they may remain close to wildlife for prolonged periods (Klein 1993). Casual photographers with low-power lenses may approach wildlife closer than other users. Cole (2004) suggests the following factors as most important in determining recreation impacts: amount of use, type and behavior of use, timing of use, resistance and resilience of the environment, and spatial distribution of use. Specialized wildlife viewers, particularly birders, seek out specific and often rare species. Because these activities may occur during sensitive times of the year (e.g., nesting), and because they often involve close approaches to wildlife for purposes of identification or photography, there is a potential for negative effects (Knight and Cole 1995b).

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Burger (1999 as cited by Oberbillig 2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of 330 feet would minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommended buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails.

Refuge-specific Impacts

Refuge visitation that has an emphasis on wildlife observation, photography, education, and interpretation are projected to increase under the Preferred Alternative and therefore disturbance effects are likely to be somewhat higher than present. However, it is anticipated that the design of Refuge facilities and the stipulations associated with these uses would be sufficient to mitigate these impacts.

People who visit Deer Flat NWR and engage in wildlife observation, photography, environmental education and/or interpretation typically access the Refuge by motorized vehicles using the surrounding public roads and Refuge parking lots. Because of the close proximity to houses and an urban setting, some visitors can easily access the Refuge by walking or biking from their place of residence.

Once on the Refuge, visitors have access to a variety of multiuse trails on which to participate in these nonconsumptive wildlife uses. Foot travel can potentially create disturbance in or near any habitat and result in vegetation trampling as noted above. The current and proposed trails system has been designed to minimize disturbance to wildlife and habitat and the stipulations presented below are intended to further mitigate any potential impacts stemming from these uses. Restricting the disturbance to an established trail during the nesting season would increase predictability of public use patterns on the Refuge, allowing nesting wildlife to habituate to nonthreatening activities. Providing seasonal closures around sensitive wildlife areas would reduce impacts to wildlife while providing recreational opportunities in these areas when the wildlife is less vulnerable.

Under the Preferred Alternative, two photography/wildlife observation blinds and associated access trails would be built, one in the Upper Dam Marsh area and the other near the New York Canal. The construction of these blinds may cause a temporary, short-term impact on wildlife species in the immediate area. Minimal long-term effects are expected to occur as a result of construction.

Increased use of the blind areas is expected to occur adding to the likelihood of disturbance but should be compensated for by the creation of predictable and concentrated visitation. Educational materials that inform visitors of ethical use could reduce impacts and careful placement and camouflaging of blinds would reduce disturbance from this user group.

Most of Deer Flat NWR's education and interpretation programs are large, organized special events that differ from informal day-to-day observation and interpretive activities in that they take place at the existing Visitor Center. These programs have the can overfill parking facilities to the point where parking lots fill and off-site parking and shuttle service is necessary to avoid safety issues. The disturbance associated with these programs are restricted to the area surrounding the Visitor Center and are kept in check by Refuge staff or volunteer leaders who are vigilant about minimizing undue disturbances.

Although disturbance to wildlife from these activities would be higher than at present, the overall effect to Refuge wildlife is expected to be minor. In addition, if disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuge would limit access to areas where unacceptable impacts occur (see Stipulations section).

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from nonconsumptive, wildlife dependent recreation would be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge would impose restrictions to mitigate disturbance.

Impact to Habitat

Miller et al. (1998) showed that bird species composition was altered near trails in both forested and grassland ecosystems. Unpaved or unsurfaced trails are susceptible to a variety of trail impacts including vegetation loss and compositional changes to soil structure including compaction and erosion (Adkison and Jackson 1996; Dale and Weaver 1974; Leung and Marion 2000). Trail widening and creation of side trails (social trails) increase the area of disturbed land (Liddle 1975). Impacts that are commonly noted on trails like vegetation damage and soil erosion are unlikely to occur on the well-defined, gravel surface of the East Dike, Kingfisher, Gotts Point, Observation Hill, and Nature Trails or the concrete surface of the Centennial Trail. Allowing off-trail use may cause trampling of plants and disturbance of wildlife. Even though this user group would be required to remain on designated trails during sensitive seasons, some users may disturb wildlife by wandering off to access the lakeshore or a scenic vista or in pursuit of observational/photographic quarry.

Control of invasive plant species on the Refuge is a difficult and never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species

(Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Refuge visitors can inadvertently carry propagules from invasive plants on clothing or equipment, spreading those plants to new areas. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants on or near these trails would be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Providing and maintaining access points and trails indirectly impacts wildlife by creating barriers to movement through vegetation removal and abrupt edge creation, which may lead to increased predation (Ratti and Reese 1988).

Public Review and Comment

This CD was prepared concurrent with the Deer Flat NWR CCP. The following is a summary of public outreach from July 2010 through September 2012.

July 15-September 10, 2010: First Outreach and Comment Period

- Published Notice of Intent in the Federal Register
- Distributed approximately 1,300 copies of Planning Update #1
- Provided informational presentations to 26 local organizations
- Held evening call-in hours the second and fourth Wednesdays of the month
- Held open houses July 28, August 20, and August 21
- Contacted visitors over eight days in July and August and handed out over 700 flyers
- Over 1,000 comments were received

September 23-25, 2010: Work Sessions

- Invited stakeholders to brainstorm potential solutions to key management issues

May 27, 2011-July 29, 2011: Preliminary Draft Alternatives Outreach and Comment Period

- Distributed Planning Update #3 to the mailing list
- Provided informational presentations to 28 local organizations
- Held open houses on June 3, June 4, July 8, and July 9
- Attended local festivals
- Almost 350 comments were received

Winter 2013: Draft CCP/EIS Outreach and Comment Period

Public review and comments are solicited in conjunction with release of this Draft CCP/EIS in order to comply with the National Environmental Policy Act and with Service policy.

Determination

_____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Proposed changes to boating regulations and facilities are described in the Recreational Boating Compatibility Determination.
- To minimize disturbance to wildlife during the nesting season, pedestrian travel would be restricted to designated trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel would be allowed August 1 through January 31.
- In the East Side Recreation Area, off-trail travel would be allowed all year because it is a less biologically sensitive area.
- In the Gotts Point area, off-trail travel would be allowed February 1 through September 30.
- Cross-country skiing access would be allowed only on land. Skiing on ice would be prohibited.
- Lower Dam Recreation Area is open from April 15 through September 30.
- On the Snake River Islands Unit, off-trail travel would be allowed from June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands.
- Recreational access to closed areas would be allowed only under provisions of an SUP with stipulations set by the Refuge Manager.
- Use would be restricted to daylight hours only.
- Open fires would be prohibited.
- Pedestrians should yield right of way to equestrians.
- Collection of plants and animals would be prohibited unless an SUP is obtained from the Refuge (except fish captured while engaged in recreational fishing).
- The Refuge would require an SUP for wildlife-dependent groups of over 20 people to avoid conflicts with other users and management activities.
- Seasonal closures would be implemented as necessary to protect sensitive wildlife habitat. For example:
    - 300-yard buffer around eagle nests from February 15 through July 15.
    - 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - 500-yard closure around grebe colonies until July 15 of the following year. If the birds have not re-nested in the closed area by July 15 of the following year, the closure would be removed. Upland portions of the closures would be open to use from October 1 through January 31.
    - 250-yard buffer around heron rookeries from February 1 through July 1.
    - 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff would monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data would be used to modify these stipulations if necessary to ensure continued compatibility of these activities.

Justification

Wildlife photography, observation, interpretation, and environmental education, when compatible, are wildlife-dependent recreational activities considered priority public uses for the National Wildlife Refuge System. Although these activities can result in disturbance to wildlife, disturbance would be intermittent and short-term when activities are conducted according to the stipulations described above. It is anticipated that wildlife populations would find sufficient food resources and resting places such that their abundance and use of the Refuge would not be measurably reduced from allowing these activities to occur. The relatively limited number of individual animals and plants expected to be adversely affected would not cause wildlife populations to materially decline, the physiological condition and production of Refuge species would not be impaired, their behavior and normal activity patterns would not be altered dramatically, and their overall welfare would not be negatively impacted. Thus, allowing wildlife photography, observation, interpretation and environmental education to occur under the stipulations described above would not materially detract or interfere with the purposes for which the Refuge was established or the mission of the National Wildlife Refuge System.

Mandatory Re-evaluation Date

2028 Mandatory 15-year Re-evaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: _____ _____
(Signature) (Date)

Document continues on next page.

Appendix C. Implementation

C.1 Overview

Implementation of the comprehensive conservation plan (CCP) would require increased funding, which would be sought from a variety of sources. This plan would depend on additional Congressional allocations, partnerships, and grants. There are no guarantees that additional Federal funds would be made available to implement any of these projects. Other sources of funds would need to be obtained (both public and private). Activities and projects identified would be implemented as funds become available.

Many of the infrastructure and facility projects (i.e., Refuge roads) would be eligible for funding through construction or Federal Lands Highway Program funds.

The CCP proposes several projects to be implemented over the next 15 years. All of these projects are included in the Refuge Management Information System (Refuge Operational Needs System [RONS] or Maintenance Management System [MMS]), which is used to request funding from Congress. Currently, a large backlog of maintenance needs exists on Deer Flat National Wildlife Refuge (Deer Flat NWR or the Refuge). An attempt at reducing this backlog needs to be made and is included here in the analysis of funding needs. The RONS documents proposed new projects to implement the CCP to meet the Refuge's goals and objectives and legal mandates.

Annual revenue sharing payments would continue to Canyon, Payette, Owyhee, and Washington Counties in Idaho, and Malheur County in Oregon. At this time, no expansions are planned through the purchase of inholdings or through an expanded Refuge boundary.

Monitoring activities would be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions, and responses to management practices. Actual monitoring and evaluation procedures would be detailed in step-down management plans.

C.2 Costs to Implement CCP

The following sections detail both one-time and recurring costs for various projects. One-time costs reflect the initial costs associated with a project, such as the purchase of equipment, contracting services, construction, and the like. Recurring costs reflect the future operational and maintenance costs associated with the project. Costs have been summarized by their association with either public use programs, or wildlife and habitat management.

C.2.1 One-time and Recurring Costs Common to All Alternatives

Some projects, programs, and maintenance would occur under all alternatives. These costs are already covered by the current Refuge budget and are included in the following tables. The current funding that is received by the Refuge was used as a baseline to start from for all alternatives. Some of the programs and projects paid for by this funding are listed below. Differences between alternatives for new one-time and recurring costs can be found in Sections C.2.2 and C.2.3 respectively.

The current budget for nonstaff costs is approximately $204,700. Examples of projects, programs, and maintenance that are covered by this budget include the following:

- Current maintenance of existing trails
- Current maintenance of existing observation facilities
- Current maintenance of existing buildings
- Permitting for bass tournaments
- Current hunting programs on Lake Lowell and Snake River Islands Units (including youth waterfowl hunt)
- Maintenance of existing signage
- Maintenance of the Lower Dam Recreation Area (if partnership with Canyon County continues)
- Winter wildlife closures of Gotts Point, Lake Lowell, and the Lower Dam Recreation Area.
- Current wildlife and administrative closures on the southeast end, the northwest end, and around the shop complex
- Seasonal closures around current eagle and osprey nests
- Partnership with Idaho Department of Fish and Game for carp removal
- Invasive species control at current acreage
- One volunteer recognition event per year
- Current volunteer projects
- Current events
- Utilities for existing facilities

Some programs, projects, and maintenance that are currently paid for by the operational budget of the Refuge would be reduced to increase alternative programs without an increase in cost. In some instances, the alternatives would show a savings from what is currently spent.

Environmental Education versus Interpretation. In Alternatives 2 and 3, on-site interpretive programs would be emphasized over traditional environmental education (EE) programs. These interpretive programs could include guided walks, on-water kayak/canoe trips, and guided walks at night or into closed areas. In these programs, Refuge staff and volunteers would aim to interact with visitors at high-use access points to increase awareness of the Refuge and its wildlife and habitats. In order to provide an increase in interpretive programs, the EE program (especially from April 15 through September 30) would need to be reduced. Scout Days, day camps, off-site programs, and the on-site Discover Wildlife Journeys program may be reduced or restructured in order to allow enough staff and volunteer time to provide for increase on-site interpretation. By shifting focus from EE to interpretation, no extra cost is anticipated for the increase in interpretive programs.

The following descriptions summarize the costs that would be required to accomplish each alternative and area above and beyond the current base operations budget.

C.2.2 New One-time Costs Related to Public Use

One-time costs are project costs that have a startup cost associated with them, such as purchasing a new vehicle for wildlife and habitat monitoring or designing and installing an interpretive sign. Some are full project costs for those projects that can be completed in three years or less. One-time costs can include the cost of temporary or term salary associated with a short-term project. Salary for new

positions and operational costs are reflected in operational or recurring costs. Funds for one-time costs would be sought through increases in Refuge base funding, special project funds, grants, and the like. The majority of new one-time costs are associated with the upgrade and enhancement of facilities, signage, and programs for the visiting public.

Boardwalk. A trail on the south side of the Refuge was suggested by several members of the public during the scoping phase of the CCP's development. Any ground-level trail would be inundated by irrigation water for much of the winter, spring, and fall, which would cause major maintenance issues and likely result in the trail being unavailable to Refuge visitors. Because of these issues, any trail in the riparian zone on the south side of the Refuge would need to be elevated. Cost projections were made based on Region 1 engineering cost estimates and previously constructed boardwalks. Due to the projected cost for the 2-mile boardwalk between Parking Lots 1 and 3, it is not proposed in the Preferred Alternative (Alternative 2). Instead, the trail concept would be investigated further, under Alternative 2, to determine if a lower cost option is available.

Table C-1. One-time Costs for Boardwalk Construction ($ in thousands)

New Trails	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Miles of Trail	Cost	Miles of Trail	Cost	Miles of Trail	Cost	Miles of Trail	Cost	
Boardwalk	-	-	-	-	2	$5,848	-	-	L
Total Cost for Boardwalk Construction		-		-		**$5,848**		-	

New Trails and Signage. Because the status quo alternative takes into account public use at its current trajectory, some trail upgrades would need to occur even under this alternative. There are currently no trail heads or maps designating trails. This has lead to confusion over the distinction between trails and firebreaks. Visitors currently use a firebreak by the Refuge entrance as a trail, but other firebreaks were not meant to be used as trails. In order to eliminate this confusion, the firebreak that stretches from the entrance parking area to the observation blind would be turned into a trail even under the status quo alternative. Signage would also be upgraded to ensure that users know when they are on a designated trail and what regulations exist. Because of the multiple-use nature of all trails in Alternative 1, signs would also be needed to address right-of-way and expected behavior for different types of uses. Although no new alterations would be made to increase access for nonwildlife-dependent users, alterations to the current horse walk-through would need to be made to ensure safety of riders. Confusion over on- and off-trail uses has existed for many years. Although the last compatibility determination requires on-trail travel, most visitors are unaware of this regulation. Trail use regulations differ across alternatives. Costs associated with a varying number of regulatory signage for trail use would also be needed under all alternatives. Costs for both interpretive and regulation signs have been accounted for.

Changes to public use within the hunt areas, as well as a current need to improve safety along the Lake Lowell Unit boundary, would also require new signs in the hunt area. These signs would remind hunters not to fire over or toward the Refuge boundary, and in some alternatives remind both hunters and other users to be aware of each other.

In an attempt to address scoping comments that took issue with pet feces on the trails, the Refuge would require visitors walking pets to pick up their pet's feces under Alternative 2. Given the current trajectory of use by visitors with pets, and the complaints that the Refuge has already received, the

Refuge would supply feces removal bags under Alternatives 1 and 2. Because pets are allowed in more areas under Alternative 1, more bag dispensers would be needed.

An overview of the costs for new trails and signage can be found in Table C-2.

Table C-2. New One-time Costs for New Trails and Signage ($ in thousands)

New Trails	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Miles of Trail	Cost	Miles of Trail	Cost	Miles of Trail	Cost	Miles of Trail	Cost	
Ground-level trails	0.63	$37	4.5	$397	2	$359	1.5	$234	M
Signs for trails and boardwalk		$24		$29		$50		$27	H
Alterations to allow dogs and horses		$2		$1		-		-	H
Hunting area signs		$1		$1		$1		$1	H
Multiuse trail signs		$16		$8		-		-	H
Total Cost for Trails and Signs		**$80**		**$436**		**$410**		**$262**	

Dock and Blinds. In order to provide additional opportunities for fishing, wildlife observation, and photography, new docks and blinds would be installed at the Refuge in Alternatives 2 through 4. During the scoping period, commenters requested additional access to the shoreline for these types of activities. Because the Refuge currently does not offer waterfowl hunting opportunities that are accessible to people with physical disabilities, an ADA-accessible hunting blind would be installed under Alternatives 1, 2, and 4. In Alternative 3, the dock associated with the boardwalk at Parking Lot 1 would be used as an ADA-accessible hunting blind during the waterfowl hunting season. An overview of the number of docks and blinds, as well as the associated costs by alternative, can be found in Table C-3.

Table C-3. New One-time Costs for New Docks and Blinds ($ in thousands)

New Docks and Blinds	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	#	Cost	#	Cost	#	Cost	#	Cost	
Docks	0	-	2	$45	4	$89	2	$45	M
Blinds and signage	0	-	2	$123	2	$122	1	$60	L
Accessible hunting dock	1	$25	1	$25	Accounted for in docks cost		1	$25	H
Total for Docks and Blinds		**$25**		**$193**		**$211**		**$130**	

Kiosks. During Many visitors to Lake Lowell do not know that they are visiting a national wildlife refuge. In an attempt to address this concern, the Refuge would install kiosks at high-use areas of the Lake Lowell Unit and add one additional kiosk at a boat ramp along the Snake River. Both kiosk construction and interpretive signage were accounted for in the cost analysis (see Table C-4).

Table C-4. New One-time Costs for New Kiosks and Associated Signage ($ in thousands)

New Kiosks	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	#	Cost	#	Cost	#	Cost	#	Cost	
Kiosks for access points at Lake Lowell and Snake River Islands Units	0	-	5	$207	5	$ 207	5	$ 207	M
Signs for new kiosks	0	-	42	$55	42	$55	42	$55	M
Total for Kiosks		-		**$262**		**$262**		**$262**	

Environmental Education (EE) and Interpretation Facilities. The Refuge currently uses the Environmental Education Building at the Lower Dam Recreation Area to provide opportunities for self-service environmental education activities for groups. Scout groups are the most frequent users of this facility. During a recent facilities condition assessment, regional Service staff identified cracking in the exterior walls of both the Visitor Center and the Environmental Education Building. Regional staff suggested that the Environmental Education Building be tested for structural soundness and updated as needed. In Alternatives 2 through 4, this building would be removed or renovated to create a visitor contact station to support the increased interpretive programs at the Lower Dam Recreation Area. Therefore, an estimated cost for testing and rehabilitation of the Environmental Education Building is included in Alternative 1 and not in the other alternatives.

Comments during the scoping process identified the lack of visitor knowledge of the Refuge. In order to address this issue, a small visitor contact station would be established at the Lower Dam Recreation Area. Providing volunteer and staff contact at this high-use area would increase the ability of the Refuge to provide information on its purpose and the importance of its wildlife and habitats. The contact station should help increase the enjoyment of visitors by providing information about recreational opportunities around the Refuge. This contact station could also act as a base of operations for the roving interpreters and would double as a fee station under Alternative 3.

Covered learning facilities would be constructed under Alternatives 2 through 4. These structures would provide covered areas to gather school children during EE programs. Currently, children have no cover from weather during the outdoor portions of their field trips. Since field trips are scheduled mostly in the spring and fall, weather can reach extremes of intense sunshine and pouring rain. In an attempt to give children a dynamic opportunity to experience nature, the Refuge would install a nature play area under Alternatives 2 and 3. The cost of this area includes design. See Table C-5 for analysis of the future of environmental education and interpretation facilities across alternatives.

Table C-5. New One-time Costs for EE and Interpretation Facilities ($ in thousands)

EE and Interpretation Facilities	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
2 covered learning facilities	-	$136	$136	$136	L
Structural evaluation of Visitor Center	$25	$25	$25	$25	H
Update/rehabilitate Visitor Center	$425	$425	$425	$425	M
Structural evaluation and update/rehab of Environmental Education Building	$174	-	-	-	H
Visitor contact station at Lower Dam Recreation Area	-	$480	$480	$480	M
Nature play area	-	$40	$40	-	M
Total EE and Interpretation Facilities	**$624**	**$1,106**	**$1,106**	**$1,066**	

Other Facilities. Several comments were received requesting improved bathroom facilities on the Refuge. Two new facilities have been suggested in Alternatives 2 and 3. The Lower Dam Recreation Area is in need of renovation. It currently is partially paved, and that pavement is in disrepair. Parking and access for boat launches, buildings, and beaches are extremely restricted on busy weekends. A new site plan would also be created in all alternatives to improve functionality, traffic flow, and safety at the Lower Dam Recreation Area. Until the site plan is completed, the cost of renovation of the Lower Dam Recreation Area is unknown. At the bare minimum, the beach parking area and the road leading to it would need to be rehabilitated under any alternative that is selected.

Table C-6. New One-time Costs for Other Facilities ($ in thousands)

Other New Facilities	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
1 comfort station and 1 vault toilet	-	$208	$208	-	L
Lower Dam Recreation Area redesign site plan	$40	$40	$40	$40	H
Rehabilitation of beach access/parking	$50	$50	$50	$50	M
Total Other New Facilities	**$90**	**$298**	**$298**	**$90**	

Interpretive and Educational Projects. Changes to the general brochure would be required under all alternatives. It is anticipated that a new brochure would need to be created under all alternatives with changes needed to maps and text. If the old brochure can be reprinted with modifications under any of the alternatives, the cost may be reduced.

Table C-7. New One-time Costs for Interpretive and Educational Projects ($ in thousands)

Interpretive/ Educational Projects	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Wildlife webcam	-	$10	$10	$10	L
Refuge video	-	$30	$30	$30	L
General brochure	$3	$3	$3	$3	H
Total for Projects	**$3**	**$43**	**$43**	**$43**	

Fees. The upfront costs for a fee program include fee deposition containers (i.e., iron rangers) and fee collection envelopes. The Refuge considered providing an optional fee reduction program in Alternative 3. This program would consist of training about the Refuge and its wildlife. Participants would need to take and pass a post-training assessment to be provided a discounted entrance fee. Start-up costs for the fee reduction program would include computers and creation of the training and post-training assessment.

Table C-8. New One-time Costs for Fee Program ($ in thousands)

Fees	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Entrance fee	-	-	$22	-	L
Boat launch fee	-	-	$9	$9	L
Fee reduction program	-	-	$8	-	L
Total for Fees	**-**	**-**	**$39**	**$9**	

Wildlife Disturbance Reduction Signs. No-wake zones, closed areas, and/or seasonally closed areas are used to differing degrees to reduce disturbance to wildlife and habitats in every alternative. Signs providing a boundary of the zone or area, as well as information about why there is a restriction to access would need to be provided. All of the seasonal closures at Lake Lowell in Alternatives 3 and 4 are already accounted for in the buoys required for the closed areas. Given that the goose-nesting closure on the islands would continue, and that island signage is limited at this time, a cost associated with continuing the current closure is represented under Alternative 1. Table C-9 shows the costs associated with providing such signage under each alternative.

Table C-9. New One-time Costs for Wildlife Disturbance Reduction Signs ($ in thousands)

Signs	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Seasonal nesting closures at Lake Lowell Unit	-	$1	-	-	H
Seasonal nesting closures on Snake River Islands Unit	$5	$11	$11	$11	H
Wintering goose closure on Leavitt Tract	-	-	$1	$1	H
Total For Signs	**$5**	**$12**	**$12**	**$12**	

Wildlife Disturbance Reduction Buoys. The Refuge and Canyon County Sheriff's Office currently deploy approximately 90 to 95 buoys in Lake Lowell to demarcate no-wake zones, closed areas, and swimming areas. In the action alternatives, these buoys would be reconfigured, and in some instances fewer buoys would be needed. Since the buoy replacements needed for the status quo alternative are accounted for in the base operations budget, some alternatives would require fewer buoys and therefore represent a savings in this area. Table C-10 displays the reduction in cost or additional cost required to meet requirements of the Service Sign Manual under each alternative.

Table C-10. New One-time Costs for Wildlife Disturbance Reduction Buoys ($ in thousands)

Wildlife Disturbance Reduction Buoys	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Permanent no-wake zones, closed areas, and swimming areas	-	$4	-	-	H
Seasonally closed areas	-	$1	-	-	H
Total for Buoys	-	**$5**	-	-	

Law Enforcement and Safety. Many comments were provided to the Refuge about visitors not following regulations. This issue would also be addressed through costs discussed in the staffing section, but it is important to look at technologies that may also reduce the likelihood of illegal activity. Remote video cameras and electronic gates may allow the Refuge to decrease illegal activity, increase the ability of law enforcement personnel to catch those engaged in illegal activity, and provide unobstructed use of the Refuge during daylight hours. There is a history of illegal activity on the Refuge (see Chapter 5), and these activities are expected to continue into the future and perhaps even increase as the population surrounding the Refuge grows. Because of current and potential future illegal activities, the cost of technological solutions can be found under all alternatives. Because many of the illegal activities that occur in the uplands are related to nonwildlife-dependent activities (e.g., dog walking, partying), no cameras were factored into

Alternative 4 because no nonwildlife-dependent activities would be allowed. The cost of electronic gates in Alternative 4 would also be less because Gotts Point would remain closed to vehicles.

Table C-11. New One-time Costs for Safety and Law Enforcement Improvements ($ in thousands)

Improved Safety and Law Enforcement	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Cameras	$2	$3	$3	-	L
Electronic gates	$25	$225	$225	$200	H
Total for Safety	**$27**	**$228**	**$228**	**$200**	

Research and Monitoring Related to Public Use. There are two different types of research and monitoring programs that are related to public use. The first provides feedback on the quality of public use opportunities, and the second studies whether or not our public use programs are compatible with the purpose of the Refuge. As was pointed out in many of the comments received during scoping for the CCP, Deer Flat NWR does not have on-site research showing the interaction of public use programs and wildlife. In order to remedy this lack and test whether our public use programs under each alternative can be provided without substantially impacting wildlife and habitat, disturbance studies must be conducted. Because we would need this information for the next CCP (scheduled to be completed in 15 years), these studies would be completed regardless of the alternative selected. Quality of public use programs is related to the program itself and the ways in which users impact each other. Many studies would not have large one-time costs associated with them and would be listed in the staffing needs section. The studies listed in Table C-12 are those that would be contracted to outside entities in the creation of the study protocols or the completion of the study itself.

Table C-12. New One-time Costs for Public Use Surveys and Research ($ in thousands)

Public Use Survey and Research Needs	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Study to assess disturbance to grebes, shorebirds, herons and landbirds at Lake Lowell (2-year study)	$140	$140	$140	$140	H
Quality of wildlife-dependent public uses	$75-$80	$75-$80	$75-$80	$75-$80	M
Total for Research and Monitoring	**$215-$220**	**$215-$220**	**$215-$220**	**$215-$220**	

Table C-13 summarizes the one-time costs that are needed to provide for public uses at Deer Flat NWR.

Table C-13. Summary of New One-time Costs Related to Public Use ($ in thousands)

	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
Providing Recreation While Minimizing Impacts to Wildlife and Habitats				
Buoys	-	$5	-	-
Signs	$5	$12	$12	$12
Subtotal	**$5**	**$17**	**$12**	**$12**
Public Use Enhancements				
Boardwalk	-	-	$5,848	-
Trails and signs	$80	$436	$410	$262
Docks and blinds	$25	$193	$211	$130

	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
Kiosks	-	$262	$262	$262
Environmental education and interpretation facilities	$624	$1,106	$1,106	$1,066
Other new facilities	$90	$298	$298	$90
Environmental education and interpretation projects	$3	$43	$43	$43
Subtotal	$822	$2,338	$8,178	$1,853
Establish a Fee Program				
Fee collection	-	-	$39	$9
Subtotal	**$0**	**$0**	**$39**	**$9**
Enhance Safety and Law Enforcement				
Technology	$27	$228	$228	$200
Subtotal	**$27**	**$228**	**$228**	**$200**
Studies, Research, and Monitoring Related to Public Uses				
Human-wildlife interaction	$140	$140	$140	$140
Quality of recreation	$75-$80	$75-$80	$75-$80	$75-$80
Subtotal	**$215-$220**	**$215-$220**	**$215-$220**	**$215-$220**
Total Public-use-related One-time Costs	**$1,069-$1,074**	**$2,798-$2,803**	**$8,672-$8,677**	**$2,289-$2,294**

C.2.3 New One-time Costs for Wildlife and Habitat Management

Habitat management can be achieved in a variety of ways, which makes estimating costs for individual projects difficult before a habitat management plan has been created. For example, the treatment of invasive species can be accomplished chemically (with herbicides), mechanically (e.g., mowing, discing, chipping), through the use of fire or goats, or by hand. Each of these different treatments requires different equipment and staffing to achieve. Because of the variety of ways that management can be accomplished, the costs listed in all of the tables below are estimates that would be refined as projects are planned and implemented.

Mudflats. Additional areas of mudflats would be created adjacent to current mudflats by removing vegetation removal through discing, burning, and or other mechanical control methods. Mudflats would be enhanced by using a disc to create scours that would hold pools of water. The projects would occur within the life of the CCP.

Table C-14. New One-time Costs for Mudflat-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Create and enhance mudflats	-	-	5-25	$1-$6	5-25	$1-$6	5-25	$1-$6	L
Total	**-**	**-**	**5-25**	**$1-$6**	**5-25**	**$1-$6**	**5-25**	**$1-$6**	

Riparian Areas at Lake Lowell. The fragmentation of the riparian zone would be reduced by relocating firebreaks so they coincide with Board of Control drainage and canals. The riparian areas would also be enhanced and maintained through the reduction of nondesirable plants; reduction of hazardous fuels; planting of desirable trees, shrubs and grasses (to replace nondesirables that are removed); and enhancements in nesting habitat. Because these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of

riparian enhancement would differ depending on the tools that are used. The estimates below reflect some of the most expensive methods in order to capture the highest estimated costs. The projects would occur throughout the life of the CCP.

Table C-15. New One-time Costs for Lake Lowell Riparian-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	-	-	1,200	$210	1,200	$210	1,200	$210	H
Plant desirable vegetation	-	-	10-15	$5-$7	10-15	$5-$7	10-15	$5-$7	H
Relocate fire breaks	-	-	100	$18	100	$18	100	$18	M
Total		-		**$233-$235**		**$233-$235**		**$233-$235**	

Riparian Areas at Snake River Islands. The size of the islands within the Snake River Islands Unit varies from 1 acre to 40 acres. Because the prioritization of island enhancement and protection would occur after the CCP is completed, an average size of 20 acres was used to create the cost estimates in Table C-16. The same theory was used for fencing of islands and adjacent lands. An average shoreline size was established and used to create the cost estimates. The projects would occur over the life of the CCP.

Table C-16. New One-time Costs for Snake River Islands Riparian-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	#of Islands	Cost	# of Islands	Cost	# of Islands	Cost	# of Islands	Cost	
Remove undesirable vegetation and plant desirable vegetation	-	-	2-10	$60-$300	2-10	$60-$300	2-10	$60-$300	H
Reduce cattle trespass	-	-	2-10	$6-$30	2-10	$6-$30	2-10	$6-$30	M
Total	-	-	**2-10**	**$66-$330**	**2-10**	**$66-$330**	**2-10**	**$66-$330**	

Wetlands. Emergent wetlands would be enhanced through removal of undesirable vegetation, planting of desirable vegetation, and recontouring. Because some of these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of enhancement would differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects would occur throughout the life of the CCP.

Table C-17. New One-time Costs for Wetlands-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	-	-	82	$18	82	$18	82	$18	M
Plant desirable vegetation	-	-	82	$25	82	$25	82	$25	M
Re-contour wetlands	-	-	82	$7	82	$7	82	$7	L
Total	-	-	**82**	**$50**	**82**	**$50**	**82**	**$50**	

Shrub-steppe Habitat at Lake Lowell. Shrub-steppe habitat would be enhanced through removal of undesirable vegetation, planting of desirable vegetation, and removal of unnecessary internal firebreaks. Because some of these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of enhancement would differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects would occur throughout the life of the CCP.

Table C-18. New One-time Costs for Lake Lowell Shrub-Steppe-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	-	-	300	$38	300	$38	300	$38	H
Plant desirable vegetation	-	-	150	$36	150	$36	150	$36	H
Remove unnecessary internal firebreaks	-	-	4	$1	4	$1	4	$1	M
Total	-	-		**$75**		**$75**		**$75**	

Shrub-steppe Habitat at Snake River Islands. The size of the islands within the Snake River Islands Unit varies from 1 acre to 40 acres. Because the prioritization of island enhancement and protection would occur after the CCP is completed, an average size of 20 acres was used to create the cost estimates in Table C-19. The projects would occur over the life of the CCP.

Shrub-steppe habitat would be enhanced through removal of undesirable vegetation, planting of desirable vegetation, and removal of unnecessary internal firebreaks. Because some of these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of enhancement would differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects would occur throughout the life of the CCP.

Table C-19. New One-time Costs for Snake River Islands Shrub-steppe-related Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	-	-	40-200	$14-$70	40-200	$14-$70	40-200	$14-$70	H
Plant desirable vegetation	-	-	40-200	$60-$300	40-200	$60-$300	40-200	$60-$300	H
Total	-	-	**40-200**	**$74-$370**	**40-200**	**$74-$370**	**40-200**	**$74-$370**	

Agriculture. Enhancement of the agricultural program would occur through installation of a new well, creating better growing conditions.

Table C-20. New One-time Costs for Agricultural Projects ($ in thousands)

Project	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Install well	-	$80-$100	$80-$100	$80-$100	L
Total	-	**$80-$100**	**$80-$100**	**$80-$100**	

Grasslands. Maintenance of the goose browse in the Leavitt Tract would occur through updates to the irrigation system and re-establishment of goose pasture. Efficient and effective irrigation is also an important part of the cooperative land management program at Lake Lowell Unit. In order to provide an adequate amount of water to the Refuge's managed grasslands the irrigation system would need to be improved.

Table C-21. New One-time Costs for Grasslands Projects ($ in thousands)

Project	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Update irrigation		-		$12		$12		$12	M
Interseed grass	-	-	80	$48	80	$48	80	$48	M
Total		**-**		**$60**		**$60**		**$60**	

Research, Surveys, and Assessments of Wildlife and Habitat. Table C-22 provides costs for research, surveys, and assessments that would accomplished through the use of contractors. It is important to understand the baseline structure of habitats and wildlife so that future changes can be monitored.

Table C-22. New One-time Costs for Surveys and Research ($ in thousands)

Public Use Survey and Research Needs	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Prioritization of Refuge islands for wildlife value	-	$30	$30	$30	H
Analyze historic biological data to assess long-term population trends	-	$30	$30	$30	M
Contaminants study of DDT in Lake Lowell	-	$250	$250	$250	M
Contaminants investigation of	-	$200	$200	$200	M

Public Use Survey and Research Needs	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
	Cost	Cost	Cost	Cost	
Leavitt Tract					
Mule deer study at Lake Lowell Unit (3-year vegetation and population study)	-	$60	$60	$60	M
Mule deer study at Snake River Islands Unit (3-year vegetation and population study)	-	$80	$80	$80	M
Cheatgrass removal study (4 years of study and monitoring)	-	$110	$110	$110	H
Soil survey of shrub-steppe and GIS layer	-	$40	$40	$40	M
Surveys of wetland topography	-	$20	$20	$20	M
Total for Research and Monitoring	-	**$820**	**$820**	**$820**	

Table C-23 summarizes the one-time costs that are needed to provide for public uses at Deer Flat NWR.

Table C-23. Summary of New One-time Costs Related to Wildlife and Habitat Management ($ in thousands)

	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
Enhance Habitat				
Mudflats	-	$1-6	$1-6	$1-6
Riparian at Lake Lowell	-	$233-$235	$233-$235	$233-$235
Riparian at Snake River Islands	-	$66-$330	$66-$330	$66-$330
Wetlands	-	$50	$50	$50
Shrub-steppe at Lake Lowell	-	$75	$75	$75
Shrub-steppe at Snake River Islands	-	$74-$370	$74-$370	$74-$370
Agriculture	-	$80-$100	$80-$100	$80-$100
Grasslands	-	$60	$60	$60
Subtotal	-	**$639-$1,226**	**$639-$1,226**	**$639-$1,226**
Studies, Research, and Monitoring				
Wildlife and habitat research	-	$820	$820	$820
Subtotal	-	**$820**	**$820**	**$820**
Total Wildlife and Habitat Management One-time Costs	-	**$1,459-$2,046**	**$1,459-$2,046**	**$1,459-$2,046**

C.2.4 Summary of One-time Costs

Table C-24. Summary of One-time Costs ($ in thousands)

Cost Category	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
	Cost Per Year	Cost Per Year	Cost Per Year	Cost Per Year
Public use	$1,069-$1,074	$2,798-$2,803	$8,672-$8,677	$2,289-$2,294
Wildlife and habitat	-	$1,459-$2,046	$1,459-$2,046	$1,459-$2,046
Total One-time Costs	**$1,069-$1,074**	**$4,257-$4,849**	**$10,131-$10,723**	**$3,748-$4,340**

C.2.5 Nonstaff Recurring Costs Related to Public Use

Facilities: Trails, Boardwalk, Kiosks, Blinds, Environmental Education and Interpretation Facilities, and Other Facilities (costs for maintaining docks are discussed under Buoys, Docks, and Signs). With new trails, signs, and other public use facilities comes an increase in associated maintenance and operations. The following are estimated maintenance costs per year for the new trails. In Fiscal Year (FY) 2011, approximately $28,000 was spent on maintaining Refuge buildings. It is estimated that $10,000 per year is spent to maintain the current trail system (including herbicide treatment, grading, and adding gravel), the observation blind, and platforms. Special maintenance projects in 2011 on the Kingfisher Trail and the observation blind cost the Refuge an additional $10,000. These expenditures were used as a baseline to estimate new funding needs for the maintenance of new facilities proposed under each alternative. If the visitor contact station replaces the Environmental Education Building, the cost of building maintenance should not rise. Because the maintenance costs for a wooden boardwalk may exceed those for a gravel trail, extra funding was added to Alternative 3.

The Refuge currently pays for waste removal in the Gotts Point and Upper Dam Recreation Area vault toilets. These vault toilets are currently only pumped, on average, once every two years. Visitors have complained about the condition of restrooms, which may be alleviated, in part, by monthly pumping. Therefore, monthly pumping, from April through September, has been factored into all alternatives. Canyon County Parks, Recreation, and Waterways maintains the vault toilets in the Lower Dam Recreation Area. If Canyon County decided not to continue maintenance at the Lower Dam Recreation Area, the cost for restroom maintenance would rise.

Table C-25. New Recurring Costs for Facilities ($ in thousands)

Facilities	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
		Cost	Cost	Cost	Cost	
Utilities	Every year	-	$2	$2	$2	M
Restroom maintenance	Every year	$2	$3	$3	$2	L
Other facilities maintenance	Every year	$1	$4	$5	$3	M
Dog feces disposal bags	Every year	$1	$1	-	-	H
Total	**Every year**	**$4**	**$10**	**$10**	**$7**	

Buoys, Docks and Signs. Due to vandalism, theft, and normal wear and tear, a percentage of the Refuge's signs and buoys would have to be replaced annually. It was estimated that 25 percent of the regulation and directional signs would need to be replaced yearly and that half of the interpretive signs would need to be replaced during the life of the CCP. According to the Canyon County Sheriff's office, between $10,000 and $20,000 per year is spent on maintaining the current boat launching docks and buoys on the Refuge. The additional funds needed to maintain new buoys and docks were estimated based on an average annual maintenance cost of $15,000 for the six docks that are currently maintained by Canyon County. Two other docks that are currently maintained by the Refuge are already maintained with base funding. The funding needed to maintain the current docks would increase if Canyon County discontinued the maintenance of the current boating docks. Table C-26 captures this cost.

Table C-26. New Recurring Costs for Buoys, Docks, and Signs ($ in thousands)

Buoys, Docks, and Signs	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
		Cost	Cost	Cost	Cost	
Buoy and dock maintenance	Every year	-	$7	$10	$7	H
Replace 25% of regulatory and directional signs	Every year	$2	$5	$3	$3	H
Replace 50% of interpretive signs	Every 10 years	$19	$56	$52	$41	M
Total	**Every year**	**$2**	**$12**	**$13**	**$10**	
Total	**Every 10 years**	**$19**	**$56**	**$52**	**$41**	

Environmental Education and Interpretation Projects. Many of the recurring costs are above and beyond the current base budget even though they are happening currently, because they have been funded by grants. These grants cannot be counted on, so these costs must be accounted for in recurring costs to continue the upkeep of the program or project. Costs include but are not restricted to printing of materials, equipment, volunteer awards, scholarships for buses, and presenter costs.

Table C-27. Recurring Costs for New Environmental Education and Interpretation Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
		Cost	Cost	Cost	Cost	
Teach the teacher	Every year	-	$1	$1	$1	M
EE program	Every year	$4	$4	$4	$4	M
Volunteers	Every year	-	$1	$1	-	H
On-site events	Every year	-	$2	$2	$1	H
Webcam	Every year	$1	$1	$1	$1	L
Brochure reprint	Every 3 years	$3	$3	$3	$3	H
Total	**Every year**	**$5**	**$9**	**$9**	**$7**	
Total	**Every 3 years**	**$3**	**$3**	**$3**	**$3**	

Fees. In order to collect fees at multiple entrances, envelopes and self-service fee stations must be provided. Once in place, the fee stations (i.e., iron rangers) require little maintenance or upkeep. However, envelopes are disposable items, and a new envelope must be used for each visit. The cost of printing envelopes for approximately 200,000 visitors is displayed in Table C-28.

Table C-28. Recurring Costs for New Fee Programs ($ in thousands)

Fees	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
		Cost	Cost	Cost	Cost	
Fee envelopes	Every year	-	-	$45	$13	L
Total	**Every year**	-	-	**$45**	**$13**	

Controlled Waterfowl Hunt. Depending on the type of controlled hunt employed, the program could have staffing or materials costs associated with it. In order to create a fee system that would not depend on a staff member, a self-check system would be employed. If the hunt program used a check-in/out system, then envelopes and iron rangers would be used, much like the fee program explained above.

Table C-29. New Recurring Costs for Hunting Programs ($ in thousands)

Controlled Hunt	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4	Priority
		Cost	Cost	Cost	Cost	
Envelopes	Every 3 years	-	-	**$1**	-	L
Total	**Every 3 years**	-	-	**$1**	-	

Table C-30 summarizes the recurring costs that are needed to provide for public uses at Deer Flat NWR.

Table C-30. Summary of New Recurring Costs Related to Public Use ($ in thousands)

Public Use Recurring Costs	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
		Cost	Cost	Cost	Cost
Buildings and trail maintenance	Every year	$4	$10	$10	$7
Signs, docks and buoy, maintenance	Every year	$2	$12	$13	$10
Environmental education, volunteers, and interpretation	Every year	$5	$9	$9	$7
Fees	Every year	-	-	$45	$13
Brochures	Every 3 years	$3	$3	$3	$3
Controlled hunt	Every 3 years	-	-	$1	-
Interpretive signs	Every 10 years	$19	$56	$52	$41
Total	**Every year**	**$11**	**$31**	**$77**	**$37**
Total	**Every 3 years**	**$3**	**$3**	**$4**	**$3**
Total	**Every 10 years**	**$19**	**$56**	**$52**	**$41**

C.2.6 Nonstaff Recurring Costs Related to Wildlife and Habitat Management

As explained in Section C.2.3 New One-time Costs for Wildlife and Habitat Management, habitat management can be achieved in a variety of ways, which makes estimating costs difficult before a habitat management plan has been created. The costs listed below are estimates based on the most expensive method of treatment. Because the most expensive method of treatment was used to estimate cost, the actual cost of implementation should be lower. These costs would be refined as projects are planned and implemented.

Emergent Beds. Enhancement of emergent habitat would occur through soil disturbance, invasive species control, and the seeding/planting of moist soil plants. These efforts are above and beyond invasive species control that is currently occurring and accounted for in Section C.2.1 One-time and Recurring Costs Common to All Alternatives.

Table C-31. New Recurring Costs for Emergent-bed Habitat Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
		Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Maintain and enhance emergent beds	Every year	-	-	20	$4	20	$4	20	$4	H
Total	**Every year**	**-**	**-**	**20**	**$4**	**20**	**$4**	**20**	**$4**	

Shrub-steppe Habitat at Lake Lowell. Shrub-steppe habitat would be maintained through removal of undesirable vegetation in areas that have been restored. The costs estimated below would not be realized until after an area has been rehabilitated. Cost estimates are based on having to use herbicide to control nondesirable species on 25 percent of the total restored acreage each year. The per-year estimate would be excessive, because the entire 300 acres would not be restored within the first year.

Table C-32. New Recurring Costs for Lake Lowell Shrub-steppe Habitat Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
		Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	Every year	-	-	75	$23	75	$23	75	$23	H
Total	**Every year**	-	-	**75**	**$23**	**75**	**$23**	**75**	**$23**	

Shrub-steppe Habitat at Snake River Islands. Shrub-steppe habitat would be maintained through removal of undesirable vegetation in areas that have been restored. The costs estimated below would not be realized until after an area has been rehabilitated. Cost estimates are based on having to use herbicide to control nondesirable species on 25 percent of the total restored acreage each year. The per-year estimate would be excessive, because the entire 40 to 200 acres would not be restored within the first year. Costs per acre are more expensive for shrub-steppe maintenance on the islands because of the logistical challenges in bringing herbicide to the islands.

Table C-33. New Recurring Costs for Snake River Islands Shrub-steppe Habitat Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
		Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Remove undesirable vegetation	Every year	-	-	10-50	$4-$18	10-50	$4-$18	10-50	$4-$18	H
Total	**Every year**	-	-	**10-50**	**$4-$18**	**10-50**	**$4-$18**	**10-50**	**$4-$18**	

Agriculture. Enhancement of the agricultural program would include annual planting of crops along the shoreline of the lake. Because the cost of the new plantings would vary depending on the type of crop that is planted, the most expensive crops were used for the estimate in order to capture the highest estimated cost.

Table C-34. New Recurring Costs for Agricultural Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
		Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Plant crops on shoreline	Every year	-	-	25	$7	25	$7	25	$7	L
Total	**Every year**	-	-	**25**	**$7**	**25**	**$7**	**25**	**$7**	

Grasslands. Maintenance of desirable short grasses for goose browse in the Leavitt Tract would occur through the use of prescribed fire, herbicide, and/or mechanical control. The actual costs of maintenance would differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects would occur throughout the life of the CCP.

Table C-35. New Recurring Costs for Grasslands Projects ($ in thousands)

Project	Timing	Alternative 1 (Status Quo)		Alternative 2 (Preferred)		Alternative 3		Alternative 4		Priority
		Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	
Manage short grasses	Every year	-	-	80	$12	80	$12	80	$12	M
Total	**Every year**	-	-	**80**	**$12**	**80**	**$12**	**80**	**$12**	

Table C-36 summarizes the recurring costs that are needed to implement new wildlife and habitat maintenance projects at Deer Flat NWR.

Table C-36. Summary of New Recurring Costs Related to Wildlife and Habitat Management ($ in thousands)

Projects Maintaining Wildlife Habitats	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
		Cost	Cost	Cost	Cost
Emergent beds	Every year	-	$4	$4	$4
Shrub-steppe at Lake Lowell Unit	Every year	-	$23	$23	$23
Shrub-steppe at Snake River Islands Unit	Every year	-	$4-$18	$4-$18	$4-$18
Agriculture	Every year	-	$7	$7	$7
Grasslands	Every year	-	$12	$12	$12
Total	**Every year**	-	**$50-$64**	**$50-$64**	**$50-$64**

C.2.7 Summary of All Recurring Costs

Table C-37. Summary of Recurring Costs ($ in thousands)

Recurring Costs	Timing	Alternative 1 (Status Quo)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
		Cost	Cost	Cost	Cost
Public use	Every year	$11	$31	$77	$37
Public use	Every 3 years	$3	$3	$4	$3
Public use	Every 10 years	$19	$56	$52	$41
Wildlife and habitat	Every year	-	$50-$64	$50-$64	$50-$64
Total	**Every year**	**$11**	**$81-$95**	**$127-$141**	**$87-$101**
Total	**Every 3 years**	**$3**	**$3**	**$4**	**$3**
Total	**Every 10 years**	**$19**	**$56**	**$52**	**$41**

C.2.8 Staffing Costs

Table C-38. Current Permanent Staffing ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
Refuge Manager	PFT	GS-0485-12
Assistant Refuge Manager	PFT	GS-0485-11
Visitor Services Manager	PFT	GS-0025-11
Wildlife Biologist	PFT	GS-0486-09
Maintenance Worker	PFT	WG-4749-08
Administrative Assistant	PFT	WG-0303-06
Total Positions and Salary	**6**	**$448**

Table C-39. Current Temporary Staffing ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
Office Aide	STEP	GS-0303-4
Youth Conservation Corps Leader	TEMP	GS-0186-05
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Total Positions and Salary	**6**	**$47**

Table C-40. Current Operations Funded Interns ($ in thousands)

Interns	Status	Series, Position, and Grade
Environmental Education Specialist	TERM	Intern
Volunteer Coordinator	TERM	Intern
Biological Science Technician	SEASONAL	Intern
Total Positions and Salary	**3**	**$30**

Table C-41. Additional Staff Needed to Implement CCP ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
*Biological Science Technician	PFT	GS-0400-07
*Environmental Education Specialist	PFT	GS-1750-07
*Volunteer Coordinator	PFT	GS-0025-07
Law Enforcement Officer	PFT	GS-0025-09
Total Positions and Salary	**4**	**$217**

***If these positions were funded, the current interns would not be necessary.

C.3 Step-down Plans

The CCP is one of several plans necessary for Refuge management. The CCP provides guidance in the form of goals, objectives, and strategies for several Refuge program areas but may lack some of the specifics needed for implementation. Step-down management plans would be developed for individual program areas within approximately five years after the CCP's completion. All step-down plans require appropriate National Environmental Policy Act (NEPA) compliance, and implementation may require additional permits. Step-down plans for the Refuge follow. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans.

Table C-42. Status of Step-down Plans

Step-down Plans	Status
Safety Plan	Revised 2012
Integrated Pest Management Plan	Created 2012, included as CCP Appendix G
Fire Management Plan	Revised 2012, included as CCP Appendix K
Habitat Management Plan	Within 2 years of CCP completion
Visitor Services Plan	Within 2 years of CCP completion
Fisheries Management Plan	Within 5 years of CCP completion
Inventory and Monitoring Plan	Within 2 years of CCP completion
Hunt Plan(s) for new hunts	Within 3 years of CCP completion

Document continues on next page.

Appendix D. Wilderness Review

D.1 Introduction

The Deer Flat National Wildlife Refuge (Refuge) comprises two units, the 10,500-acre Lake Lowell Unit, which includes the 9,000-acre Lake Lowell, and the Snake River Island Unit, which comprises 104 islands totaling about 1060 acres (as calculated using GIS). The islands stretch along the Snake River for 113 river miles in Idaho and Oregon.

The Lake Lowell Unit supports several habitat types including riparian forest, shrub-steppe, and managed agricultural lands. Lake Lowell itself is an irrigation project managed by the Bureau of Reclamation, which operates the lake's water for agricultural purposes; the U.S. Fish and Wildlife Service (Service) manages the surface uses. The Snake River islands also support riparian and shrub-steppe/grassland habitats. Both units of the Refuge receive substantial and varied public use, while the islands are further influenced by river traffic, including all types of recreational boating.

D.2 Policy and Direction for Wilderness Reviews

Service policy (602 FW 3.4 C.(1)(c)) requires that wilderness reviews be completed as part of the comprehensive conservation planning process. This review includes the re-evaluation of Refuge lands existing during the initial 10-year review period of the Wilderness Act of 1964, as amended (16 U.S. Code [U.S.C.] 1131-1136), as well as new lands and waters added to the National Wildlife Refuge System (NWRS) since 1974. A preliminary inventory of the wilderness resources is to be conducted during pre-acquisition planning for new or expanded refuges (341 FW 2.4 B., Land Acquisition Planning). NWRS policy on Wilderness Stewardship (610 FW 1-5) includes guidance for conducting wilderness reviews (610 FW 4, Wilderness Review and Evaluation).

A wilderness review is the process of determining whether the Service should recommend NWRS lands and waters to U.S. Congress for wilderness designation. The wilderness review process consists of three phases: wilderness inventory, wilderness study, and wilderness recommendation.

D.2.1 Wilderness Inventory

The inventory is a broad look at a refuge to identify lands and waters that meet the minimum criteria for wilderness: size, naturalness, and outstanding opportunities for solitude or primitive and unconfined type of recreation. All areas meeting the criteria are preliminarily classified as Wilderness Study Areas (WSAs). If WSAs are identified, the review proceeds to the study phase.

D.2.2 Wilderness Study

During the study phase, WSAs are further analyzed

- For all ecological, recreational, cultural, economic, and symbolic values;
- For all resources, including wildlife, vegetation, water, minerals, and soils;
- For existing and proposed public uses;
- For existing and proposed refuge management activities within the area; and

- To assess the refuge's ability to manage and maintain the wilderness character in perpetuity, given the current and proposed management activities. Factors for evaluation may include, but are not limited to, staffing and funding capabilities, increasing development and urbanization, public uses, and safety.

We evaluate at least an All Wilderness Alternative and a No Wilderness Alternative for each WSA to compare the benefits and impacts of managing the area as wilderness as opposed to managing the area under an alternate set of goals, objectives, and strategies that do not involve wilderness designation. We may also develop Partial Wilderness Alternatives that evaluate the benefits and impacts of managing portions of a WSA as wilderness.

In the alternatives, we evaluate:

- The benefits and impacts to wilderness values and other resources;
- How each alternative will achieve the purposes of the Wilderness Act and the NWRS;
- How each alternative will affect achievement of refuge purpose(s) and the refuge's contribution toward achieving the Refuge System mission;
- How each alternative will affect maintenance and, where appropriate, restoration of biological integrity, diversity, and environmental health at various landscape scales;
- Other legal and policy mandates; and
- Whether a WSA can be effectively managed as wilderness by considering the effects of existing private rights, land status and service jurisdiction, refuge management activities and refuge uses, and the need for or possibility of eliminating Section 4(c) prohibited uses.

D.2.3 Wilderness Recommendation

If the wilderness study demonstrates that a WSA meets the requirements for inclusion in the National Wilderness Preservation System, a wilderness study report should be written that presents the results of the wilderness review, accompanied by a Legislative Environmental Impact Statement (LEIS). The wilderness study report and LEIS that support wilderness designation are then transmitted through the Secretary of the Interior to the President of United States, and ultimately to the U.S. Congress for action. Refuge lands recommended for wilderness consideration by the wilderness study report would retain their WSA status and be managed as "wilderness according to the management direction in the final CCP [comprehensive conservation plan] until Congress makes a decision on the area or we amended the CCP to modify or remove the wilderness recommendation" (610 FW 4.22 B). When a WSA is revised or eliminated, or when there is a revision in "wilderness stewardship direction, we include appropriate interagency and tribal coordination, public involvement, and documentation of compliance with NEPA [National Environmental Policy Act]" (610 FW 3.13).

The following constitutes the inventory phase of the wilderness review for Deer Flat National Wildlife Refuge.

D.3 Previous Wilderness Review

On June 21, 1972, the Director of the Bureau of Sport Fisheries and Wildlife sent a cover memo, draft wilderness study report, and mock-up brochure with a map to the Assistant Secretary of Fish, Wildlife, and Parks. The memo states that, with the Assistant Secretary's concurrence, the Bureau

would conduct a public hearing recommending that 68 islands, constituting approximately 734 acres within the Snake River Unit of the Deer Flat National Wildlife Refuge, qualify for wilderness designation within the National Wilderness Preservation System. (At the time the memo was written, the Snake River Islands Unit included 73 islands along 110 miles of the lower Snake River.) The Assistant Secretary signed his concurrence on June 21, 1972.

The draft wilderness study report, titled "Snake River Islands Wilderness Proposal, Snake River Unit, Deer Flat National Wildlife Refuge, Idaho-Oregon," states:

> This report was prepared pursuant to the Wilderness Act, Public Law 88-577. Publication of the findings and recommendation herein should not be construed as representing either the approval or disapproval of the Secretary of the Interior. The purpose of this report is to provide information and alternatives for further consideration by the Bureau of Sport Fisheries and Wildlife, Secretary of the Interior, and other Federal agencies.

The draft wilderness study report states in its conclusion:

> These refuge islands are mostly undeveloped and appear to be largely unaffected by man's works. However, the bordering riverbanks and adjacent lands are developed and intensively cultivated. Few islands are out of sight of some sort of man-made disturbance. Developments include irrigation pumping stations, power lines, towns, bridges, industrial plants, farm buildings and feed lots which in many cases extend to the water's edge. Since the river is relatively narrow with many of the islands in close proximity to the shore, man's presence is clearly visible and his activity can be heard from nearly every island in the complex. Hence the opportunity for solitude is diminished, yet the value of these islands as wilderness is not invalidated by sights and sounds from outside the proposed wilderness. Rather the value of these islands is commensurately enhanced by their mere existence amidst an area where man and his works dominate the landscape. Therefore, 68 islands containing approximately 734 acres in the Snake River Unit of the Refuge are considered suitable for inclusion in the National Wilderness Preservation System.

Now, more than 16 years later, during the December 2008 preplanning phase of the Deer Flat National Wildlife Refuge CCP, the Service conducted a wilderness review of Refuge lands at Deer Flat, both the Lake Lowell and Snake River Units, including re-evaluating the findings and conclusions of the 1972 draft wilderness study report.

D.4 Lands Considered Under This Wilderness Review

All Service-owned lands and waters within the Deer Flat National Wildlife Refuge–approved boundary were considered during this review of potential wilderness areas. For purposes of the review, the Refuge's two units are analyzed separately: (1) the Lake Lowell Unit and (2) the Snake River Unit, including 104 islands (1,200 acres) along 113 river miles from the Canyon-Ada County line, Idaho, to Farewell Bend, Oregon

D.5 Wilderness Inventory

D.5.1 Criteria for Evaluating Lands for Possible Inclusion in the National Wilderness Preservation System

The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136), provides the following description of wilderness:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act as an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.

The following criteria for identifying areas as wilderness are outlined in Section 2(c) of the Wilderness Act and are further expanded upon in NWRS policy (610 FW 4). The first three criteria are evaluated during the inventory phase; the fourth criterion is evaluated during the study phase.

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- Has at least five thousand acres of land or is of a sufficient size as to make practicable its preservation and use in an unimpaired condition; and
- May also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Criterion 3 is further defined in Section 3(c) of the Wilderness Act as (1) a roadless area of 5,000 contiguous acres or more, or (2) a roadless island. "Roadless" is defined as the absence of improved roads suitable and maintained for public travel by means of four-wheeled, motorized vehicles that are intended for highway use.

D.5.2 Process of Analysis

The following evaluation process was used in identifying the suitability of Refuge units for wilderness designation:

- Determination of Refuge unit sizes;
- Assessment of the units' capacity to provide opportunities for solitude or primitive and unconfined recreation; and
- Assessment of "naturalness" of Refuge units.

More detail on the actual factors considered and used for each assessment step follows.

D.5.2.1 Unit Size

Roadless areas meet the size criteria if any one of the following standards apply:

- An area with over 5,000 contiguous acres solely in the Service's ownership.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or an area that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

D.5.2.2 Outstanding Solitude or Primitive or Unconfined Recreation

A designated wilderness area must provide outstanding opportunities for solitude, or a primitive and unconfined type of recreation. Possession of only one of these outstanding opportunities is sufficient for an area to qualify as wilderness, and it is not necessary for one of these outstanding opportunities to be available on every acre. Furthermore, an area does not have to be open to public use and access to qualify under these criteria.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means nonmotorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. Primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

D.5.2.3 Naturalness and Wildness

The naturalness and wildness criterion states that the area must generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable. This criterion must be evaluated in the context of current natural conditions and societal values and expectations without compromising the original intent of the Wilderness Act. It is well recognized that there are few areas remaining on the planet that could be truly classified as primeval or pristine, with even fewer, if any, existing in the conterminous United States. Likewise, few areas exist that do not exhibit some impact from anthropogenic influences, be it noise, light, or air pollution; water quality or hydrological manipulations; past and current land management practices; road or trails; suppression of wildfires; invasions by nonnative species of plants and animals; or public uses. While allowing for the near-complete pervasiveness of modern society on the landscape, the spirit of the Wilderness Act is to protect lands that still retain the wilderness qualities of (1) natural, (2) untrammeled, and (3) undeveloped. These three qualities are cornerstones of wilderness character. For areas proposed or designated as wilderness, wilderness character must be monitored to determine baseline conditions and must thereafter be periodically monitored to assess the condition of these wilderness qualities. Proposed and designated wilderness areas by law and policy are required to maintain wilderness character through management and/or restoration in perpetuity.

Defining the first two qualities (natural and untrammeled) requires a knowledge and understanding of the ecological systems that are being evaluated as potential wilderness. Ecological systems have three primary attributes—composition, structure, and function. Composition refers to the components that make up an ecosystem, such as the habitat types, native species of plants and animals, and

abiotic (physical and chemical) features. These contribute to the diversity of the area. Structure is the spatial arrangement of the components that contributes to the complexity of the area. Composition and structure are evaluated to determine the naturalness of the area. Function refers to the processes that result from the interaction of the various components both temporally and spatially, and the disturbance processes that shape the landscape. These processes include but are not limited to predator-prey relationships, insect and disease outbreaks, nutrient and water cycles, decomposition, fire, wind storms, flooding, and both general and cyclic weather patterns. Ecological functions are evaluated to determine the wildness or untrammeled quality of the area.

The third quality assessment is whether an area is undeveloped. Undeveloped refers to the absence of permanent structures such as roads, buildings, dams, fences, and other human-made alterations to the landscape. Exceptions can be made for historic structures or structures required for safety or health considerations, providing they are made of natural materials and are relatively unobtrusive on the landscape.

General guidelines used for evaluating areas for wilderness potential during this wilderness inventory process include:

- The area should provide a variety of habitat types and associated abiotic features, as well as a nearly complete complement of native plants and wildlife indicative of those habitat types. Nonnative and invasive species should constitute a negligible portion of the landscape.
- The area should be spatially complex (vertically and/or horizontally) and exhibit all levels of vegetation structure typical of the habitat type, have an interspersion of these habitats, and provide avenues for plant and wildlife dispersal.
- The area should retain the basic natural functions that define and shape the associated habitats, including but not limited to flooding regimes, fire cycles, unaltered hydrology and flowage regimes, and basic predator-prey relationships including herbivory patterns.
- Due to their size, islands may not meet the habitat guidelines in the first two points above. Islands should, however, exhibit the natural cover type with which they evolved, and should continue to be shaped and modified by natural processes. Islands should be further analyzed during the study portion of the review, if they provide habitat for a significant portion of a population or key life cycle requirements for any resources of concern or listed species.
- Potential wilderness areas should be relatively free of permanent structures or human-made alterations. Areas may be elevated to the study phase if existing structures or alterations can be removed or remediated within a reasonable time frame, and prior to wilderness recommendation to the Secretary of the Interior.

D.5.2.4 Supplemental Values

The Wilderness Act states that an area of wilderness may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. Supplemental values of the area are optional, but the degree to which their presence enhances the area's suitability for wilderness designation should be considered. The evaluation should be based on an assessment of the estimated abundance or importance of each of the features.

D.6 Inventory Summary and Conclusion

Based on this inventory, the Lake Lowell Unit does not meet any of the basic criteria for inclusion in the National Wilderness Preservation System. The islands within the Snake River Unit meet the size criterion but do not meet the criteria for naturalness and wildness, nor do they provide outstanding opportunities for solitude or primitive or unconfined recreation. Based on this summary and conclusion, further evaluation of these lands under the wilderness study phase is unwarranted. Table D-1 summarizes the evaluation and conclusion for each unit.

Table D-1. Results of Wilderness Inventory for Deer Flat National Wildlife Refuge

Refuge Unit	Lake Lowell Unit	Snake River Islands Unit
(1) Unit Size: has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unconfined condition, or is a roadless island	No	Yes
(2) Naturalness and wildness: generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable	No	No
(3a) Outstanding opportunities for solitude	No	No
(3b) Outstanding opportunities for primitive and unconfined recreation	No	No
(4) Contains ecological, geological, or other features of scientific, educational, scenic, or historical value	N/A	N/A
Area qualifies as a wilderness study area (meets Criteria 1,2, and 3a, or 3b)	No	No

Document continues on next page.

Appendix E. Biological Resources of Concern

E.1 Introduction

Early in the planning process, the planning team cooperatively identified species, species groups, and communities of concern for Deer Flat National Wildlife Refuge (NWR or Refuge). A comprehensive list of these resources was compiled based upon review of numerous plans (see Section 1.8 of the Draft Comprehensive Conservation Plan/Environmental Impact Statement [CCP/EIS]), many of which highlight priority species or habitats for conservation. The comprehensive list of potential resources of concern is contained in Table E-3. In addition, a table of species and species groups specifically identified in establishing documents for the Refuge was compiled (Table E-1). A complete list of current species known to occur on the Refuge is located in Table E-5.

The comprehensive resources of concern table was further culled in developing a more targeted assemblage of priority resources of concern. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources. Table E-4 contains the priority resources of concern identified for the Refuge.

Definitions for the column headings in Table E-4 are as follows:

- **Focal Species:** Species selected as representatives or indicators for the overall condition of the conservation target. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal species may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Management will be focused on attaining conditions required by the focal species. Other species using the conservation target will generally be expected to benefit as a result of management for the focal species.
- **Habitat Type:** The general habitat description utilized by the focal species.
- **Habitat Structure:** The specific and measurable habitat attributes considered necessary to support the focal species.
- **Life History Requirement:** The general season of use for the focal species.
- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal species. The list is not comprehensive; see Table E-3 for the Refuge for a more complete list.

Table E-1. Summary of Species and Habitats Identified in Refuge Purposes

Conservation Target (species/species group or habitat)	Supporting Habitat Type	Life History Requirement	Supporting Documentation
Migratory birds	Open water, mudflats, and emergent plant beds for the reservoir	Breeding	Executive Order (E.O.) BIDEH 1032 (February 25, 1909)
Migratory birds and other wildlife	Open water, mudflats, and emergent plant beds for the reservoir	Breeding and wintering	E.O. 7655 "Establishing Deer Flat Migratory Waterfowl Refuge, Idaho" (Franklin D. Roosevelt; July 12, 1937)
Migratory birds and other wildlife	Island habitats: riparian and shrub steppe	Breeding and wintering	E.O. 7691 "Establishing the Snake River Migratory Waterfowl Refuge, Idaho" (Franklin D. Roosevelt; August 17, 1937)
Waterfowl (ducks and geese): migratory feeding/resting areas Geese: wintering	Migration and wintering habitat	Feeding, resting, and wintering	Migratory Bird Conservation Commission (MBCC) Memorandum No. 9 (February 20, 1951)
Mallard and western Canada geese: wintering (500,000-800,000 ducks and geese annually; terminus of flight from prairie provinces of Canada)	Marshland for nesting and for foraging, specifically smartweed and dwarfish "tealgrass"	Food for waterfowl	MBCC Memorandum No. 8 (February 15, 1955)

E.2 Biological Integrity, Diversity, and Environmental Health

Natural Plant and Waterfowl Populations with Natural Processes and Limiting Factors

Table E-2 provides an overview of habitats with the plant communities and animals typically associated with that habitat type. Not all of the species presented in this table have been documented on Deer Flat NWR.

Table E-2. Summary of Biological Integrity, Diversity, and Environmental Health (BIDEH)

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
Alkaline wetlands	Seasonal; semipermanent; flat basin characterized by high annual/seasonal variability in water and salinity levels; mosaic, ephemeral layers of wet grasslands, shrubs, perennial forbs; fine sandy loam/silt loam alkaline soils. Layers of vegetation include • Reed, sedge, rush spp., Sandberg's bluegrass, Nevada bluegrass, redtop, common spikerush, inland saltgrass, foxtail barley, Nuttall's alkaligrass, alkali sacaton, duckweed, rough bugleweed, willowherb, alkali mallow, milkweed spp., sumpweed, and common cattail; and • Sand dropseed, beardless wildrye, mugwort, western wheatgrass, greasewood spp., yarrow, gray/green rabbitbrush, and golden currant. *Potential conservation species: migrating, wintering, breeding waterfowl species, American avocet, Wilson's phalarope, dunlin, sandpiper, green-backed heron, long-billed curlew, killdeer, black-necked stilt, snowy egret, peregrine falcon, northern harrier,*	Seasonal and annual levels of precipitation and water levels; low/flat land areas developed with intermittent natural springs. Seasonal drying with poorly drained soils. Broad natural channel basin area possibly formed from glacial flood drainage.	Currently nonexistent; Lake Lowell reservoir created in 1906 by damming three low areas in a natural broad channel of Deer Flat region. Altered hydrology.

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	sandhill crane, mallard, and Great Basin spadefoot toad.		
Shrub-steppe	Semiarid; characterized by three layers of vegetation: • Dominant sagebrush (*Artemisia* spp.) <2 m including bitterbrush, fourwing saltbush, gray/green rabbitbrush, greasewood, spiny horsebrush, and spiny hopsage; • Understory of native bunch grasses and forbs including bluebunch wheatgrass, Indian ricegrass, squirreltail bottlebrush, steppe bluebunch, Idaho fescue, Great Basin wildrye, Sandberg's bluegrass, perennial bunchgrasses, perennial and annual herbs, perennial forbs; and • Microbiotic crust composed of algae, lichens, and mosses. *Potential conservation species: peregrine falcon, ferruginous hawk, Swainson's hawk, American kestrel, horned lark, grasshopper sparrow, meadowlark, loggerhead shrike, burrowing owl, northern pygmy-owl, pygmy rabbit, western longnose snake, black-throated sparrow, sage sparrow, sage thrasher, black-collared lizard, and southern Idaho ground squirrel.*	Periodic fire; shallow well-drained soils.	Loss of perennial grasses; invasive species encroachment including cheatgrass, Canada thistle, broadleaved pepperweed, hoary cress, rush skeletonweed, jointed goatgrass, Scotch thistle, and nonnative grasses. Altered fire regime/return interval; past grazing/soil disturbance; loss of native habitat; fragmentation. Widespread presence of cheatgrass may cause unnatural and severe fires to sagebrush-steppe habitat.
Emergent wetlands • Riverine • Palustrine • Persistent • Nonpersistent	Seasonal; semipermanent; developing and varying according to seasonal natural spring inflow, river flow, and soil texture/ permeability. Diversity of hydric vegetation includes sedge, rush, reed spp., flatsedge, mannagrass, rough	Periodic flooding; seasonal fluctuations/drying but more permanent water situation than typical seasonal wetlands; natural springs.	Invasive species including Russian olive, salt cedar, purple loosestrife, poison hemlock, Bohemian knotweed, Japanese knotweed, houndstongue, and white bryony. Flood depth and duration; habitat

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	bentgrass, bulrush, stinging nettle, common cattail, water plantain, milkweed spp., smartweed, yellowcress, goldenrod, smooth sumac, wood's rose, and peachleaf willow. *Potential conservation species: migrating, wintering, breeding waterfowl species, cinnamon teal, northern pintail, lesser scaup, Canada geese, white pelican, western grebe, tundra swan, shorebird species, red-necked phalarope, American bittern, long-billed curlew, violet-green swallow, marsh wren, snowy egret, and northern leopard frog.*		loss; altered water regimes. Water quality issues include pollution, temperature, and contaminants. Disturbance from public uses. Trophic bioaccumulation of chemical contaminants and heavy metals.
Riverine islands • Shrub-scrub	Seasonal; semipermanent; permanent, developing, and varying according to seasonal river flow. Native canopy and shrub layer dominates include poplar, willow, sagebrush, rabbitbrush, hawthorn, wheatgrass, reedgrass, reed, and sedge defined by >30% canopy cover of shrubs or small trees <6 m (20 feet) in height. *Potential conservation species: bald eagle, osprey, white-throated swift, Barrow's goldeneye, bufflehead, white-winged scoter, western grebe, red-breasted merganser, canyon wren, sage thrasher, snowy egret, double-crested cormorant, beaver, river otter, Canada goose, bank swallow, mourning dove, black-crowned night-heron, yellow-breasted chat, green-tailed towhee, white pelican, black rosy-finch, gray rosy-finch, trumpeter swan, and shining flatsedge.*	Periodic, seasonal flood events; riparian habitat connectivity; submergent vegetation, upland scrub. Spring flows create scours and cut new channels that isolate islands.	Encroachments of invasive plant species include salt cedar, Russian olive, poison hemlock, cheatgrass, and nonnative grasses. Pollution; species predation. Nonfunctioning floodplain; dams reduce/alter flood events on Snake River; altered water/channel regimes. Past grazing and invasive species produce competition and soil binding; lack of silt deposition; loss of habitat.
Riverine channel	Open, generally flowing water; potentially	Periodic flooding with flood energy	Agriculture ad open pasture; excess

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
• Lower perennial	supporting rearing anadromous fish; supports resident fish, affording fish passage throughout watershed. *Potential conservation species: Canada goose, tundra swans, American coot, osprey, bald eagle, double-crested cormorant, pied-billed grebe, western grebe, caspian tern, resident fish, white sturgeon, and Idaho springsnail.*	variable depending on location of stream/river in landscape, perennial water flows, open water, submergent vegetation.	nutrients and pollutants. Contaminants, siltation, water quality, and increased temperature. Altered hydrology; lack of adequate flows to maintain dynamic river channel morphology. Encroachment of invasive species includes salt cedar and Russian olive. Encroachment of residential and commercial development.
Large flocks of migrating/wintering waterfowl	Snake River Islands; Great Basin wetlands. *Potential conservation species: most waterfowl species identified in Purpose documents and table of potential resources of concern.*	Historical, predominant, Pacific population of western Canada geese and waterfowl species. Riparian habitats of river islands, emergent wetlands, alkaline marsh, and natural springs provide migratory connectivity; regions of critical breeding and wintering areas. Periodic flooding of river plain and lowland areas naturally provides islands of refuge and forage.	Seasonal drawdown of lake for agriculture irrigation reduces wetland area. Damming; manipulated river hydrology. Lack of periodic fire. Residential and commercial development within floodplain. Water quality issues; pollution, contaminants; increased temperature. Human disturbance from recreational activities.

Table E-3. Deer Flat National Wildlife Refuge Potential Resources of Concern

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
BIRDS *known to nest on Refuge																	
Migrating waterfowl	X	X		X	X												
Nesting waterfowl	X	X		X	X												
American avocet * (*Recurvirostra americana*)	X	X					23H	5			G5, S5B, S3		X				
American bittern * (*Botaurus lentiginosus*)	X	X					19M		M-10								
American coot * (*Fulica americana*)	X	X															
American golden plover (*Pluvialus dominica*)	X																
American kestrel * (*Falco sparverius*)	X	X															
American robin * (*Turdus migratorius*)		X															
American tree sparrow (*Spizella arborea*)		X															PR
American white pelican (*Pelecanus erythrorhynchos*)	X	X					24H		H	X	G3, S1B	Type 2				X	
American wigeon* (*Anas americana*)	X	X			X										X		
Ash-throated flycatcher (*Myiarchus tuberculifer*)							18M										
Baird's sandpiper (*Calidris bairdii*)	X	X						1									
Bald eagle * (*Haleaeetus leucocephalus*)	X	X					19M				G4, S3B, S4N, E	Type 1				X	PR
Bank swallow * (*Riparia riparia*)		X															
Barrow's goldeneye (*Bucephala islandica*)	X	X			X	X	24H					Type 5					

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Belted kingfisher * (*Ceryle alcyon*)		X															
Black rosy-finch (*Leucosticte atrata*)		X					23H				G4, S3						PR
Black tern (*Chlidonias niger*)	X	X					18M		H	X	G4, S1B, S1	Type 3				X	
Black-bellied plover (*Pluvialis squatarola*)	X							2									
Black-billed magpie * (*Pica hudsonia*)							19H										
Black-capped chickadee * (*Poecile atricapillus*)							13M										
Black-chinned hummingbird * (*Archilochus alexandri*)		X					23H										
Black-crowned night heron * (*Nycticorax nycticorax*)	X	X							M-9	X	G5, S2B						
Black-necked stilt * (*Himantopus mexicanus*)	X	X					18H	5			G5, S3B, S3						
Black-throated gray warbler (*Dendroica nigrescens*)							22H										PR
Black-throated sparrow (*Amphispiza bilineata*)		X					21M				S2B	Type 4				X	MA
Blue-winged teal * (*Anas discors*)	X	X			X												
Bohemian waxwing (*Bombycilla garrulus*)																	PR
Bonaparte's gull (*Larus philadelphia*)	X									X							
Brewer's blackbird * (*Euphagus cyanocephalus*)							15M					Type 5					
Brewer's sparrow (*Spizella breweri*)							24H				G5, S3B	Type 3	X	X			MA

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Broad-tailed hummingbird * (*Selasphorus platycercus*)		X															
Brown creeper (*Certhia americana*)							18H										
Bufflehead (*Bucephala albeola*)	X	X			X		18M										
Bullock's oriole * (*Icterus bullockii*)							19M										
Burrowing owl (*Athene cunicularia*)		X	SOC				19M				G4, S2B, S2	Type 5	X	X			
Bushtit * (*Psaltriparus minimus*)							18M										
California gull * (*Larus californicus*)	X						19M		M-10	X	G5, S2B, S3N						
Calliope hummingbird (*Stellula calliope*)							23H					Type 3					PR
Canada goose * (*Branta canadensis*)	X	X		X	X												
Canvasback (*Aythya valisineria*)	X				X		20M				S2N				X		
Canyon wren * (*Catherpes mexicanus*)		X					18M										
Caspian tern * (*Sterna caspia*)	X	X					17M		M-10	X	G5, S2B						
Cassin's finch (*Carpodacus cassinii*)							19M					Type 5					MA
Cassin's vireo (*Vireo cassinii*)							X										
Cattle egret (*Bubulcus ibis*)	X									X	G5, S2B						
Chipping sparrow (*Spizella passerina*)							16M										

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Cinnamon teal * (*Anas cyanoptera*)	X	X			X	X	21H										
Clark's grebe (*Aechmophorus clarkii*)	X						20M		M-10	X	G5, S2B						
Clark's nutcracker (*Nucifraga columbiana*)																	
Common goldeneye (*Bucephala clangula*)	X	X			X												
Common grackle (*Quiscalus quiscula*)	X	X															
Common loon (*Gavia immer*)	X						X		H		G5, S1B, S2N						
Common merganser * (*Mergus merganser*)	X	X			X												
Common poorwill (*Phalaenoptilus nuttallii*)							21M										
Common redpoll (*Carduelis flammea*)	X																
Common snipe * (*Gallinago gallinago*)	X							3									
Common tern (*Sterna hirundo*)	X								M-10	X				X			
Cooper's hawk (*Accipiter cooperii*)	X																
Dark-eyed junco (*Junco hyemalis*)							13M										
Double-crested cormorant * (*Phalacrocorax auritus*)	X	X								X							
Dunlin (*Calidris alpina*)	X	X						2									
Eared grebe * (*Podiceps nigricollis*)	X						15M		H-9	X							

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Ferruginous hawk (*Buteo regalis*)	X	X					23H				G4, S3B	Type 3	X	X		X	
Forster's tern (*Sterna forsteri*)	X						20M		H-10/ M-9	X	G5, S1B, S1					X	
Fox sparrow (*Passerellailiaco*)																	
Franklin's gull (*Larus pipixcan*)	X						24H		H	X	G4G5, S2B					X	
Gadwall* (*Anas strepera*)	X				X	X	17M										
Glaucous gull (*Larus hyperboreus*)	X									X							
Golden eagle (*Aquila chrysaetos*)	X						19H						X				
Golden-crowned kinglet (*Regulus satrapa*)	X																
Grasshopper sparrow (*Ammodramus savannarum*)		X					20H				G5, S2B	Type 5		X		X	MA
Gray flycatcher (*Empidonax wrightii*)	X						24H										
Great blue heron * (*Ardea herodias*)	X									X							
Great egret (*Ardea alba*)	X									X	G5, S1B						
Greater white-fronted goose (*Anser albifrons*)	X	X			X										X		
Greater yellowlegs (*Tringa melanoleuca*)	X							3									
Green heron * (*Butorides virescens*)	X	X								X							
Green-tailed towhee (*Pipilo chlorurus*)		X					19M					Type 5				X	PR

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Green-winged teal * (*Anas crecca*)	X	X			X												
Gyrfalcon (*Falco rusticolus*)	X																PR
Harlequin duck (*Histrionicus histrionicus*)	X				X	X	20M				G4, S1B	Type 4			X		
Harris' sparrow (*Zonotrichia querula*)														X			
Herring gull (*Larus argentatus*)	X									X							
Hooded merganser * (*Lophodytes cucullatus*)	X	X			X		22H				G5, S2B, S3N						
Horned grebe (*Podiceps grisegena*)	X										S1						
Horned lark * (*Eremophila alpestris*)		X												?			
Indigo bunting (*Passerina cyanea*)																	PR
Killdeer * (*Charadrius vociferus*)	X	X					19H	3									
Lapland longspur (*Calcarius lapponicus*)																	PR
Lark sparrow * (*Chondestes grammacus*)							20H										
Lazuli bunting (*Passerina amoena*)		X					19M										
Least bittern (*Ixobrychus exilis*)	X								M-9								
Least sandpiper (*Calidris minutilla*)	X	X						4									
Lesser scaup (*Aythya affinis*)	X	X			D		17M				G5, S3				X		

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Lesser yellowlegs (*Tringa flavipes*)	X							2									
Lewis's woodpecker * (*Melanerpes lewis*)		X					23H				G4, S3B	Type 3	X	X		X	MA
Lincoln's sparrow (*Melospiza lincolnii*)																	PR
Loggerhead shrike * (*Lanius ludovianus*)		X	SOC				20H					Type 3	X	X		X	
Long-billed curlew (*Numenius americanus*)	X	X	SOC				23H	5			G5, S2B	Type 5	X	X		X	
Long-billed dowitcher (*Limnodromus scolopaceus*)	X							5									
MacGillivray's warbler (*Oporornis tolmiei*)							21H										
Mallard * (*Anas platyrhychos*)	X	X			X												
Marbled godwit (*Limosa fedoa*)	X							4			S2		X	X			
Marsh wren * (*Cistothorus palustris*)		X					20M										
Mountain bluebird (*Sialia currucoides*)							X										PR
Mountain chickadee (*Poecile gambeli*)							16M										
Mourning dove * (*Zenaida macroura*)		X		X											X		
Nashville warbler (*Vermivora ruficapilla*)							20M										
Northern flicker * (*Colaptes auratus*)		X					15M										
Northern goshawk (*Accipiter gentilis*)	X		SOC				21H					Type 3				X	

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Northern harrier * (*Circus cyaneus*)	X	X					18M							X			
Northern pintail* (*Anas acuta*)	X	X			X D						G5, S5B, S2N				X		
Northern pygmy-owl (*Glaucidium gnoma*)		X					X					Type 5					
Northern rough-winged swallow * (*Stelgidopteryx serripennis*)							19M										
Northern shoveler * (*Anas clypeata*)	X	X			X						S2N						
Long-tailed duck – Oldsquaw (*Clangula hyemalis*)	X	X			X												
Olive-sided flycatcher (*Contopus cooperi*)							21H					Type 3		X			MA
Orange-crowned warbler (*Vermivora celata*)																	
Osprey * (*Pandion haliaetus*)	X	X					17M										
Pectoral sandpiper (*Calidris melanotos*)	X							1									
Peregrine falcon (*Falco peregrinus*)	X	X					19M				G4T3, S2B, E	Type 3	X	X		X	PR
Pied-billed grebe * (*Podilymbus podiceps*)	X	X															
Pine siskin (*Carduelis pinus*)							14M										
Plumbeous vireo (*Vireo plumbeus*)							22H										
Prairie falcon (*Falco mexicanus*)	X	X					24H					Type 3	X	X			
Red knot (*Calidris canutus*)	X							1						X			

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Red-breasted merganser (*Mergus serrator*)	X	X			X												
Red-breasted nuthatch (*Sitta canadensis*)							14M										
Redhead * (*Aythya americana*)	X	X			X	X	22H										
Red-necked phalarope (*Phalaropus lobatus*)	X	X						4									
Red-tailed hawk * (*Buteo jamaicensis*)	X	X															
Ring-billed gull * (*Larus delawarensis*)	X						15M			X							
Ring-necked duck (*Aythya collaris*)	X				X		20M								X		
Rock wren * (*Salpinctes obsoletus*)							19H										
Ross's goose (*Chen rossii*)	X	X			X												
Rough-legged hawk (*Buteo lagopus*)	X	X															PR
Ruddy duck* (*Oxyura jamaicensis*)	X				X	X	19M				S2N						
Rufous hummingbird (*Selasphorus rufus*)							22H							X			MA
Sabine's gull (*Xema sabini*)	X									X							
Sage sparrow (*Amphispiza belli*)		X					25H					Type 3	X			X	PR
Sage thrasher * (*Oreoscoptes montanus*)		X					22H					Type 5				X	PR
Sanderling (*Calidris alba*)	X							1					X				

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Sandhill crane (*Grus canadensis*)	X	X		X			24H				G5, S3B						
Savannah sparrow * (*Passerculus sandwichensis*)		X															
Semi-palmated plover (*Charadrius semipalmatus*)	X							3									
Semi-palmated sandpiper (*Calidris pusilla*)	X	X						1									
Sharp-shinned hawk (*Accipiter striatus*)	X	X					18H										
Short-eared owl * (*Asio flammeus*)							23H				G5, S4	Type 5		X			MA
Snow bunting (*Plectrophenax nivalis*)																	PR
Snow goose (*Chen caerulescens*)	X	X			X										X		
Snowy egret (*Egretta thula*)	X	X					14M		H-9/ M-10	X	G5, S2B					X	
Snowy owl (*Nyctea scandiaca*)																	PR
Solitary sandpiper (*Tringa solitaria*)	X							2					X	X			
Song sparrow * (*Melospiza melodia*)		X															
Sora * (*Porzana carolina*)	X																
Spotted sandpiper * (*Actitus macularius*)	X	X						3									
Spotted towhee * (*Pipilo maculatus*)							17M										
Stilt sandpiper (*Calidris himantopus*)	X	X						1						X			

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Swainson's hawk * (*Buteo swainsoni*)	X	X					23H				G5, S3B	Type 5	X	X			MA
Swainson's thrush (*Catharus ustulatus*)																	
Townsend's solitaire (*Myadestes townsendi*)							19M										
Townsend's warbler (*Dendroica townsendi*)							22H										
Trumpeter swan (*Cygnus buccinator*)	X	X	SOC	X	X	X	26H				G4, S1B, S2N	Type 3			X	X	
Tundra swan (*Cygnus columbianus*)	X	X		X	X												
Varied thrush (*Ixoreus naevius*)							22H										PR
Vaux's swift (*Chaetura vauxi*)	X						23H					Type 5					
Vesper sparrow * (*Pooecetes gramineus*)							16M										
Violet-green swallow * (*Tachycineta thalassina*)		X					17M										
Virginia rail * (*Rallus limicola*)	X																
Warbling vireo (*Vireo gilvus*)							18M										
Western grebe * (*Aechmophorus occidentalis*)	X	X					22H		H-9/ M-10	X	G5, S2B						
Western kingbird * (*Tyrannus jerticalis*)																	
Western meadowlark * (*Sturnella neglecta*)		X					18H										
Western sandpiper (*Calidris mauri*)	X	X						4									

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Western screech owl * (*Otus kennicottii*)		X															
Western tanager * (*Piranga cudoviciana*)							20H										
Western wood-pewee (*Contopus sordidulus*)							17M										
White-faced ibis (*Plegadis chihi*)	X	X	SOC				20H		M	X	G5, S2B	Type 4					
White-throated sparrow (*Zonotrichia albicollis*)																	PR
White-throated swift * (*Aeronautes saxatalis*)	X	X					18M										MA
White-winged scoter (*Melanitta fusca*)	X	X			XD												
Willet (*Catoptrophorus semipalmatus*)	X						20M	4									
Willow flycatcher (*Empidonax trailii*)							21H					Type 3					MA
Wilson's phalarope (*Phalaropus tricolor*)	X	X					21M	5			G5, S3B	Type 5	X	X			
Winter wren (*Troglodytes troglodytes*)																	
Wood duck * (*Aix sponsa*)	X				X		19M								X		
Yellow warbler * (*Dendroica petechia*)							18H										
Yellow-billed cuckoo* (*Coccyzus americanus*)		X	SOC				19M				G5, S2B	Type 1	C	LT /LE			
Yellow-breasted chat * (*Icteria virens*)		X															

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Yellow-headed blackbird * (*Xanthocephalus xanthocephalus*)		X					18M										PR
Yellow-rumped warbler (*Dendroica coronata*)							16M										
MAMMALS																	
Pygmy rabbit (*Brachylagus idahoensis*)		X														X	
Southern Idaho ground squirrel (*Spermophilus brunneus endemicus*)		X	SOC														
AMPHIBIANS																	
Northern leopard frog (*Rana pipiens*)		X	SOC								G5, S2	Type 2					
Western toad (*Bufo boreas*)		X	SOC														
REPTILES																	
Western longnose snake (*Rhinicheilus lecontei*)		X									G5, S2	Type 3					

Table E-3. Category Codes: Deer Flat National Wildlife Refuge Potential Resources of Concern

Category Codes:	* known to nest on Refuge either Lake Lowell or Snake River Islands
Refuge Purposes:	X - species groups benefiting from waterfowl/Refuge management (1967 Refuge Prospectus)
Biological Diversity, Integrity, and Environmental Health:	X - Refuge-compatible species
Federal T and E:	LE - Endangered
	LT -Threatened
	SOC - Species of Concern
Pacific Flyway Waterfowl Plan:	X - species benefiting from waterfowl plan
North American Waterfowl Management Plan:	D - decreasing long-term trend
Idaho Partners in Flight:	Idaho Bird Conservation (Version 1.0 January 2000)
	H - High priority breeding
	M - Moderate priority in habitat management and monitoring plans/high responsibility
	Bold face - Primary breeding habitat available on Refuge
Intermountain West Regional Shorebird Plan:	5 - Critically important
	4 - Very important
	3 - Important
	2 - Slightly important
	1 - Unimportant
Idaho CWCS:	Species of Greatest Conservation Need
	S1- Critically imperiled in Idaho
	S2 - Imperiled in Idaho
	S3 - Vulnerable in Idaho
	S4 - Apparently secure in Idaho; some cause for long-term concern due to declines or other factors
	S5 - Secure in Idaho; common, widespread, abundant
	G4 - Apparently secure globally; some cause for long-term concern due to declines or other factors
	G5 - Secure globally; common, widespread, abundant
	N - Nonbreeding
	B - Breeding, conservation status refers to breeding populations of this species
	E - State Endangered
	SNR - Unranked: conservation status not yet assessed
BLM Sensitive Species List:	Type 1 - Threatened, endangered, proposed and candidate
	Type 2 - Rangewide/Globally imperiled
	Type 3 - Regional/State imperiled
	Type 4 - Peripheral
	Type 5 - Watch list
Birds of Conservation Concern: Region 1 USFWS	
BCR 9 and 10	X – Regional Birds of Conservation Concern
BCC/National:	X – National Birds of Conservation Concern
GBBDC:	X - Gamebirds below desired condition

The Nature Conservancy (TNC) Columbia Plateau Ecoregional Assessment:	X - Species/Habitats of concern
Landbird Conservation Plan:	IM - Immediate Action
	MA - Management
	PR - Longterm Planning and Responsibility
Other Plans:	Addressed in Plan, no specific category

Sources/Criteria for Potential Resources of Concern Table

[a] Deer Flat National Wildlife Refuge Purpose: E.O. 7655, July 12, 1937; 16 U.S.C. 715d (Migratory Bird Conservation Act); 16 U.S.C. 460k-1 (Refuge Recreation Act).

[b] USFWS Endangered Species Program.

[c] SPPCG (Subcommittee on Pacific Population of Canada Geese). 2000. Pacific Flyway management plan for the Pacific Population of Canada Geese (unpublished report). Pacific Flyway Study Committee, U.S. Fish and Wildlife Service. Portland, OR. 31 pp.

[d] NAWMPC (North American Waterfowl Management Plan Committee). 2004. North American waterfowl management plan. Implementation framework: strengthening the biological foundation. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales. 106 pp.

[e] IWJV (Intermountain West Joint Venture) Idaho Steering Committee. 2005. Coordinated implementation plan for bird conservation in Idaho. Appendix A, pp. 34-42. Available at: http://saltshake.com.s50844.gridserver.com/?get=1.28.148. Accessed May 18, 2012.

[f] Idaho Partners in Flight 2000. Idaho Bird Conservation Plan, Version 1.0: Appendices 2 and 3 pp. 118-123. 166 pp.

[g] Brown, S., C. Hickey, B. Harington, and R. Gill, eds. 2001. United States shorebird conservation plan, 2nd ed. Manomet Center for Conservation Sciences. Manomet, MA. 64 pp.

[h] Oring, L.W., L. Neel, and K.E. Oring. 2000. U.S. shorebird conservation plan. Intermountain West regional shorebird plan version 1.0. Available at: shorebirdplan.fws.gov/RegionalShorebird/downloads/IMWEST4.doc. Accessed May 18, 2012.

[i] Kushlan, J.A., M. Steinkamp, K. Parsons, J. Capp, M.A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R.M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J.E. Saliva, B. Syderman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird conservation for the Americas: the North American waterbird conservation plan, version 1. Waterbird Conservation for the Americas. Washington, D.C. 84 pp.

[j] IDFG (Idaho Department of Fish and Game). 2005. Idaho comprehensive wildlife conservation strategy. Idaho Conservation Data Center, Idaho Department of Fish and Game. Boise, ID. Available at: http://fishandgame.idaho.gov/public/wildlife/cwcs/. Accessed May 18, 2012.

[k] BLM (Bureau of Land Management). 2011. BLM sensitive species. Available at: http://www.blm.gov/wy/st/en/programs/pcp/species/sensitive.html. Accessed May 25, 2012.

[l] USFWS (U.S. Fish and Wildlife Service). 2002c. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp. Available at: http://www.fws.gov/midwest/wind/references/BCC2002.pdf. Accessed June 11, 2012.

[m] USFWS Division of Migratory Bird Management. 2007. Gamebirds below desired condition (draft). Available at: http://library.fws.gov/bird_publications/gamebirds_conditions.pdf. Accessed June 11, 2012.

[n] Andelman S., K. Gillem, C. Groves, C. Hansen, J. Humke, T. Klahr, L. Kramme, B. Moseley, M. Reid, D. Vander Schaaf, M. Coad, C. Deforest, C. Macdonald, J. Baumgartner, J. Hak, C. Hansen, S. Hobbs, L. Lunte, L. Smith, and C. Soper. 1999. The Columbia Plateau ecoregional assessment: a pilot effort in ecoregional conservation. The Nature Conservancy. Available at: http://waconservation.org/projects/ecoregions/. Accessed May 25, 2012.

[o] Altman, B. and A. Holmes. 2000. Conservation strategy for landbirds in the Columbia Plateau of Eastern Oregon and Washington. Version 1.0. Oregon-Washington Partners in Flight. 97 pp.

Table E-4 includes focal species and habitat types and structures commonly associated with these species. Not all species listed in this table have been documented on the Refuge.

Table E-4. National Wildlife Refuge System Priority Resources of Concern at the Refuge.

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
Riparian Forests: Lake Lowell and River Islands				
Yellow warbler *Dendroica petechia*	Deciduous forest and shrub	Mid- to late succession multilayered, varied forest >70% cover in shrub layer (<10 feet), subcanopy layer (>10 feet and below the canopy foliage) with subcanopy layer contributing >40% of the total cover, canopy tree closure >20% with native species including cottonwood, willow, ash, maple, red-osier dogwood, elderberry, golden currant.	Nesting, foraging, and migrating	Bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, mule deer, red fox
Song sparrow *Melospiza melodia*		Early succession, continuous mesic and patchy shrub layer (3-12 feet tall) with 30%-80% cover with scattered herbaceous openings; canopy trees >12 feet covering <20%; near water. Dense underbrush and deep grass of native species including willows, elm, wild rose, golden currant, elderberry, Great basin wildrye, and bluebunch wheatgrass.	Nesting, foraging, and migrating	White-crowned sparrow, California quail, western tanager, calliope hummingbird, black-throated sparrow, gray flycatcher, vesper sparrow, savannah sparrow, common yellowthroat, western terrestrial garter snake
Marsh Wetlands				
Mallard *Anas platyrhychos*	Palustrine emergent, freshwater marsh	Seasonally flooded shallow, marsh <4-36 inches deep; flooded by irrigation inflow April through October, seasonal precipitation November through March; 30%-70% cover of emergent vegetation, native seed bearing species	Nesting, foraging, and wintering	Wood duck, great blue heron, American wigeon, black-crowned night heron, marsh wren, red-winged blackbird, yellow-headed blackbird, western meadowlark, mourning dove, barn owl, pied-billed grebe, sora, American kestrel, painted turtle

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
		including cattail, bulrush spp., reed spp., smartweed, and duckweed.		
Emergent Vegetation: Lake Lowell				
Western grebe ***Aechmophorus occidentalis***	Lacustrine, littoral	Shallow-flooded emergent community characterized by 50%-75% cover of moist-soil plants (e.g., smartweeds) interspersed with Baltic rush, spikerush, bulrush, salt grass, bur-reed, and cattail. Minimal human disturbance during late spring and summer.	Nesting and loafing	Pied-billed grebe, Clark's grebe, eared grebe, canvasback, American coot
Canada goose ***Branta canadensis***			Foraging, migrating, and wintering	Tundra swan, double-crested cormorant, caspian tern, black tern, Bonaparte's gull, glaucous gull, Franklin's gull, Sabine's gull
Mallard ***Anas platyrhychos***			Foraging, migrating, and wintering	Blue-winged teal, canvasback, ruddy duck, American wigeon, gadwall, green-winged teal, northern shoveler, redhead, common merganser, northern pintail, northern leopard frog
Shoreline Mudflats: Lake Lowell				
Long-billed dowitcher ***Limnodromus scolopaceus***	Nonpersistent; lacustrine	Sparse to no vegetation; shallow flooding (<4 inches) during winter/spring; exposed during summer/fall by water withdrawals; substrate of silt, sand, and gravel; minimal human disturbance during late spring and summer.	Foraging, loafing, and migrating	American avocet, virginia rail, sora, Baird's sandpiper, American bittern, great blue heron, killdeer, common snipe, greater yellowlegs, lesser yellowlegs, willet, least bittern, western sandpiper, semi-palmated plover, black-bellied plover, cattle egret, white-faced ibis, great egret, solitary sandpiper, Wilson's phalarope
Open Water: Lake Lowell				
American white pelican ***Pelecanus erythrorhynchos***	Lacustrine; limnetic	Unconsolidated, open deep water with abundant fish; open water adjacent to emergent vegetation; minimal human disturbance.	Foraging, loafing, and migratory	Osprey, bald eagle, common loon, Clark's grebe, common merganser, double-crested cormorant, Canada goose, mallard, California gull, caspian tern, ring-billed gull, black tern, common tern, tundra swan
Western grebe ***Aechmophorus occidentalis***				
Shrub-steppe: Lake Lowell and River Islands				
Sage thrasher ***Oreoscoptes montanus***	Reservoir uplands: shrub-steppe Tall mature sagebrush in	Unfragmented stands of sagebrush spp. >50 acres; mosaic open (5%) to moderate (25%) shrub cover; variety of ages and	Nesting, foraging, and migrating	Swainson's hawk, northern harrier, ferruginous hawk, prairie falcon, long-billed curlew, killdeer, gray flycatcher, western meadowlark, sage sparrow, Brewer's sparrow, green-tailed

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
	relatively large patches	heights associated with patchy distribution including bitterbrush, saltbrush, rabbitbrush; open understory of bare ground, native perennial forbs and bunchgrasses including bluebunch wheatgrass, Great basin wildrye, and Idaho fescue.		towhee, rock wren, vesper sparrow, horned lark, grasshopper sparrow, black-tailed jackrabbit, badger, yellow-bellied marmot, mountain cottontail
Loggerhead shrike ***Lanius ludovianus***		Open stands, 20-40 acres of sagebrush, bitterbrush, greasewood, native shrub, and small trees >50 inches with low ground cover; flat topography <10% grade; near thick patches of shrub; short native grassland.		
Canada goose ***Branta canadensis***	Riverine islands: shrub-steppe Permanent cover of sagebrush; semipermanent, emergent willow	Tall shrub cover <3% consisting of dense residual vegetation; mix of tall native grasses, forbs, and low shrub cover; <50 m from wetlands/open water. Vegetation including sagebrush spp., fourwing saltbush, rabbitbrush spp., golden currant, wild rose, willow spp., Great basin wildrye, bluebunch wheatgrass, Indian ricegrass, western wheatgrass, and smooth brome.	Nesting, wintering, and migrating	Black rosy-finch, gray rosy-finch, green-tailed towhee, yellow-breasted chat, rock wren, canyon wren, vesper sparrow, cliff swallow, chukar, red-tailed hawk, golden eagle, bank swallow, white-throated swift, raccoon, mink
Mallard ***Anas platyrhychos***				
Agricultural				
Canada goose ***Branta canadensis***	Agricultural pastures, croplands	Short grass/alfalfa (<6 inches); winter wheat/barley (4-6 inches average winter vegetation height), ryegrass preferred (>30%), small pastures <100 acre patch size adjacent to wetlands.	Foraging, wintering, and migrating	Greater white-fronted goose, Ross's goose, common goldeneye, great blue heron, American wigeon, barn owl, short-eared owl, Swainson's hawk, red-tailed hawk, coyote, montane vole, mule deer, red fox, mountain cottontail
Mallard ***Anas platyrhychos***				

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
		Residual crops of corn; cropland area buffered by at least 250 meters to minimize human disturbance.		

*"Life History Requirement" column only reflects focal species.

Table E-5. Current List of Wildlife and Plants of Deer Flat National Wildlife Refuge

Common Name	Family	Genus	Species
Silver maple	Aceraceae	*Acer*	*saccharium*
Water plantain	Alismataceae	*Alisma*	sp.
Tumble pigweed	Amaranthaceae	*Amaranthus*	*albus*
Palmer amaranth pigweed	Amaranthaceae	*Amaranthus*	*palmeri*
Redroot pigweed	Amaranthaceae	*Amaranthus*	*retroflexus*
Smooth sumac	Anacardiaceae	*Rhus*	*glabra*
Skunkbush sumac	Anacardiaceae	*Rhus*	*trilobata*
Poison ivy	Angcardiaceae	*Rhus*	*radicans*
Water hemlock	Apiaceae	*Cicuta*	*douglasii*
Poison hemlock	Apiaceae	*Conivum*	*maculatum*
Fern-leaved desert parsley	Apiaceae	*Lomatium*	*dissectum*
Indian hemp dogbane	Apocynaceae	*Apocynum*	*cannabinum*
Showy milkweed	Asclepiadaceae	*Ascelepias*	*speciosa*
Mexican whorled milkweed	Asclepiadaceae	*Asclepias*	*fascicularis*
False dandelion	Asteraceae	*Agoseris*	*glauca*
Common burdock	Asteraceae	*Arctium*	*minus*
Silver sage	Asteraceae	*Artemisia*	*cana*
Basin big sagebrush	Asteraceae	*Artemisia*	*tridentata trindentata*
Wyoming sagebrush	Asteraceae	*Artemisia*	*tridentata wyomingensis*
Musk thistle	Asteraceae	*Carduus*	*nutans*
Spotted knapweed	Asteraceae	*Centaurea*	*stoebe*
Rush skeletonweed	Asteraceae	*Chondrilla*	*juncea*
Gray rabbitbrush	Asteraceae	*Chrysothamnus*	*nauseosus*
Green rabbitbrush	Asteraceae	*Chrysothamnus*	*viscidiflorus*
Canada thistle	Asteraceae	*Cirsium*	*arvense*
Bull thistle	Asteraceae	*Cirsium*	*vulgare*
Hawskbeard	Asteraceae	*Crepis*	*acumenata*
Curlycup gumweed	Asteraceae	*Grindelia*	*squarrosa*
Snakeweed	Asteraceae	*Gutierrezia*	*sarothrae*
Common sunflower	Asteraceae	*Helianthus*	*annuus*
Poverty weed	Asteraceae	*Iva*	*axillaris*
Marsh elder	Asteraceae	*Iva*	*xanthifolia*
Prickly lettuce	Asteraceae	*Lactuca*	*serriola*
Purple aster	Asteraceae	*Machaeranthera*	*canescens*
Scotch thistle	Asteraceae	*Onopordum*	*acanthium*
Goldenrod	Asteraceae	*Solidago*	spp.
Common sowthistle	Asteraceae	*Sonchus*	*oleraceus*
Dandelion	Asteraceae	*Taraxacum*	*officinale*
Spiny horsebrush	Asteraceae	*Tetradymia*	*spinosa*
Western yellow salsify	Asteraceae	*Tragopogon*	*dubius*
Common cocklebur	Asteraceae	*Xanthium*	*strumarium*

Common Name	Family	Genus	Species
Fiddleneck	Boraginaceae	*Amsinckia*	*menziesii*
Fiddleneck	Boraginaceae	*Amsinckia*	*retrorsa*
Wintercress	Brassicaceae	*Barbarea*	*orthoceras*
Shepherd's purse	Brassicaceae	*Capsella*	*bursa-pastoris*
Hoary cress	Brassicaceae	*Cardaria*	*draba*
Blue mustard	Brassicaceae	*Chorispora*	*tenella*
Pinnate tansy mustard	Brassicaceae	*Descurainia*	*pinnata*
Spring draba	Brassicaceae	*Draba*	*verna*
Whitetop	Brassicaceae	*Lepidium*	*draba*
Broadleaved pepperweed	Brassicaceae	*Lepidium*	*latifolium*
Clasping pepperweed	Brassicaceae	*Lepidium*	*perfoliatum*
Yellowcress	Brassicaceae	*Rorippa*	sp.
Tumblemustard	Brassicaceae	*Sisymbrium*	*altissimum*
Field pennycress	Brassicaceae	*Thlaspi*	*arvense*
Prickly pear cactus	Cactaceae	*Opuntia*	*polycantha*
Blue elderberry	Caprifoliaceae	*Sambucus*	*nigra* ssp. *Cerulea*
Jagged chickweed	Caryophyllaceae	*Holosteum*	*umbellatum*
Fourwing saltbush	Chenopodiaceae	*Atriplex*	*canescens*
Kochia	Chenopodiaceae	*Bassia*	sp.
Common lambsquarter	Chenopodiaceae	*Chenopodium*	*album*
Spiny hopsage	Chenopodiaceae	*Grayii*	*spinosa*
Russian thistle	Chenopodiaceae	*Salsola*	*kali*
Greasewood	Chenopodiaceae	*Sarcobatus*	*Nees*
Field bindweed	Convolvulaceae	*Convolvulus*	*arvensis*
White bryony	Cucurbitaceae	*Bryonia*	*alba*
Annual wild cucumber	Cucurbitaceae	*Echinocystis*	*lobata*
Western wild cucumber	Cucurbitaceae	*Marah*	*oreganus*
Sedge	Cyperaceae	*Carex*	spp.
Spikerush sp.	Cyperaceae	*Eleocharis*	sp.
Hard-stem bulrush	Cyperaceae	*Schoenoplectus*	*acutus*
River bulrush	Cyperaceae	*Schoenoplectus*	*fluviatilis*
Soft-stem bulrush	Cyperaceae	*Schoenoplectus*	*tabernaemontani*
Bulrush	Cyperaceae	*Scirpus*	sp.
Common teasel	Dipsacaceae	*Dipsacus*	*fullonum*
Russian olive	Elaeagnaceae	*Elaeagnus*	*angustifolia*
Small matted sandmat	Euphorbiaceae	*Chamaesyce*	*serpens*
Turkey mullein	Euphorbiaceae	*Eremocarpas*	*setigerus*
Leafy spurge	Euphorbiaceae	*Euphorbia*	*esula*
False indigo bush	Fabaceae	*Amorpha*	*fruticosa*
Packard's milkvetch	Fabaceae	*Astragalus*	*cusickii var. packardiae*
Hermit milkvetch	Fabaceae	*Astragalus*	*eremiticus*
Woollypod milkvetch	Fabaceae	*Astragalus*	*purshii ophiogenes*
Black medic	Fabaceae	*Medicago*	*lupulina*
Alfalfa	Fabaceae	*Medicago*	*sativa*
White sweet clover	Fabaceae	*Melilotus*	*albus*
Yellow sweet clover	Fabaceae	*Melilotus*	*officinalis*
Strawberry clover	Fabaceae	*Trifolium*	*fragiferum*
White clover	Fabaceae	*Trifolium*	*repens*
Storksbill	Geraniaceae	*Erodium*	*cicutarium*
Golden currant	Grossulariaceae	*Ribes*	*aureum*
Eurasian watermilfoil	Haloragaceae	*Myriophyllum*	*spicatum*
Hydrilla	Hydrocharitaceae	*Hydrilla*	*verticillata*

Common Name	Family	Genus	Species
Yellow flag	Iridaceae	*Iris*	*pseudacorus*
Black walnut	Juglandaceae	*Juglans*	*nigra*
Catnip	Lamiaceae	*Nepeta*	*cataria*
Duckweed	Lemnaceae	*Lemna*	*minor*
Taper-tip onion	Liliaceae	*Allium*	*acuminatum*
Asparagus	Liliaceae	*Asparagus*	*officinalis*
Sego lily	Liliaceae	*Calochurtus*	*nuttallii*
Purple loosestrife	Lythraceae	*Lythrum*	*salicaria*
Common mallow	Malvaceae	*Malva*	*neglecta*
Gooseberryleaf globemallow	Malvaceae	*Sphaeralcea*	*grossulariifolia*
Munro's globemallow	Malvaceae	*Sphaeralcea*	*munroana*
White mulberry	Moraceae	*Morus*	*alba*
White ash	Oleaceae	*Fraxinus*	*americana*
Green ash	Oleaceae	*Fraxinus*	*pennsylvanica*
Tall annual willow herb	Onagraceae	*Epilobium*	*paniculatum*
Lewis's mockorange	Philadelphaceae	*Philadelphus*	*lewisii*
Broad leafed plantain	Plantaginaceae	*Plantago*	*major*
Jointed goatgrass	Poaceae	*Aegilops*	*cylindrica*
Crested wheatgrass	Poaceae	*Agropyron*	*cristatum*
Intermediate wheatgrass	Poaceae	*Agropyron*	*intermedia*
Siberian wheatgrass	Poaceae	*Agropyron*	*siberiuim*
Bluebunch wheatgrass	Poaceae	*Agropyron*	*spicata*
Rough bentgrass	Poaceae	*Agrostis*	*scabra*
Wild oat	Poaceae	*Avena*	*fatua*
Smooth brome	Poaceae	*Bromus*	*inermis*
Japanese brome	Poaceae	*Bromus*	*japonicus*
Cheatgrass	Poaceae	*Bromus*	*tectorum*
Orchard grass	Poaceae	*Dactycis*	*glomerata*
Salt grass	Poaceae	*Distichlis*	*spicata*
Barnyardgrass	Poaceae	*Echinochloa*	*crus-galli*
Great basin wildrye	Poaceae	*Elymus*	*cinereus*
Bottlebrush squirreltail	Poaceae	*Elymus*	*elimoides*
Tall wheatgrass	Poaceae	*Elytrigia*	*pontica*
Tall fescue	Poaceae	*Festcua*	*arundinaceae*
Six week fescue	Poaceae	*Festcua* (*Vulpia*)	*octoflora*
Idaho fescue	Poaceae	*Festuca*	*idahoensis*
Mannagrass	Poaceae	*Glyceria*	sp.
Smooth annual barley	Poaceae	*Hordeum*	*glancum*
Foxtail barley	Poaceae	*Hordeum*	*jubatum*
Giant wildrye	Poaceae	*Leymus*	*condensatus*
Beardless wildrye	Poaceae	*Leymus*	*triticoides*
Indian ricegrass	Poaceae	*Oryzopsis*	*hymenoides*
Fall panicgrass	Poaceae	*Panicum*	*dichotomiflorum*
Western wheatgrass	Poaceae	*Pascopyrum*	*smithii*
Reed canarygrass	Poaceae	*Phalaris*	*arundinacea*
Common timothy	Poaceae	*Phleum*	*pratense*
Bulbous bluegrass	Poaceae	*Poa*	*bulbosa*
Nevada bluegrass	Poaceae	*Poa*	*nevadensis*
Kentucky bluegrass	Poaceae	*Poa*	*pratensis*
Sandberg's bluegrass	Poaceae	*Poa*	*secunda*
Rabbitfoot grass	Poaceae	*Polypogon*	*monspeliensis*
Weeping alkaligrass	Poaceae	*Puccinellia*	*distans*

Common Name	Family	Genus	Species
Green foxtail	Poaceae	*Setaria*	*glauca*
Alkali cordgrass	Poaceae	*Spartina*	*gracilis*
Sand dropseed	Poaceae	*Sporobolus*	*cryptandrus*
Needle and thread grass	Poaceae	*Stipa*	*comata*
Medusahead	Poaceae	*Taeniatherum*	*caput-medusae*
Prickly-leaved phlox	Polemoniaceae	*Phlox*	*aculeata*
Long-leafed phlox	Polemoniaceae	*Phlox*	*longifolia*
Water smartweed	Polygonaceae	*Polygonum*	*amphibium*
Prostrate knotweed	Polygonaceae	*Polygonum*	*arenasturm*
Spotted ladysthumb	Polygonaceae	*Polygonum*	*persicaria*
Curly dock	Polygonaceae	*Rumex*	*crispis*
Willow leaves dock	Polygonaceae	*Rumex*	*salicifolius*
Common purslane	Portulacaeae	*Portulaca*	*oleracea*
Curly-leaf pondweed	Potamogetonaceae	*Potamogeton*	*crispus*
Cursed buttercup	Ranunculaceae	*Ranunculus*	*scleratus*
Bur buttercup	Ranunculaceae	*Ranunculus*	*testiculatus*
Biennial cinquefoil	Rosaceae	*Potentilla*	*biennis*
Ornamental plum	Rosaceae	*Prunus*	spp.
Bitterbrush	Rosaceae	*Purshia*	*tridentata*
Sweetbriar rose	Rosaceae	*Rosa*	*eglanteria*
Woods' rose	Rosaceae	*Rosa*	*woodsii*
Catchweed bedstraw	Rubiaceae	*Galium*	*aparine*
Cottonwood sp.	Salicaceae	*Populus*	sp.
Peachleaf willow	Salicaceae	*Salix*	*amygdaloides*
Coyote willow	Salicaceae	*Salix*	*exigua*
Pacific willow	Salicaceae	*Salix*	*lucida* spp. *Lasiandra*
Willow	Salicaceae	*Salix*	*salix* spp.
Indian paintbrush	Scrophulariaceae	*Castilleja*	*mutis* spp.
Woody mullein	Scrophulariaceae	*Verbascum*	*blattaria*
Common mullein	Scrophulariaceae	*Verbascum*	*thapsus*
Water speedwell	Scrophulariaceae	*Veronica*	*anagallis-aquatica*
Virginia groundcherry	Solanaceae	*Physalis*	*virginiana*
Bittersweet nightshade	Solanaceae	*Solanum*	*dulcamara*
Black nightshade	Solanaceae	*Solanum*	*nigrum*
Simplestem bur-reed	Sparganiaceae	*Sparganium*	*erectum*
Salt cedar	Tamaricaceae	*Tamarix*	*ramosissima*
Tamarisk	Tamaricaceae	*Tamarix*	*ramosissima*
Common cattail	Typhaceae	*Typha*	*latifolia*
Chinese elm	Ulmaceae	*Ulmus*	*parvifolia*
Stinging nettle	Urticaceae	*Urtica*	*dioica*
Prostrate vervain	Verbenaceae	*Verbena*	*bracteata*
Virginia creeper	Vitaceae	*Parthenocissus*	*quinquefolia*
Riverbank grape	Vitaceae	*Vitis*	*riparia*
Puncturevine	Zygophyllaceae	*Tribulus*	*terrestris*

Mammals			
Common Name	**Family**	**Genus**	**Species**
Coyote	Canidae	*Canis*	*latrans*
Red fox	Canidae	*Vulpes*	*vulpes*
North American beaver	Castoridae	*Castor*	*canadensis*
Elk	Cervidae	*Cervus*	*canadensis*
Mule deer	Cervidae	*Odocoileus*	*hemionus*

Mammals			
Common Name	**Family**	**Genus**	**Species**
White-tailed deer	Cervidae	*Odocoileus*	*virginianus*
Mountainvole	Cricetidae	*Microtus*	*montanus*
Deer mouse	Cricetidae	*Peromyscus*	*maniculatus*
Western harvest mouse	Cricetidae	*Reithrodontomys*	*megalotis*
Northern pocket gopher	Geomyidae	*Thomomys*	*talpoides*
Northern pocket gopher	Geomyidae	*Thomomys*	*talpoides*
Black-tailed jackrabbit	Leporidae	*Lepus*	*californicus*
Mountain cottontail	Leporidae	*Sylvilagus*	*nuttalli*
Striped skunk	Mephitidae	*Mephitis*	*mephitis*
House mouse	Muridae	*Mus*	*musculus*
North American river otter	Mustelidae	*Lontra*	*canadensis*
American mink	Mustelidae	*Neovison*	*vison*
Badger	Mustelidae	*Taxidea*	*taxus*
Raccoon	Procyonidae	*Procyon*	*lotor*
Yellow-bellied marmot	Sciuridae	*Marmota*	*Flavientris*
Fox squirrel	Sciuridae	*Sciurus*	*niger*

Birds			
Common Name	**Family**	**Genus**	**Species**
Geese, Swans, and Ducks			
Wood duck	Anatidae	*Aix*	*sponsa*
Northern pintail	Anatidae	*Anas*	*acuta*
American wigeon	Anatidae	*Anas*	*americana*
Green-winged teal	Anatidae	*Anas*	*carolinensis*
Northern shoveler	Anatidae	*Anas*	*clypeata*
Cinnamon teal	Anatidae	*Anas*	*cyanoptera*
Blue-winged teal	Anatidae	*Anas*	*discors*
Eurasian wigeon	Anatidae	*Anas*	*penelope*
Mallard	Anatidae	*Anas*	*platyrhychos*
Gadwall	Anatidae	*Anas*	*strepera*
Greater white-fronted goose	Anatidae	*Anser*	*albifrons*
Lesser scaup	Anatidae	*Aythya*	*affinis*
Redhead	Anatidae	*Aythya*	*americana*
Ring-necked duck	Anatidae	*Aythya*	*collaris*
Greater scaup	Anatidae	*Aythya*	*marila*
Canvasback	Anatidae	*Aythya*	*valisineria*
Canada goose	Anatidae	*Branta*	*canadensis*
Bufflehead	Anatidae	*Bucephala*	*albeola*
Common goldeneye	Anatidae	*Bucephala*	*clangula*
Barrow's goldeneye	Anatidae	*Bucephala*	*islandica*
Snow goose	Anatidae	*Chen*	*caerulescens*
Ross's goose	Anatidae	*Chen*	*rossii*
Long-tailed duck	Anatidae	*Clangula*	*hyemalis*
Trumpeter swan	Anatidae	*Cygnus*	*buccinator*
Tundra swan	Anatidae	*Cygnus*	*columbianus*
Harlequin duck	Anatidae	*Histrionicus*	*histrionicus*
Hooded merganser	Anatidae	*Lophodytes*	*cucullatus*
White-winged scoter	Anatidae	*Melanitta*	*deglandi*
Common merganser	Anatidae	*Mergus*	*merganser*
Red-breasted merganser	Anatidae	*Mergus*	*serrator*
Ruddy duck	Anatidae	*Oxyura*	*jamaicensis*

Birds			
Common Name	**Family**	**Genus**	**Species**
Gallinaceous Birds			
California quail	Odontophoridae	*Callipepla*	*californica*
Northern bobwhite	Odontophoridae	*Colinus*	*virginianus*
Chukar	Phasianidae	*Alectoris*	*chukar*
Wild turkey	Phasianidae	*Meleagris*	*gallopavo*
Gray partridge	Phasianidae	*Perdix*	*perdix*
Ring-necked pheasant	Phasianidae	*Phasianus*	*colchicus*
Loons			
Common loon	Gaviidae	*Gavia*	*immer*
Pacific loon	Gaviidae	*Gavia*	*pacifica*
Grebes			
Clark's grebe	Podicipedidae	*Aechmophorus*	*clarkii*
Western grebe	Podicipedidae	*Aechmophorus*	*occidentalis*
Horned grebe	Podicipedidae	*Podiceps*	*auritus*
Eared grebe	Podicipedidae	*Podiceps*	*nigricollis*
Pied-billed grebe	Podicipedidae	*Podilymbus*	*Podiceps*
Pelicans and Cormorants			
American white pelican	Pelecanidae	*Pelecanus*	*erythrorhynchos*
Double-crested cormorant	Phalacrocoracidae	*Phalacrocorax*	*auritus*
Bitterns, Herons, and Egrets			
Great egret	Ardeidae	*Ardea*	*alba*
Great blue heron	Ardeidae	*Ardea*	*herodias*
American bittern	Ardeidae	*Botaurus*	*lentiginosus*
Cattle egret	Ardeidae	*Bubulcus*	*ibis*
Green heron	Ardeidae	*Butorides*	*virescens*
Snowy egret	Ardeidae	*Egretta*	*thula*
Least bittern	Ardeidae	*Ixobrychus*	*exilis*
Black-crowned night heron	Ardeidae	*Nycticorax*	*nycticorax*
Ibis and Spoonbills			
White-faced ibis	Threskiornithidae	*Plegadis*	*chihi*
New World Vultures			
Turkey vulture	Cathartidae	*Cathartes*	*aura*
Osprey, Kites, Eagles, and Hawks			
Cooper's hawk	Accipitridae	*Accipiter*	*cooperii*
Northern goshawk	Accipitridae	*Accipiter*	*gentilis*
Sharp-shinned hawk	Accipitridae	*Accipiter*	*striatus*
Golden eagle	Accipitridae	*Aquila*	*chrysaetos*
Red-tailed hawk	Accipitridae	*Buteo*	*jamaicensis*
Rough-legged hawk	Accipitridae	*Buteo*	*lagopus*
Ferruginous hawk	Accipitridae	*Buteo*	*regalis*
Swainson's hawk	Accipitridae	*Buteo*	*swainsoni*
Northern harrier	Accipitridae	*Circus*	*cyaneus*
Bald eagle	Accipitridae	*Haleaeetus*	*leucocephalus*
Osprey	Accipitridae	*Pandion*	*haliaetus*
Falcons			
Merlin	Falconidae	*Falco*	*columbarius*
Prairie falcon	Falconidae	*Falco*	*mexicanus*
Peregrine falcon	Falconidae	*Falco*	*peregrinus*
Gyrfalcon	Falconidae	*Falco*	*rusticolus*
American kestrel	Falconidae	*Falco*	*sparverius*

Birds			
Common Name	**Family**	**Genus**	**Species**
Rails			
American coot	Rallidae	*Fulica*	*americana*
Sora	Rallidae	*Porzana*	*carolina*
Virginia rail	Rallidae	*Rallus*	*limicola*
Cranes			
Sandhill crane	Gruidae	*Grus*	*canadensis*
Plovers			
Snowy plover	Charadriidae	*Charadrius*	*nivosus*
Semi-palmated plover	Charadriidae	*Charadrius*	*semipalmatus*
Killdeer	Charadriidae	*Charadrius*	*vociferus*
American golden plover	Charadriidae	*Pluvialis*	*dominica*
Black-bellied plover	Charadriidae	*Pluvialis*	*squatarola*
Stilts and Avocets			
Black-necked stilt	Recurvirostridae	*Himantopus*	*mexicanus*
American avocet	Recurvirostridae	*Recurvirostra*	*americana*
Sandpipers			
Spotted sandpiper	Scolopacidae	*Actitis*	*macularius*
Sanderling	Scolopacidae	*Calidris*	*alba*
Dunlin	Scolopacidae	*Calidris*	*alpina*
Baird's sandpiper	Scolopacidae	*Calidris*	*bairdii*
Stilt sandpiper	Scolopacidae	*Calidris*	*himantopus*
Western sandpiper	Scolopacidae	*Calidris*	*mauri*
Pectoral sandpiper	Scolopacidae	*Calidris*	*melanotos*
Least sandpiper	Scolopacidae	*Calidris*	*minutilla*
Semipalmated sandpiper	Scolopacidae	*Calidris*	*pusilla*
Short-billed dowitcher	Scolopacidae	*Limnodromus*	*griseus*
Long-billed dowitcher	Scolopacidae	*Limnodromus*	*scolopacrus*
Marbled godwit	Scolopacidae	*Limosa*	*fedoa*
Red Knot	Scolopacidae	*Calidris*	*canutus*
Long-billed curlew	Scolopacidae	*Numenius*	*americanus*
Lesser yellowlegs	Scolopacidae	*Tringa*	*flavipes*
Greater yellowlegs	Scolopacidae	*Tringa*	*melanoleuca*
Willet	Scolopacidae	*Tringa*	*semipalmata*
Solitary sandpiper	Scolopacidae	*Tringa*	*solitaria*
Snipe			
Wilson’s snipe	Scolopacidae	*Gallinago*	*delicata*
Phalaropes			
Red-necked phalarope	Scolopacidae	*Phalaropus*	*lobatus*
Wilson’s phalarope	Scolopacidae	*Phalaropus*	*tricolor*
Gulls and Terns			
California gull	Laridae	*Larus*	*californicus*
Ring-billed gull	Laridae	*Larus*	*delawarensis*
Lesser Black-backed gull	Laridae	*Larus*	*fuscus*
Glaucous-winged gull	Laridae	*Larus*	*glaucescens*
Bonaparte’s gull	Laridae	*Larus*	*philadelphia*
Franklin’s gull	Laridae	*Larus*	*pipixcan*
Herring gull	Laridae	*Larus*	*smithsonianus*
Thayer's gull	Laridae	*Larus*	*thayeri*
Forster’s tern	Laridae	*Sterna*	*forsteri*
Sabine’s gull	Laridae	*Xema*	*sabini*
Black tern	Sternidae	*Chlidonias*	*niger*

Birds			
Common Name	**Family**	**Genus**	**Species**
Caspian tern	Sternidae	*Hydroprogne*	*caspia*
Common tern	Sternidae	*Sterna*	*hirundo*
Doves			
Rock dove	Columbidae	*Columba*	*livia*
Eurasian collared dove	Columbidae	*Streptopelia*	*decaocto*
Mourning dove	Columbidae	*Zenaida*	*macroura*
Cuckoos			
Yellow-billed cuckoo	Cuculidae	*Coccyzus*	*americanus*
Owls			
Northern saw-whet owl	Strigidae	*Aegolius*	*acadicus*
Short-eared owl	Strigidae	*Asio*	*flammeus*
Long-eared owl	Strigidae	*Asio*	*otus*
Burrowing owl	Strigidae	*Athene*	*cunicularia*
Snowy owl	Strigidae	*Bubo*	*scandiacus*
Great horned owl	Strigidae	*Bubo*	*virginianus*
Northern pygmy-owl	Strigidae	*Glaucidium*	*gnoma*
Western screech owl	Strigidae	*Megascops*	*kennicottii*
Flammulated owl	Strigidae	*Otus*	*flammeolus*
Barred owl	Strigidae	*Strix*	*varia*
Barn owl	Tytonidae	*Tyto*	*alba*
Nightjars			
Common nighthawk	Caprimulgidae	*Chordeiles*	*minor*
Common poorwill	Caprimulgidae	*Phalaenoptilus*	*nuttallii*
Swifts			
White-throated swift	Apodidae	*Aeronautes*	*saxatalis*
Vaux's swift	Apodidae	*Chaetura*	*vauxi*
Hummingbirds			
Black-chinned hummingbird	Trochilidae	*Archilochus*	*alexandri*
Broad-tailed hummingbird	Trochilidae	*Selasphorus*	*platycercus*
Rufous hummingbird	Trochilidae	*Selasphorus*	*rufus*
Calliope hummingbird	Trochilidae	*Stellula*	*calliope*
Kingfishers			
Belted kingfisher	Cerylidae	*Megaceryle*	*alcyon*
Woodpeckers			
Northern flicker	Picidae	*Colaptes*	*auratus*
Lewis's woodpecker	Picidae	*Melanerpes*	*lewis*
Downy woodpecker	Picidae	*Picoides*	*pubescens*
Hairy woodpecker	Picidae	*Picoides*	*villosus*
Flycatchers			
Olive-sided flycatcher	Tyrannidae	*Cantopus*	*cooperii*
Western wood-pewee	Tyrannidae	*Contopus*	*sordidulus*
Cordilleran	Tyrannidae	*Empidonax*	*occidentalis*
Willow flycatcher	Tyrannidae	*Empidonax*	*trailii*
Gray flycatcher	Tyrannidae	*Empidonax*	*wrightii*
Ash-throated flycatcher	Tyrannidae	*Myiarchus*	*cinerascens*
Say's phoebe	Tyrannidae	*Sayornis*	*saya*
Eastern kingbird	Tyrannidae	*Tyrannus*	*tyrannus*
Western kingbird	Tyrannidae	*Tyrannus*	*verticalis*
Shrikes			
Northern shrike	Laniidae	*Lanius*	*excubitor*
Loggerhead shrike	Laniidae	*Lanius*	*ludovicianus*

Birds			
Common Name	**Family**	**Genus**	**Species**
Vireos			
Cassin's vireo	Vireonidae	*Vireo*	*cassinii*
Warbling vireo	Vireonidae	*Vireo*	*gilvus*
Red-eyed vireo	Vireonidae	*Vireo*	*olivaceus*
Plumbeous vireo	Vireonidae	*Vireo*	*plumbeus*
Jays, Magpies, and Crows			
American crow	Corvidae	*Corvus*	*brachyrhynchos*
Common raven	Corvidae	*Corvus*	*corax*
Blue jay	Corvidae	*Cyanocitta*	*cristata*
Steller's jay	Corvidae	*Cyanocitta*	*stelleri*
Black-billed magpie	Corvidae	*Pica*	*Hudsonia*
Larks			
Horned lark	Alaudidae	*Eremophila*	*alpestris*
Swallows			
Barn swallow	Hirundinidae	*Hirundo*	*rustica*
Cliff swallow	Hirundinidae	*Petrochelidon*	*pyrrhonota*
Bank swallow	Hirundinidae	*Riparia*	*riparia*
Northern rough-winged swallow	Hirundinidae	*Stelgidopteryx*	*serripennis*
Tree swallow	Hirundinidae	*Tachycineta*	*bicolor*
Violet-green swallow	Hirundinidae	*Tachycineta*	*thalassina*
Chickadees			
Black-capped chickadee	Paridae	*Poecile*	*atricapillus*
Mountain chickadee	Paridae	*Poecile*	*gambeli*
Bushtits			
Bushtit	Aegithalidae	*Psaltriparus*	*minimus*
Nuthatches			
Red-breasted nuthatch	Sittidae	*Sitta*	*canadensis*
White-breasted nuthatch	Sittidae	*Sitta*	*carolinensis*
Creepers			
Brown creeper	Certhidae	*Certhia*	*americana*
Wrens			
Canyon wren	Troglodytidae	*Catherpes*	*mexicanus*
Marsh wren	Troglodytidae	*Cistothorus*	*palustris*
Rock wren	Troglodytidae	*Salpinctes*	*obsoletus*
House wren	Troglodytidae	*Troglodytes*	*aedon*
Pacific wren	Troglodytidae	*Troglodytes*	*pacificus*
Kinglets, Bluebirds, and Thrushes			
Golden-crowned kinglet	Regulidae	*Regulus*	*satrapa*
Ruby-crowned kinglet	Sylviidae	*Regulus*	*calendula*
Hermit thrush	Turdidae	*Catharus*	*guttatus*
Swainson's thrush	Turdidae	*Catharus*	*ustulatus*
Varied thrush	Turdidae	*Ixoreus*	*naevius*
Townsend's solitaire	Turdidae	*Myadestes*	*townsendi*
Mountain bluebird	Turdidae	*Sialia*	*currucoides*
Western bluebird	Turdidae	*Sialia*	*mexicana*
American robin	Turdidae	*Turdus*	*migratorius*
Mockingbirds and Thrashers			
Gray catbird	Mimidae	*Dumetella*	*carolinensis*
Northern mockingbird	Mimidae	*Mimus*	*polyglottos*
Sage thrasher	Mimidae	*Oeroscoptes*	*montanus*

Birds			
Common Name	**Family**	**Genus**	**Species**
Starlings			
European starling	Sturnidae	*Sturnus*	*vulgaris*
Pipits			
American pipit	Motacillidae	*Anthus*	*rubescens*
Waxwings			
Cedar waxwing	Bombycillidae	*Bombycilla*	*cedrorum*
Bohemian waxwing	Bombycillidae	*Bombycilla*	*garrulus*
Warblers			
Yellow warbler	Parulidae	*Dendroica*	*petechia*
Townsend's warbler	Parulidae	*Dendroica*	*townsendi*
Common yellowthroat	Parulidae	*Geothlypis*	*trichas*
Yellow-breasted chat	Parulidae	*Icteria*	*Virens*
MacGillivray's warbler	Parulidae	*Oporornis*	*tolmiei*
Orange-crowned warbler	Parulidae	*Oreothlypis*	*celata*
Nashville warbler	Parulidae	*Oreothlypis*	*ruficapilla*
Yellow-rumped warbler	Parulidae	*Setophaga*	*coronata*
Wilson's warbler	Parulidae	*Wilsonia*	*pusilla*
Towhees and Sparrows			
Lapland longspur	Calcariidae	*Calcarius*	*lapponicus*
Snow bunting	Calcariidae	*Plectrophenax*	*nivalis*
Grasshopper sparrow	Emberizidae	*Ammodramus*	*savannarum*
Sage sparrow	Emberizidae	*Amphispiza*	*belli*
Black-throated sparrow	Emberizidae	*Amphispiza*	*bilineata*
Lark sparrow	Emberizidae	*Chondestes*	*grammacus*
Dark-eyed junco	Emberizidae	*Junco*	*hyemalis*
Lincoln's sparrow	Emberizidae	*Melospiza*	*lincalnii*
Song sparrow	Emberizidae	*Melospiza*	*melodia*
Savannah sparrow	Emberizidae	*Passerculus*	*sandwichensis*
Fox sparrow	Emberizidae	*Passerella*	*iliaca*
Green-tailed towhee	Emberizidae	*Pipilo*	*chlorurus*
Spotted towhee	Emberizidae	*Pipilo*	*maculatus*
Vesper sparrow	Emberizidae	*Pooecetes*	*gramineus*
American tree sparrow	Emberizidae	*Spizella*	*arborea*
Brewer's sparrow	Emberizidae	*Spizella*	*breweri*
Chipping sparrow	Emberizidae	*Spizella*	*passerina*
White-throated sparrow	Emberizidae	*Zonotrichia*	*albicollis*
White-crowned sparrow	Emberizidae	*Zonotrichia*	*leucophrys*
Harris' sparrow	Emberizidae	*Zonotrichia*	*querula*
Grosbeaks and Allies			
Lazuli bunting	Cardinalidae	*Passerina*	*amoena*
Indigo bunting	Cardinalidae	*Passerina*	*cyanea*
Black-headed grosbeak	Cardinalidae	*Pheuctius*	*melanocephalus*
Western tanager	Cardinalidae	*Piranga*	*ludoviciana*
Blackbirds and Orioles			
Red-winged blackbird	Icteridae	*Agelaius*	*phoeniceus*
Brewer's blackbird	Icteridae	*Euphagus*	*cyanocephalus*
Bullock's oriole	Icteridae	*Icterus*	*bullockii*
Brown-headed cowbird	Icteridae	*Molothrus*	*ater*
Great-tailed grackle	Icteridae	*Quiscalus*	*mexicanus*
Common grackle	Icteridae	*Quiscalus*	*quiscula*
Western meadowlark	Icteridae	*Sturnella*	*neglecta*

Birds			
Common Name	**Family**	**Genus**	**Species**
Yellow-headed blackbird	Icteridae	*Xanthocephalus*	*xanthocephalus*
Finches			
Common redpoll	Fringillidae	*Carduelis*	*flammea*
Pine siskin	Fringillidae	*Carduelis*	*pinus*
American goldfinch	Fringillidae	*Carduelis*	*tristis*
Cassin's finch	Fringillidae	*Carpodacus*	*cassinii*
House finch	Fringillidae	*Carpodacus*	*mexicanus*
Evening grosbeak	Fringillidae	*Coccothraustes*	*vespertinus*
Black rosy-finch	Fringillidae	*Leucosticte*	*atrata*
Gray-crowned rosy-finch	Fringillidae	*Leucosticte*	*tephrocotis*
Weaver Finches			
House sparrow	Passeridae	*Passer*	*domesticus*

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Cockroach	Blattaria (cockroaches)	Blatellidae		
Comb-clawed beetle	Coleoptera (Beetles)	Alleculidae		
	Coleoptera (Beetles)	Anobiidae		
Ant-like flower beetle	Coleoptera (Beetles)	Anthicidae		
Fungus weevils	Coleoptera (Beetles)	Anthribididae		
Seed beetle	Coleoptera (Beetles)	Bruchidae		
Metallic wood-boring beetle	Coleoptera (Beetles)	Buprestidae		
Soldier beetle	Coleoptera (Beetles)	Cantharidae		
Ground beetle	Coleoptera (Beetles)	Carabidae		
Brown sawyer beetle	Coleoptera (Beetles)	Cerambycidae		
Milkweed long-horned beetle	Coleoptera (Beetles)	Cerambycidae	*Tetraopes*	*tetraophthalmus*
Flea beetle	Coleoptera (Beetles)	Chrysomelidae		
Case-bearing leaf beetle	Coleoptera (Beetles)	Chrysomelidae		
Milkweed leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Chrysochus*	*colbaltinus*
Asparagus leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Crioceris*	*asparagi*
Spotted asparagus beetle	Coleoptera (Beetles)	Chrysomelidae	*Crioceris*	*duodecimpunctata*
Spotted cucumber leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Diabrotica*	spp.
Elm leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Galerucella*	*luteola*
Gray tiger beetle	Coleoptera (Beetles)	Cicindelidae		
Ornate checkered beetle	Coleoptera (Beetles)	Cleridae	*Trichodes*	*ornatus*
Ladybird beetle (no spots)	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle (orange; seven spots per elytron	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle (black with cream spots)	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle	Coleoptera (Beetles)	Coccinellidae	*Hippodamia*	*convergens*
Water boatman	Coleoptera (Beetles)	Corixidae		
Tiny fungus beetle	Coleoptera (Beetles)	Cryptophagidae		
Weevil	Coleoptera (Beetles)	Curculionidae		
Skin beetle	Coleoptera (Beetles)	Dermestidae		
Diving beetle	Coleoptera (Beetles)	Dytiscidae		
Click beetle (dark brown species)	Coleoptera (Beetles)	Elateridae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Mud-loving beetle	Coleoptera (Beetles)	Heteroceridae		
Water scavenger beetle	Coleoptera (Beetles)	Hydrophillidae		
Minute scavenger beetle	Coleoptera (Beetles)	Latridiidae		
Blister beetle	Coleoptera (Beetles)	Meloidae	*Nemognatha*	spp.
Soft winged flower beetle	Coleoptera (Beetles)	Melyridae		
Tumbling flower beetle	Coleoptera (Beetles)	Mordellidae		
Sap beetle (brown/ orange spots on elytra)	Coleoptera (Beetles)	Nitidulidae		
Backswimmer	Coleoptera (Beetles)	Notonectidae		spp.
Scarab beetle (black species)	Coleoptera (Beetles)	Scarabaeidae		
May beetle	Coleoptera (Beetles)	Scarabaeidae	*Phyllophaga*	sp.
False darkling beetle	Coleoptera (Beetles)	Seraptiidae		
Rove beetle	Coleoptera (Beetles)	Staphylinidae		
Darkling beetle	Coleoptera (Beetles)	Tenebrionidae		
European earwig	Dermaptera (Earwigs)	Forficulidae	*Forficula*	*auricularia*
Deer fly	Diptera (Flies)			
Robber fly	Diptera (Flies)	Asilidae		
Small minnow mayfly	Diptera (Flies)	Baetidae		
March flies	Diptera (Flies)	Bibionidae		
Bee fly (two spots on each wing)	Diptera (Flies)	Bombyliidae		
Bee fly (brown coastal edge species)	Diptera (Flies)	Bombyliidae		
Green bottle fly	Diptera (Flies)	Calliforidae		
Bitting midge	Diptera (Flies)	Ceratopogonidae		
Midge (small green species)	Diptera (Flies)	Chironomidae		
Grass flies	Diptera (Flies)	Chloropidae		
Mosquitoes	Diptera (Flies)	Culicidae		
Long-legged fly (gray species)	Diptera (Flies)	Dolichopodidae		
Dance flies	Diptera (Flies)	Empididae		
	Diptera (Flies)	Muscidae		
House fly	Diptera (Flies)	Muscoididae		
Fungus gnat (brown)	Diptera (Flies)	Mycetophilidae		
Hump-backed flies	Diptera (Flies)	Phoridae		
Moth fly	Diptera (Flies)	Psychodidae		
Dung flies	Diptera (Flies)	Sarcophagidae		
Dark-winged fungus gnat	Diptera (Flies)	Sciaridae		
Soldier fly (metallic green species)	Diptera (Flies)	Stratiomyiidae		
Flower flies	Diptera (Flies)	Syrphidae		
Tachinid fly	Diptera (Flies)	Tachinidae		
Fruit fly (black-wing/red abdomen/green eyes)	Diptera (Flies)	Tephritidae		
Fruit fly (metallic green abdomen/clear wing species)	Diptera (Flies)	Tephritidae		
Stiletto fly	Diptera (Flies)	Therevidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Crane fly	Diptera (Flies)	Tipulidae		
Small minnow mayfly	Ephemoroptera	Baetidae		
Minute pirate bug	Hemiptera (True Bugs)	Anthocoridae		
Stilt bugs	Hemiptera (True Bugs)	Berytidae		
Broad-headed bug	Hemiptera (True Bugs)	Coriscidae		
Water boatman	Hemiptera (True Bugs)	Corixidae		
Scentless plant bug	Hemiptera (True Bugs)	Corizidae		
Big-eyed bugs	Hemiptera (True Bugs)	Geocoridae		
Water strider	Hemiptera (True Bugs)	Gerridae		
Seed bug (small gray species)	Hemiptera (True Bugs)	Lygaeidae		
Western big-eyed bug	Hemiptera (True Bugs)	Lygaeidae	*Geocoris*	*pallens*
Small milkweed bug	Hemiptera (True Bugs)	Lygaeidae	*Lygaeus*	*kalmii*
Tarnished plant bug	Hemiptera (True Bugs)	Miridae	*Lygus*	*lineolaris*
Damsel bug	Hemiptera (True Bugs)	Nabidae		
Backswimmer	Hemiptera (True Bugs)	Notonectidae		
Stink bug (green species)	Hemiptera (True Bugs)	Pentatomidae		
Rough plant bug	Hemiptera (True Bugs)	Pentatomidae	*Brochymena*	sp.
Ambush bug	Hemiptera (True Bugs)	Phymatidae	*Phymata*	*americana*
Assassin bug (gray/tan species)	Hemiptera (True Bugs)	Reduviidae		
Shore bug	Hemiptera (True Bugs)	Saldidae		
Aphids	Homoptera (Aphids and Relatives)	Aphididae		
Leafhopper nymphs (gray with white stripe)	Homoptera (Aphids and Relatives)	Cicadellidae		
Delphacid planthopper	Homoptera (Aphids and Relatives)	Delphacidae		
Jumping plantlice (tiny tan/green species)	Homoptera (Aphids and Relatives)	Psyllidae		
?	Hymenoptera (Bees, Wasps and Ants)		*Aphaenogaster*	*?*
	Hymenoptera (Bees, Wasps and Ants)		*Forelius*	*pruinosus* (*Royer*)
	Hymenoptera (Bees, Wasps and Ants)	Aphelinidae		
Honey bee	Hymenoptera (Bees, Wasps and Ants)	Apidae		*Apis mellifera*
Honey bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Apis*	*mellifera*
Large bumble bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Bombus*	sp.
Longhorn bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Melissodes*	sp.
	Hymenoptera (Bees, Wasps and Ants)	Bethylidae		
Braconid wasp	Hymenoptera (Bees, Wasps and Ants)	Braconidae		
	Hymenoptera (Bees, Wasps and Ants)	Chalcidae		
Cuckoo wasp	Hymenoptera (Bees, Wasps and Ants)	Chrysididae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Gall wasp	Hymenoptera (Bees, Wasps and Ants)	Cynipidae		
	Hymenoptera (Bees, Wasps and Ants)	Diapriidae		
	Hymenoptera (Bees, Wasps and Ants)	Encyrtidae		
	Hymenoptera (Bees, Wasps and Ants)	Eulophidae		
	Hymenoptera (Bees, Wasps and Ants)	Eupelmidae		
	Hymenoptera (Bees, Wasps and Ants)	Figitidae		
Thatch/Wood ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Formica*	*rufa* spp.
Big headed ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Pheidole*	*?*
Owyhee harvester ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Pogonomyrmex*	*salinus*
Odorous house ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Tapinoma*	*sessile*
Pavement ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Tetramorium*	*caespitum*
Flower bee (red-yellow abdomen)	Hymenoptera (Bees, Wasps and Ants)	Halictidae		
Sweat bee (blue-green head)	Hymenoptera (Bees, Wasps and Ants)	Halictidae		
Parasitic ichneumon wasp (orange/black-wing species)	Hymenoptera (Bees, Wasps and Ants)	Ichneumonidae		
Parasitic ichneumon wasp	Hymenoptera (Bees, Wasps and Ants)	Ichneumonidae	*Ophion*	sp.
Leaf-cutting bee	Hymenoptera (Bees, Wasps and Ants)	Megachilidae		
Velvet ant	Hymenoptera (Bees, Wasps and Ants)	Mutillidae		
Fairy flies	Hymenoptera (Bees, Wasps and Ants)	Mymaridae		
	Hymenoptera (Bees, Wasps and Ants)	Perilampidae		
Spider wasp	Hymenoptera (Bees, Wasps and Ants)	Pompillidae		
	Hymenoptera (Bees, Wasps and Ants)	Pteromalidae		
Hunting wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae		
Thread-waisted wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Ammophilia*	spp.
Sand wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Bembix*	*americana*
Caterpillar wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Podalonia*	spp.
Tiphiid wasp (brown species)	Hymenoptera (Bees, Wasps and Ants)	Tiphiidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Paper wasp	Hymenoptera (Bees, Wasps and Ants)	Vespidae	*Polistes*	*fuscatus*
Western hornet	Hymenoptera (Bees, Wasps and Ants)	Vespidae	*Vespula*	*pennsylvanica*
Termites	Isoptera			
Ochre ringlet	Lepidoptera (Butterflies and Moths)		*Coenonympha*	*tullia*
Northern white skipper	Lepidoptera (Butterflies and Moths)		*Heliopetes*	*ericetorum*
Purplish copper	Lepidoptera (Butterflies and Moths)		*Lycaena*	*helloides*
Tiger moth	Lepidoptera (Butterflies and Moths)	Arctiidae		
Dogbane tiger moth	Lepidoptera (Butterflies and Moths)	Arctiidae	*Cycnia*	*tenera*
Banded woollybear moth	Lepidoptera (Butterflies and Moths)	Arctiidae	*Isia*	*isabella*
Monarch butterfly	Lepidoptera (Butterflies and Moths)	Danaidae	*Danaus*	*plexippus*
Inchworm moth	Lepidoptera (Butterflies and Moths)	Geometridae		
Western pygmy blue butterfly	Lepidoptera (Butterflies and Moths)	Lycaenidae	*Brephidium*	*exile*
Gray hairstreak butterfly	Lepidoptera (Butterflies and Moths)	Lycaenidae	*Strymon*	*melinus*
Euthesanotia-type noctuid	Lepidoptera (Butterflies and Moths)	Noctuidae		
Celery looper moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Anagrapha*	*falcifera*
Looper noctuid moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Dargida*	*procinctus*
Dart noctuid moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Euxoa*	sp.
Clandestine dart moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Spaelotis*	*clandestina*
Beet armyworm moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Spodoptera*	*exigua*
Viceroy butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Limenitis*	*archippus*
Field crescent butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Phyciodes*	*campestris*
Painted lady butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Vanessa*	*cardui*
Western tiger swallowtail butterfly	Lepidoptera (Butterflies and Moths)	Papilionidae	*Papilio*	*rutulus*
Cabbage white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pieris*	*rapae*
Becker's white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*beckerii*
Western white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*occidentalis*
Checkered white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*protodice*

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Diamondback moth	Lepidoptera (Butterflies and Moths)	Plutellidae	*Plutella*	*xylostella*
Plume moth	Lepidoptera (Butterflies and Moths)	Pterophoridae		
Corn earworm-like grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Crambus grass moth (gray and silver)	Lepidoptera (Butterflies and Moths)	Pyralidae		
Crambus grass moth (yellow and pearl)	Lepidoptera (Butterflies and Moths)	Pyralidae		
Diorhyctria-type grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Loxostege-like grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Tan grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Grass moth	Lepidoptera (Butterflies and Moths)	Pyrilidae		
Common ringlet butterfly	Lepidoptera (Butterflies and Moths)	Satyridae	*Coenonympha*	*ampelos*
Leaf-roller moth (pale yellow)	Lepidoptera (Butterflies and Moths)	Tortricidae		
Leaf-roller moth (pale yellow with brown markings)	Lepidoptera (Butterflies and Moths)	Tortricidae		
Leaf-roller moth	Lepidoptera (Butterflies and Moths)	Tortricidae	*Choristoneura*	spp.
Green lace-wing	Neuroptera (nervewings)	Chrysopidae		
Ant lion	Neuroptera (nervewings)	Myrmeleontidae		
Snakefly	Neuroptera (nervewings)	Raphidiidae		
Blue-eyed darner	Odonata (Dragonflies and Damselflies)	Aeshnidae	*Aeshna*	*multicolor*
Narrow winged damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		
Gray damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		
Blue damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		
Bluet damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae	*Enallagma*	sp.
Skimmer dragonfly (red species)	Odonata (Dragonflies and Damselflies)	Libellulidae	*Sympetrum*	spp.
Skimmer dragonfly (tan species)	Odonata (Dragonflies and Damselflies)	Libellulidae	*Sympetrum*	spp.
Saddlebag skimmer dragonfly	Odonata (Dragonflies and Damselflies)	Libellulidae	*Tramea*	spp.
Damselfly	Odonata (Dragonflies and Damselflies)	Zygopidae		
Short-horned grasshopper (gray species)	Orthoptera (Grasshoppers and Relatives)	Acrididae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Short-horned grasshopper (gray with black and yellow hindwings; red-legged)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Short-horned grasshopper (green with white stripes)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Short-horned grasshopper (tan species)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Tree cricket	Orthoptera (Grasshoppers and Relatives)	Grillidae		
Jeruselem cricket	Orthoptera (Grasshoppers and Relatives)	Gryllacrididae		
Praying mantis	Orthoptera (Grasshoppers and Relatives)	Mantidae		
Ant cricket	Orthoptera (Grasshoppers and Relatives)	Myrmecophilidae	*Myrmecophilus*	
Pygmy grasshopper	Orthoptera (Grasshoppers and Relatives)	Tetrigidae		
Katydids	Orthoptera (Grasshoppers and Relatives)	Tettigoniidae		
Plantlouse (tiny)	Psocoptera (Plantlice and Barklice)			
Thrips	Thysanptera (thripes)			
Caddisfly (black species)	Trichoptera (Caddisflies)			
Caddisfly (small/tan/short antennae)	Trichoptera (Caddisflies)			
Caddisfly (medium-sized/tan/long antennae)	Trichoptera (Caddisflies)			
Caddisfly (medium-sized/gray-brown/short antennae)	Trichoptera (Caddisflies)			
Caddisfly (medium-sized/gray/long antennae)	Trichoptera (Caddisflies)			

Fish			
Common	**Family**	**Genus**	**Species**
Largescale sucker	Catostomidae	*Catostomus*	*macrochelius*
Pumpkinseed	Centrarchidae	*Lepomis*	*gibbosus*
Bluegill	Centrarchidae	*Lepomis*	*macrochirus*
Smallmouth bass	Centrarchidae	*Micropterus*	*dolomieu*
Largemouth bass	Centrarchidae	*Micropterus*	*salmoides*
Black crappie	Centrarchidae	*Pomoxis*	*nigromaculatus*
Oriental weatherfish	Cobitidae	*Misgurnus*	anguillicaudatus
Common carp	Cyprinidae	*Cyprinus*	*carpio*
Northern pikeminnow	Cyprinidae	*Ptychocheilus*	*oregonensis*
Redside shiner	Cyprinidae	*Richardsonius*	*balteatus*
Brown bullhead	Ictaluridae	*Ameiurus*	*nebulosus*
Channel catfish	Ictaluridae	*Ictalurus*	*punctatus*
Yellow perch	Percidae	*Perca*	*flavescens*

Fish			
Common	**Family**	**Genus**	**Species**
Lahontan cutthroat trout	Salmonidae	*Oncorhynchus*	*clarkii henshawi*
Rainbow trout	Salmonidae	*Oncorhynchus*	*mykiss*
Kokanee	Salmonidae	*Oncorhynchus*	*Nerka*

Herptiles			
Common Name	**Family**	**Genus**	**Species**
Racer	Colubridae	*Coluber*	*constrictor*
Striped whipsnake	Colubridae	*Masticophis*	*taeniatus*
Gopher snake	Colubridae	*Pituophis*	*catenifer*
Bull snake	Colubridae	*Pituophis*	*melanoleucuc*
Western terrestrial garter snake	Colubridae	*Thamnophis*	*elegans*
Common garter snake	Colubridae	*Thamnophis*	*sirtalis*
Painted turtle	Emydidae	*Chrysemys*	*picta*
Pacific tree frog	Hylidae	*Pseudacris*	*regilla*
Bullfrog	Ranidae	*Rana*	*Catesbeiana*
Northern leopard frog	Ranidae	*Rana*	*pipiens*
Great Basin spadefoot toad	Scaphiopodidae	*Spea*	*intermontana*
Western rattlesnake	Viperidae	*Crotalus*	*viridis*

Other			
Common Name	**Family**	**Genus**	**Species**
Water mite		*Acari*	
Free-living aquatic worm		*Nematode*	
Scud	Amphipoda		
Springtail	Collembola		
New Zealand mudsnail	Hydrobiidae	*Potamopyrgus*	*antipodarum*
Aquatic worm	Oligochaeta		
Wind scorpion	Solifudae		
Ink cap fungi	Coprinaceae	*Coprinus*	spp.

Document continues on next page.

Appendix F. Statement of Compliance

STATEMENT OF COMPLIANCE[1]
for Implementation of the
Deer Flat National Wildlife Refuge, Headquartered in Nampa, Canyon County, Idaho
(and Refuge lands in Payette, Owyhee, and Washington Counties in Idaho; and Malheur County in Oregon)
Comprehensive Conservation Plan

The following executive orders and legislative acts have been reviewed as they apply to implementation of the Deer Flat National Wildlife Refuge (Refuge) Comprehensive Conservation Plan (CCP).

- **National Environmental Policy Act (1969) (42 U.S.C. 4321 et seq.) (NEPA).** The planning process has been conducted in accordance with NEPA Implementing Procedures and Department of the Interior and U.S. Fish and Wildlife Service (Service) procedures, and has been performed in coordination with the affected public.

  The CCP is programmatic in many respects, and specific details of certain projects and actions cannot be determined until a later date depending on funding and implementation schedules. Certain projects or actions may require additional NEPA compliance.

- **National Historic Preservation Act (1966) (16 U.S.C. 470 et seq.).** The implementation of the CCP should not affect cultural resources. The proposed action does not meet the criteria of an effect or adverse effect as an undertaking defined in 36 Code of Federal Regulations 800.9 and Service Manual 614 FW 2. The Service will comply with the National Historic Preservation Act if any management actions have the potential to affect any historic properties that may be present.

- **Executive Order 12372. Intergovernmental Review.** Coordination and consultation with affected Tribal, local, and State governments, other Federal agencies, and landowners has been completed through personal contact and/or in writing by Service planners, Refuge managers, and supervisors.

- **Executive Order 13175. Consultation and Coordination with Indian Tribal Governments.** As required under Secretary of the Interior Order 3206, American Indian Tribal Rights, Federal-Tribal Responsibilities, and the Endangered Species Act, the Project Leader attempted to consult and coordinate with the Nez Perce, Shoshone-Bannock, and Shoshone Paiute Tribes regarding the proposed action. All listed tribes were contacted in writing and by phone to assess their interest in the CCP planning process.

- **Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in

[1] See 602 FW 3, Exhibit 2 for other potential compliance requirements.

the United States. The CCP was evaluated, and no adverse human health or environmental effects were identified for minority or low-income populations, Indian Tribes, or anyone else.

- **Wilderness Act of 1964.** The Service has evaluated the suitability of the Refuge for wilderness designation and found that no lands within the Refuge meet all necessary criteria for inclusion in the National Wilderness Preservation System.

- **National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee).** Appropriate Use Findings were prepared for boating at no-wake speeds, competitive and group cycling and jogging, individual cycling and jogging, float plan use, geocaching, grazing and farming, high-speed watercraft use, horseback riding, ice skating, remote controlled planes, research, swimming and beach use, and walking with dogs. Walking with dogs, swimming and beach use, individual cycling and jogging, boating at no-wake speeds, horseback riding, and high-speed watercraft use were all found to be appropriate when following stipulations set forth in the compatibility determination for each use. Compatibility determinations were also prepared for fishing, hunting, wildlife observation, photography, interpretation, and environmental education. All wildlife-dependent activities and appropriate nonwildlife-dependent activities were found to be compatible with stipulations.

- **Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds.** The CCP is consistent with Executive Order 13186 because the CCP and NEPA analyses evaluate the effects of agency actions on migratory birds.

- **Endangered Species Act of 1973 (16 U.S.C. 1531-1544).** CCP implementation is expected to result in findings of no significant action.

- **Executive Order 11990. Protection of Wetlands.** The CCP is consistent with Executive Order 11990 because CCP implementation would protect existing wetlands.

- **Integrated Pest Management, 517 DM 1 and 7 RM 14.** In accordance with 517 DM 1 and 7 RM 14, an integrated pest management (IPM) approach has been adopted to eradicate, control, or contain pest and invasive species on the Refuge. In accordance with 517 DM 1, only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under refuge jurisdiction.

_____ _____

Chief, Division of Planning, Visitor Services, and Transportation

Date

Appendix G. Integrated Pest Management (IPM) Program

G.1 Background

IPM is an interdisciplinary approach using methods to prevent, eliminate, contain, and/or control pest species in concert with other management activities on refuge lands and waters to achieve wildlife and habitat management goals and objectives. IPM is also a scientific, adaptive management process where available scientific information and best professional judgment of the refuge staff and other resource experts would be used to identify and implement appropriate management strategies that can be modified and/or changed over time to ensure effective, site-specific management of pest species to achieve desired outcomes. In accordance with 43 Code of Federal Regulations (C.F.R.) 46.145, adaptive management would be particularly relevant where long-term impacts may be uncertain and future monitoring would be needed to make adjustments in subsequent implementation decisions. After a tolerable pest population (threshold) is determined considering achievement of refuge resource objectives and the ecology of pest species, one or more methods, or combinations thereof, would be selected that are feasible, efficacious, and most protective of non-target resources, including native species (fish, wildlife, and plants), and Service personnel, Service authorized agents, volunteers, and the public. Staff time and available funding would be considered when determining feasibility/practicality of various treatments.

IPM techniques to address pests are presented as comprehensive conservation plan (CCP) strategies (see Chapter 2 of this CCP/environmental impact statement [EIS]) in an adaptive management context to achieve refuge resource objectives. To satisfy requirements for IPM planning as identified in the Director's Memo (dated September 9, 2004) entitled *Integrated Pest Management Plans and Pesticide Use Proposals: Updates, Guidance, and an Online Database*, the following elements of an IPM program have been incorporated into this CCP:

- Habitat and/or wildlife objectives that identify pest species and appropriate thresholds to indicate the need for and successful implementation of IPM techniques; and
- Monitoring before and/or after treatment to assess progress toward achieving objectives including pest thresholds.

Where pesticides would be necessary to address pests, this appendix provides a structured procedure to evaluate potential effects of proposed uses involving ground-based applications to refuge biological resources and environmental quality in accordance with effects analyses presented in Chapter 6 of this CCP/EIS, *Environmental Consequences*. Only pesticide uses that likely would cause minor, temporary, or localized effects to refuge biological resources and environmental quality with appropriate best management practices (BMPs), where necessary, would be allowed for use on the refuge.

This appendix does not describe the more detailed process used to evaluate potential effects associated with aerial applications of pesticides. Moreover, it does not address effects of mosquito control with pesticides (larvicides, pupacides, or adulticides) based upon identified human health threats and presence of disease-carrying mosquitoes in sufficient numbers from monitoring conducted on a refuge. However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides or use of insecticides for mosquito management would be similar to the process described in this appendix for ground-based treatments of other pesticides.

G.2 Pest Management Laws and Policies

In accordance with Service policy 569 FW 1 (Integrated Pest Management), plant, invertebrate, and vertebrate pests on units of the National Wildlife Refuge System (NWRS) can be controlled to ensure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Pest control on federal (refuge) lands and waters also is authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd-668ee);
- Plant Protection Act of 2000 (7 U.S.C. 7701 et seq.);
- Noxious Weed Control and Eradication Act of 2004 (7 U.S.C. 7781-7786, Subtitle E);
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 U.S.C. 136-136y);
- National Invasive Species Act of 1996 (16 U.S.C. 4701);
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 U.S.C. 4701);
- Food Quality Protection Act of 1996 (7 U.S.C. 136);
- Executive Order 13148, Section 601(a);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 U.S.C. 426-426c, 46 Stat. 1468).

Pests are defined as "…living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety" according to Department policy 517 DM 1 (Integrated Pest Management Policy). Similarly, 569 FW 1 defines pests as "…invasive plants and introduced or native organisms that may interfere with achieving our management goals and objectives on or off our lands, or that jeopardize human health or safety." 517 DM 1 also defines an invasive species as "a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Throughout the remainder of this CCP/EIS, the terms "pest" and "invasive species" are used interchangeably because both can prevent/impede achievement of refuge wildlife and habitat objectives and/or degrade environmental quality.

In general, control of pests (vertebrate or invertebrate) on refuges would conserve and protect the nation's fish, wildlife, and plant resources as well as maintain environmental quality. From 569 FW 1, animal or plant species that are considered pests may be managed if the following criteria are met:

- Threat to human health and wellbeing or private property; the acceptable level of damage by the pest has been exceeded; or State or local government has designated the pest as noxious;
- Detrimental to resource objectives as specified in a refuge resource management plan (e.g., CCP, habitat management plan [HMP]), if available; and
- Control would not conflict with attainment of resource objectives or the purposes for which the refuge was established.

The specific justifications for pest management activities on refuges are the following:

- Protect human health and wellbeing;
- Prevent substantial damage to important refuge resources;
- Protect newly introduced species or re-establish native species;

- Control nonnative (exotic) species in order to support existence for populations of native species;
- Prevent damage to private property; and
- Provide the public with quality, compatible wildlife-dependent recreational opportunities.

In accordance with Service policy 620 FW 1 (Habitat Management Plans), there are additional management directives regarding invasive species found on the refuge:

- "We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."
- "Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species…"

Animal species damaging/destroying federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 C.F.R. 31.14 (Official Animal Control Operations). For example, the incidental removal of beavers damaging refuge infrastructure (e.g., clogging with subsequent damaging of water control structures) and/or negatively affecting habitats (e.g., removing woody species from existing or restored riparian areas) managed on refuge lands may be conducted without a pest control proposal. We recognize beavers are native species and most of their activities on refuge lands represent a natural process beneficial for maintaining wetland habitats.

Trespass and feral animals also may be controlled on refuge lands. Based upon 50 C.F.R. 28.43 (Destruction of Dogs and Cats), dogs and cats running at large on a national wildlife refuge and observed in the act of killing, injuring, harassing, or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife. Feral animals should be disposed of by the most humane method(s) available and in accordance with relevant Service directives (including Executive Order 11643).

Disposed wildlife specimens may be donated or loaned to public institutions. Donation or loans of resident wildlife species would only be made after securing state approval (50 C.F.R. 30.11 [Donation and Loan of Wildlife Specimens]). Surplus wildlife specimens may be sold alive or butchered, dressed and processed subject to Federal and state laws and regulations (50 C.F.R. 30.12 [Sale of Wildlife Specimens]).

G.3 Strategies

To fully embrace IPM as identified in 569 FW 1, the following strategies, where applicable, would be carefully considered on the refuge for each pest species:

Prevention. This would be the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of established pests to un-infested areas. It requires identifying potential routes of invasion to reduce the likelihood of infestation. Hazard Analysis and Critical Control Points (HACCP) planning can be used to determine if current management activities on a refuge may introduce and/or spread invasive species in order to

identify appropriate BMPs for prevention. See http://www.haccp-nrm.org/ for more information about HACCP planning.

Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (e.g., barriers) and/or sanitation methods (e.g., wash stations) to prevent re-introductions by various mechanisms including vehicles, personnel, livestock, and horses. Because invasive species are frequently the first to establish in newly disturbed sites, prevention would require a reporting mechanism for early detection of new pest occurrences with quick response to eliminate any new satellite pest populations. Prevention would require consideration of the scale and scope of land management activities that may promote pest establishment within un-infested areas or promote reproduction and spread of existing populations. Along with preventing initial introduction, prevention would involve halting the spread of existing infestations to new sites (Mullin et al. 2000). The primary reason for prevention would be to keep pest-free lands or waters from becoming infested. Executive Order 11312 emphasizes the priority of prevention with respect to managing pests.

The following are methods to prevent the introduction and/or spread of pests on refuge lands:

- Before beginning ground-disturbing activities (e.g., disking, scraping), inventory and prioritize pest infestations in project operating areas and along access routes. Refuge staff would identify pest species on-site or within reasonably expected potential invasion vicinity. Where possible, the refuge staff would begin project activities in un-infested areas before working in pest-infested areas.
- The refuge staff would locate and use pest-free project staging areas. They would avoid or minimize travel through pest-infested areas, or restrict use to those periods when spread of seed or propagules of invasive plants would be least likely.
- The refuge staff would determine the need for and, when appropriate, identify sanitation sites where equipment can be cleaned of pests. Where possible, the refuge staff would clean equipment before entering lands at on-refuge approved cleaning site(s). This practice does not pertain to vehicles traveling frequently in and out of the project area that remain on roadways. Seeds and plant parts of pest plants would need to be collected, where practical. The refuge staff would remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- The refuge staff would clean all equipment before leaving the project site, if operating in areas infested with pests. The refuge staff would determine the need for and, when appropriate, identify sanitation sites where equipment can be cleaned.
- Refuge staff, their authorized agents, and refuge volunteers would, where possible, inspect, remove, and properly dispose of seed and parts of invasive plants found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and then properly discarding them (e.g., incinerating).
- The refuge staff would evaluate options, including closure, to restrict traffic at sites with ongoing restoration of desired vegetation. They would revegetate disturbed soil (except travel ways on surfaced projects) to optimize plant establishment for each specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. The refuge staff would use native material, where appropriate and feasible. They would use certified weed-free or weed-seed-free hay or straw where certified materials are reasonably available.

- The refuge staff would provide information, training, and appropriate pest identification materials to permit holders and recreational visitors. The refuge staff would educate them about pest identification, biology, impacts, and effective prevention measures.
- The refuge staff would require grazing permittees to use preventative measures for their livestock while on refuge lands.
- The refuge staff would inspect borrow material for invasive plants prior to use and transport onto and/or within refuge lands.
- The refuge staff would consider invasive plants in planning for road maintenance activities.
- The refuge staff would restrict off-road travel to designated routes.

The following are methods to prevent the introduction and/or spread of pests into refuge waters:

- The refuge staff would inspect boats (including air boats), trailers, and other boating equipment. Where possible, they would remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Where possible, the refuge staff would drain water from motor, live well, bilge, and transom wells while on land before leaving the site. If possible, the refuge staff would wash and dry boats, downriggers, anchors, nets, floors of boats, propellers, axles, trailers, and other boating equipment to kill pests not visible at the boat launch.
- Where feasible, the refuge staff would maintain a 100-foot buffer of aquatic pest-free clearance around boat launches and docks or quarantine areas when cleaning around culverts, canals, or irrigation sites. Where possible, the refuge staff would inspect and clean equipment before moving to new sites or one project area to another.

These prevention methods to minimize/eliminate the introduction and/or spread of pests were taken verbatim or slightly modified from the *Pacific Northwest Region Invasive Plant Program: Preventing and Managing Invasive Plants, Final Environmental Impact Statement* (U.S. Forest Service [USFS] 2005: Appendix E).

- **Mechanical/Physical Methods.** These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plants, these treatments can be accomplished by hand, hand tool (manual), or power tools (mechanical) and include pulling, grubbing, digging, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, and mulching of the pest plants.

  For animal species, Service employees or their authorized agents could use mechanical/physical methods (including trapping) to control pests as a refuge management activity. Based upon 50 C.F.R. 31.2, trapping can be used on a refuge to reduce surplus wildlife populations for a "balanced conservation program" in accordance with Federal or state laws and regulations. In some cases, non-lethally trapped animals would be relocated to off-refuge sites with prior approval from the state.

  Each of these tools would be efficacious to some degree and applicable to specific situations. In general, mechanical controls can effectively control annual and biennial pest plants. However, to control perennial plants, the root system has to be destroyed or it would resprout and continue to grow and develop. Mechanical controls are typically not capable of destroying a perennial plant's root system. Although some mechanical tools (e.g., disking, plowing) may damage root systems, they may stimulate regrowth, producing a denser plant population that may aid in the spread depending

upon the target species (e.g., Canada thistle). In addition, steep terrain and soil conditions would be major factors that can limit the use of many mechanical control methods.

Some mechanical control methods (e.g., mowing), which would be used in combination with herbicides, can be very effective techniques to control perennial species. For example, mowing perennial plants followed sequentially by treating the plant regrowth with a systemic herbicide often would improve the efficacy of the herbicide compared to herbicide treatment only.

- **Cultural Methods.** These methods would involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. Cultural methods include water-level manipulation, mulching, planting winter cover crops, changing planting dates to minimize pest impact, using prescribed burning (facilitate revegetation, increase herbicide efficacy, and remove litter to assist in emergence of desirable species), flaming with propane torches, using trap crops, having crop rotations that include non-susceptible crops, moisture management, addition of beneficial insect habitat, reducing clutter, proper trash disposal, planting or seeding desirable species to shade or outcompete invasive plants, applying fertilizer to enhance desirable vegetation, prescriptive grazing, and other habitat alterations.

- **Biological Control Agents.** Classical biological control would involve the deliberate introduction and management of natural enemies (parasites, predators, or pathogens) to reduce pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. These newly introduced pests, which are free from natural enemies found in their country or region of origin, may have a competitive advantage over cultivated and native species. This competitive advantage often allows introduced species to flourish, and they may cause widespread economic damage to crops or out compete and displace native vegetation. Once the introduced pest species population reaches a certain level, traditional methods of pest management may be cost-prohibitive or impractical. Biological controls typically are used when these pest populations have become so widespread that eradication or effective control would be difficult or no longer practical.

  Biological control has advantages as well as disadvantages. Benefits include reducing pesticide use, host specificity for target pests, long-term self-perpetuating control, low cost per acre, capacity for searching and locating hosts, synchronizing biological control agents to hosts' life cycles, and the low likelihood that hosts would develop resistance to agents. Disadvantages include the following: limited availability of agents from their native lands, the dependence of control on target species density, slow rate at which control occurs, biotype matching, the difficulty and expense of conflicts over control of the target pest, and host specificity when host populations are low.

  A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. It may not work well in a particular area while working well in other areas. Biological control agents require specific environmental conditions to survive over time. Some of these conditions are understood, whereas others are only partially understood or not at all.

  Biological control agents would not eradicate a target pest. When using biological control agents, residual levels of the target pest typically are expected; the agent population level or survival would be dependent upon the density of its host. After the pest population decreases, the population of the biological control agent would decrease correspondingly. This is a natural cycle. Some pest populations (e.g., invasive plants) tend to persist for several years after a biological control agent

becomes established due to seed reserves in the soil, inefficiencies in the agents' search behavior, and the natural lag in population buildup of the agent.

The full range of pest groups potentially found on refuge lands and waters would include disease causing organisms, invertebrates (insects, mollusks), vertebrates, and invasive plants (the most common group). Often it is assumed that biological control would address many if not most of these pest problems. There are several well-documented success stories of biological control of invasive weed species in the Pacific Northwest, including Mediterranean sage, St. Johnswort (Klamath weed), and tansy ragwort. Emerging success stories include Dalmatian toadflax, diffuse knapweed, leafy spurge, purple loosestrife, and yellow star-thistle. However, historically, each new introduction of a biological control agent in the United States has only about a 30% success rate (Coombs et al. 2004). Refer to Coombs et al. (2004) for the status of biological control agents for invasive plants in the Pacific Northwest.

Introduced species without desirable close relatives in the United States would generally be selected as biological controls. Natural enemies that are restricted to one or a few closely related plants in their country of origin are targeted as biological controls (Center et al. 1997; Hasan and Ayres 1990).

The refuge staff would ensure introduced agents are approved by the applicable authorities. Except for a small number of formulated biological control products registered by the U.S. Environmental Protection Agency (USEPA) under Federal Insecticide, Fungicide and Rodenticide Act of 1972 (FIFRA), most biological control agents are regulated by the U.S. Department of Agriculture's (USDA's) Animal Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ). State departments of agriculture and, in some cases, county agricultural commissioners or weed districts, have additional approval authority.

Federal permits (USDA-APHIS-PPQ Form 526) are required to import biocontrols agents from another state. Form 526 may be obtained by writing:

USDA-APHIS-PPQ
Biological Assessment and Taxonomic Support
4700 River Road, Unit 113
Riverdale, MD 20737

Or

Through the internet at: http://www.aphis.usda.gov/permits/ppq_epermits.shtml.

The Service strongly supports the development, and legal and responsible use of appropriate, safe, and effective biological control agents for nuisance and non-indigenous or pest species.

State and county agriculture departments may also be sources for biological control agents or they may have information about where biological control agents may be obtained. Commercial sources should have the Application and Permit to Move Live Plant Pests and Noxious Weeds (USDA-PPQ Form 226 USDA-APHIS-PPQ, Biological Assessment and Taxonomic Support, 4700 River Road, Unit 113, Riverdale, MD 20737) to release specific biological control agents in a state and/or county.

Furthermore, certification regarding the biological control agent's identity (genus, specific epithet, subspecies, and variety) and purity (e.g., parasite free, pathogen free, and biotic and abiotic contaminants) should be specified in purchase orders.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management). In addition, the refuge staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (http://sric.ucdavis.edu/exotic/exotic.htm) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, Montana, on July 9, 1999. This code identifies the following:

- Release only approved biological control agents,
- Use the most effective agents,
- Document releases, and
- Monitor for impact to the target pest, non-target species, and the environment.

Biological control agents formulated as pesticide products and registered by the USEPA (e.g., *Bti*) are also subject to pesticide use proposals (PUP) review and approval (see below).

A record of all releases would be maintained with date(s), location(s), and environmental conditions of the release site(s); the identity, quantity, and condition of the biological control agents released; and other relevant data and comments such as weather conditions. Systematic monitoring to determine the establishment and effectiveness of the release is also recommended.

National Environmental Policy Act (NEPA) documents regarding biological and other environmental effects of biological control agents prepared by another Federal agency, where the scope is relevant to evaluation of releases on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the Bureau of Land Management (BLM), the USFS, the National Park Service, USDA Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s) from the review. Incorporating by reference (43 C.F.R. 46.135) is a technique used to avoid redundancies in analysis. It also can reduce the bulk of a Service NEPA document, which must only identify the documents that are incorporated by reference. In addition, relevant portions must be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of the relevance of the referenced material to the current analysis.

- **Pesticides.** The selective use of pesticides would be based upon pest ecology (including mode of reproduction), the size and distribution of pest populations, site-specific conditions (e.g., soils, topography), known efficacy under similar site conditions, and the capability to use BMPs to reduce/eliminate potential effects to non-target species and sensitive habitats, and the potential to contaminate surface and groundwater. All pesticide use (pesticide, target species, application rate, and method of application) would comply with the applicable Federal (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Before pesticides can be used to eradicate, control, or contain pests on refuge lands and waters, PUPs would be prepared and approved in accordance with 569 FW 1. PUP records would provide a detailed, time-, site-, and target-specific description of the proposed use of pesticides on the refuge. All PUPs would be created, approved, or disapproved, and stored in the Pesticide Use Proposal System (PUPS), which is a centralized database only accessible on the Service's intranet (https://systems.fws.gov/pups). Only Service employees would be authorized to access PUP records for a refuge in this database.

Application equipment would be selected to provide site-specific delivery to target pests while minimizing/eliminating direct or indirect (e.g., drift) exposure to non-target areas and degradation of surface and groundwater quality. Where possible, target-specific equipment (e.g., backpack sprayer, wiper) would be used to treat target pests. Other target-specific equipment to apply pesticides would include soaked wicks or paint brushes for wiping vegetation and lances, hatchets, or syringes for direct injection into stems. Granular pesticides may be applied using seeders or other specialized dispensers. In contrast, aerial spraying (e.g., fixed wing or helicopter) would only be used where access is difficult (remoteness) and/or the size/distribution of infestations precludes practical use of ground-based methods.

Because repeated use of one pesticide may allow resistant organisms to survive and reproduce, multiple pesticides with variable modes of action would be considered for treatments on refuge lands and waters. This is especially important if multiple applications within years and/or over a growing season likely would be necessary for habitat maintenance and restoration activities to achieve resource objectives. Integrated chemical and non-chemical controls also are highly effective, where practical, because pesticide-resistant organisms can be removed from the site.

Cost may not be the primary factor in selecting a pesticide for use on a refuge. If the least expensive pesticide would potentially harm natural resources or people, then a different product would be selected, if available. The most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water, and groundwater) and the least potential effect on native species and communities of fish, wildlife, plants, and their habitats would be acceptable for use on refuge lands in the context of an IPM approach.

- **Habitat restoration/maintenance.** Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives would be essential for long-term prevention, eradication, or control (at or below threshold levels) of pests. Promoting desirable plant communities through the manipulation of species composition, plant density, and growth rate is an essential component of invasive plant management (Brooks et al. 2004; Masters and Shelly 2001; Masters et al. 1996). The following three components of succession could be manipulated through habitat maintenance and restoration: site availability, species availability, and species performance (Cox and Anderson 2004). Although a single method (e.g., herbicide treatment) may eliminate or suppress pest species in the short term, the resulting gaps and bare soil create niches that are conducive to further invasion by the species and/or other invasive plants. On degraded sites where desirable species are absent or in low abundance, revegetation with native/desirable grasses, forbs, and legumes may be necessary to direct and accelerate plant community recovery and achieve site-specific objectives in a reasonable timeframe. The selection of appropriate species for revegetation would be dependent on a number of factors including resource objectives and site-specific, abiotic factors (e.g., soil texture, precipitation/temperature regimes, and shade conditions). Seed availability and cost, ease of establishment, seed production, and competitive ability also would be important considerations.

G.4 Priorities for Treatments

For many refuges, the magnitude (number, distribution, and sizes of infestations) of pest problems is too extensive and beyond the available capital resources to effectively address during any single field season. To manage pests in such a refuge, it would be essential to prioritize treatment of infestations. Highest priority treatments would be focused on early detection and rapid response to eliminate infestations of new pests, if possible. This would be especially important for aggressive pests

potentially impacting species, species groups, communities, and/or habitats associated refuge purpose(s), NWRS resources of concern (federally listed species, migratory birds, selected marine mammals, and interjurisdictional fish), and native species for maintaining/restoring biological integrity, diversity, and environmental health.

The next priority would be treating established pests that appear in one or more previously un-infested areas. Moody and Mack (1988) demonstrated through modeling that small, new outbreaks of invasive plants eventually would infest an area larger than the established, source population. They also found that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority would be treating large infestations (sometimes monotypic stands) of well-established pests. In this case, initial efforts would focus upon containment of the perimeter followed by work to control/eradicate the established infested area. If containment and/or control of a large infestation are not effective, then efforts would focus upon halting pest reproduction or managing source populations. Maxwell et al. (2009) found treating fewer populations that are sources represents an effective long-term strategy to reduce the total number of invasive populations and decrease meta-population growth rates.

Although state-listed noxious weeds would always be of high priority for management, other pest species known to cause substantial ecological impact would also be considered. For example, cheatgrass may not be listed by a state as noxious, but it can greatly alter fire regimes in shrub-steppe habitats, resulting in large monotypic stands that displace native bunch grasses, forbs, and shrubs. Pest control would likely require a multi-year commitment from refuge staff. Essential to the long-term success of pest management would be pre- and post-treatment monitoring, assessment of the successes and failures of treatments and development of new approaches when proposed methods do not achieve desired outcomes.

G.5 Best Management Practices

BMPs can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats as well as degradation of water quality from drift, surface runoff, or leaching. Based upon the Department of Interior Pesticide Use policy (517 DM 1) and the Service Integrated Pest Management policy (569 FW 1), the use of applicable BMPs (where feasible) also would likely ensure that pesticide uses may not adversely affect federally listed species and/or their critical habitats through determinations made using the process described in 50 C.F.R. 402.

The following are BMPs pertaining to mixing/handling and applying pesticides for all ground-based treatments of pesticides, which would be considered and used, where feasible, based upon target- and site-specific factors and time-specific environmental conditions. Although not listed below, the most important BMP to eliminate/reduce potential impacts to non-target resources would be an IPM approach to preventing, controlling, eradicating, and containing pests.

G.5.1 Pesticide Handling and Mixing

- As a precaution against spilling, spray tanks would not be left unattended during filling.
- All pesticide containers would be triple rinsed, and the rinsate would be used as water in the sprayer tank and applied to treatment areas.
- All pesticide spray equipment would be properly cleaned. Where possible, rinsate would be used as part of the make-up water in the sprayer tank and applied to treatment areas.

- The refuge staff would triple rinse and recycle (where feasible) pesticide containers.
- All unused pesticides would be properly discarded at a local "safe send" collection.
- Pesticides and pesticide containers would be lawfully stored, handled, and disposed of in accordance with the label and in a manner safeguarding human health, fish, and wildlife, and preventing soil and water contamination.
- The refuge staff would consider the water quality parameters (e.g., pH, hardness) that are important to ensure greatest efficacy where specified on the pesticide label.
- All pesticide spills would be addressed immediately using procedures identified in the refuge spill response plan.

G.5.2 Applying Pesticides

- Pesticide treatments would only be conducted by or under the supervision of Service personnel and non-Service applicators with the appropriate state or BLM certification to safely and effectively conduct these activities on refuge lands and waters.
- The refuge staff would comply with all applicable Federal, state, and local pesticide use laws and regulations as well as Departmental, Service, and NWRS pesticide-related policies. For example, the refuge staff would use application equipment and apply rates for the specific pest(s) identified on the pesticide label as required under FIFRA.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators would review the labels, material safety data sheets (MSDSs), and PUPs for each pesticide, determining the target pest, appropriate mix rate(s), personal protective equipment (PPE), and other requirements listed on the pesticide label.
- A 1-foot no-spray buffer from the water's edge would be used, where applicable and where it does not detrimentally influence effective control of pest species.
- Low-impact herbicide application techniques (e.g., spot treatment, cut stump, oil basal, Thinvert system applications) would be used rather than broadcast foliar applications (e.g., boom sprayer, other larger tank wand applications), where practical.
- Low-volume rather than high-volume foliar applications would be used where low-impact methods mentioned above are not feasible or practical to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators would use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.
- Applicators would use the largest droplet size that results in uniform coverage.
- Applicators would use drift-reduction technologies such as low-drift nozzles, where possible.
- Where possible, spraying would occur during low (average <7 miles per hour [mph] and preferably 3 to 5 mph) and consistent direction wind conditions with moderate temperatures (typically <85°F).
- Where possible, applicators would avoid spraying during inversion conditions (often associated with calm and very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment would be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications would be made at the lowest height for uniform coverage of target pests to minimize/eliminate potential drift.

- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) would typically be conducted during early morning hours.
- Spray applications would not be conducted on days with >30% forecast for rain within 6 hours, except for pesticides that are rapidly rain-fast (e.g., glyphosate in 1 hour) to minimize/eliminate potential runoff.
- Where possible, applicators would use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Where possible, applicators would use a non-toxic dye to aid in identifying target area treated as well as potential overspray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, the application would be stopped until repairs can be made to the sprayer.
- For pesticide uses associated with cropland and facilities management, buffers, as appropriate, would be used to protect sensitive habitats, especially wetlands and other aquatic habitats.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. The refuge staff would only apply adjacent to sensitive areas when the wind is blowing in the opposite direction.
- Applicators would use scouting for early detection of pests to eliminate unnecessary pesticide applications.
- The refuge staff would consider timing of applications so native plants are protected (e.g., senescence), while effectively treating invasive plants.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.
- Application equipment (e.g., sprayer, all-terrain vehicle [ATV], tractor) would be thoroughly cleaned and PPE would be removed or disposed of on-site by applicators after treatments to eliminate the potential spread of pests to un-infested areas.

G.6 Safety

G.6.1 Personal Protective Equipment

All applicators would wear the specific PPE identified on the pesticide label. The appropriate PPE should be worn at all times during handling, mixing, and applying. PPE can include the following: disposable (e.g., Tyvek) or laundered coveralls; gloves (latex, rubber, or nitrile); rubber boots; and/or a National Institute for Occupational Safety and Health (NIOSH)–approved respirator. Because exposure to concentrated product is usually greatest during mixing, extra care should be taken while preparing pesticide solutions. Persons mixing these solutions can be best protected if they wear long gloves, an apron, footwear, and a face shield.

Coveralls and other protective clothing used during an application would be laundered separately from other laundry items. Transporting, storing, handling, mixing, and disposing of pesticide containers would be consistent with label requirements, USEPA and Occupational Safety and Health Administration (OSHA) requirements, and Service policy.

If a respirator is necessary for a pesticide use, then the following requirements would be met in accordance with Service safety policy: a written Respirator Program, fit testing, physical examination

(including pulmonary function and blood work for contaminants), and proper storage of the respirator.

G.6.2 Notification

The restricted entry interval (REI) is the time period after the application after which someone may safely enter a treated area without PPE. Refuge staff, authorized management agents of the Service, volunteers, and members of the public who could be in or near a pesticide-treated area within the stated re-entry time period on the label would be notified about treatment areas. Posting would occur at any site where individuals might inadvertently become exposed to a pesticide during other activities on the refuge. Where required by the label and/or state-specific regulations, sites would also have information posted on its perimeter and at other likely locations of entry. The refuge staff would also notify appropriate private property owners of an intended application, including any private individuals who have requested notification. Special efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

G.6.3 Medical Surveillance

Medical surveillance may be required for Service personnel and approved volunteers who mix, apply, and/or monitor use of pesticides (see 242 FW 7 [Pesticide Users] and 242 FW 4 [Medical Surveillance]). In accordance with 242 FW 7.12A, Service personnel would be medically monitored if one or more of the following criteria are met: personnel are exposed or may have been exposed to concentrations at or above the published permissible exposure limits or threshold limit values (see 242 FW 4); the personnel use pesticides in a manner considered "frequent pesticide use"; or the personnel use pesticides in a manner that requires a respirator (see 242 FW 14 for respirator use requirements). In 242 FW7.7A, "**Frequent Pesticide Use** means when a person applying pesticide handles, mixes, or applies pesticides, with a Health Hazard rating of 3 or higher, for 8 or more hours in any week or 16 or more hours in any 30-day period." Under some circumstances, individuals who use pesticides infrequently, experience an acute exposure (sudden, short term), or use pesticides with a health hazard ranking of 1 or 2 may be medically monitored. This decision would consider the individual's health and fitness level, the pesticide's specific health risks, and the potential risks from other pesticide-related activities. Refuge cooperators (e.g., cooperative farmers) and other authorized agents (e.g., state and county employees) would be responsible for their own medical monitoring needs and costs.

Standard examinations (at refuge expense) of appropriate refuge staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

G.6.4 Certification and Supervision of Pesticide Applicators

Appropriate Refuge staff or approved volunteers handling, mixing, and/or applying, or directly supervising others engaged in pesticide use activities would be trained and state or federally (BLM) licensed to apply pesticides to refuge lands or waters. In accordance with 242 FW7.18A and 569 FW 1.10B, certification is required to apply restricted use pesticides based upon USEPA regulations. For safety reasons, all individuals participating in pest management activities with general use pesticides are also encouraged to attend appropriate training or acquire pesticide applicator certification. The certification requirement would be for a commercial or private applicator depending upon the state.

New staff unfamiliar with proper procedures for storing, mixing, handling, applying, and disposing of herbicides and containers would receive orientation and training before handling or using any products. Documentation of training would be kept in the files at the refuge office.

G.6.5 Record Keeping

G.6.5.1 Labels and material safety data sheets

Pesticide labels and MSDSs would be maintained at the refuge shop and laminated copies kept in the mixing area. These documents would also be carried by field applicators, where possible. A written reference (e.g., note pad, chalk board, dry erase board) for each tank to be mixed would be kept in the mixing area for quick reference while mixing is in progress. In addition, approved PUPs stored in the PUPS database typically contain website links (URLs) to pesticide labels and MSDSs.

G.6.5.2 Pesticide use proposals

A PUP would be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. A PUP would include specific information about the proposed pesticide use including the common and chemical names of the pesticide(s), target pest species, size and location of treatment site(s), application rate(s) and method(s), and federally listed species determinations, where applicable.

In accordance with Service guidelines (Director's memo [December 12, 2007]), a refuge staff may receive up to five-year approvals for Washington Office and field-reviewed proposed pesticide uses based upon meeting identified criteria including an approved IPM plan, where necessary (see http://www.fws.gov/contaminants/Issues/IPM.cfm). For a refuge, an IPM plan (requirements described herein) can be completed independently or in association with a CCP or HMP if IPM strategies and potential environmental effects are adequately addressed within appropriate NEPA documentation.

PUPs would be created, approved, or disapproved, and stored as records in the PUPS, which is a centralized database on the Service's intranet (https://systems.fws.gov/pups). Only Service employees can access PUP records in this database.

G.6.5.3 Pesticide usage

In accordance with 569 FW 1, the refuge Project Leader would be required to maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction. This would encompass pesticides applied by other federal agencies, state and county governments, non-government applicators including cooperators and their pest management service providers with Service permission. For clarification, pesticide means all insecticides, insect and plant growth regulators, dessicants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

The following usage information can be reported for approved PUPs in the PUPS database:

- Pesticide trade name(s)
- Active ingredient(s)
- Total acres treated
- Total amount of pesticides used (lbs or gallons)

- Total amount of active ingredient(s) used (lbs)
- Target pest(s)
- Efficacy (% control)

To determine whether treatments are efficacious (eradicating, controlling, or containing the target pest) and achieving resource objectives, habitat and/or wildlife response would be monitored both pre- and post-treatment, where possible. Considering available annual funding and staffing, appropriate monitoring data regarding characteristics (attributes) of pest infestations (e.g., area, perimeter, degree of infestation density, percent cover, density) as well as habitat and/or wildlife response to treatments may be collected and stored in a relational database (e.g., Refuge Habitat Management Database), preferably a geo-referenced data management system (e.g., Refuge Lands Geographic Information System [RLGIS]) to facilitate data analyses and subsequent reporting. In accordance with adaptive management, data analysis and interpretation would allow treatments to be modified or changed over time, as necessary, to achieve resource objectives considering site-specific conditions in conjunction with habitat and/or wildlife responses. Monitoring could also identify short- and long-term impacts to natural resources and environmental quality associated with IPM treatments in accordance with adaptive management principles identified in 43 C.F.R. 46.145.

G.7 Evaluating Pesticide Use Proposals

Pesticides would only be used on refuge lands for habitat management and croplands/facilities maintenance after approval of a PUP. In general, proposed pesticide uses on refuge lands would only be approved where there would likely be minor, temporary, or localized effects to fish and wildlife species and minimal potential to degrade environmental quality. Potential effects to listed and non-listed species would be evaluated with quantitative ecological risk assessments and other screening measures. Potential effects to environmental quality would be based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization) and other quantitative screening tools. Ecological risk assessments, characteristics of environmental fate, and potential to degrade environmental quality for pesticides would be documented in Chemical Profiles (see Section G.7.6). These profiles would include threshold values for quantitative measures of ecological risk assessments and screening tools for environmental fate that represent minimal potential effects to species and environmental quality. In general, only pesticide uses with appropriate BMPs (see Section G.5) for habitat management and cropland/facilities maintenance on refuge lands that would potentially have minor, temporary, or localized effects on refuge biological and environmental quality (threshold values not exceeded) would be approved.

G.7.1 Overview of Ecological Risk Assessment

An ecological risk assessment process would be used to evaluate potential adverse effects to biological resources as a result of a pesticide(s) proposed for use on refuge lands. It is an established quantitative and qualitative methodology for comparing and prioritizing risks of pesticides and conveying an estimate of the potential risk for an adverse effect. This quantitative methodology provides an efficient mechanism to integrate best available scientific information regarding hazard, patterns of use (exposure), and dose-response relationships in a manner that is useful for ecological risk decision-making. It would provide an effective way to evaluate potential effects where there is missing or unavailable scientific information (data gaps) to address reasonable, foreseeable adverse effects in the field as required under 40 C.F.R. 1502.22. Protocols for ecological risk assessment of

pesticide uses on the refuge were developed through research and established by the USEPA (2004). Assumptions for these risk assessments are presented in Section G.7.2.3.

The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the USEPA to meet regulatory requirements under FIFRA. These studies assess the acute (lethality) and chronic (reproductive) effects associated with short- and long-term exposure to pesticides on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. Other effects data publicly available would also be used for risk assessment protocols described herein. Toxicity endpoint and environmental fate data are available from a variety of resources. Some of the more useful resources can be found in Section G.7.6.

Table G-1. Ecotoxicity Tests Used to Evaluate Potential Effects to Birds, Fish, and Mammals to Establish Toxicity Endpoints for Risk Quotient Calculations

Species Group	Exposure	Measurement endpoint
Bird	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[a]
Fish	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[b]
Mammal	Acute	Oral Lethal Dose (LD_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[c]

[a] Measurement endpoints typically include a variety of reproductive parameters (e.g., number of eggs, number of offspring, eggshell thickness, and number of cracked eggs).
[b] Measurement endpoints for early life stage/life cycle typically include embryo hatch rates, time to hatch, growth, and time to swim-up.
[c] Measurement endpoints include maternal toxicity, teratogenic effects or developmental anomalies, evidence of mutagenicity or genotoxicity, and interference with cellular mechanisms such as DNA synthesis and DNA repair.

G.7.2 Determining Ecological Risk to Fish and Wildlife

The potential for pesticides used on the refuge to cause direct adverse effects to fish and wildlife would be evaluated using USEPA's Ecological Risk Assessment Process (USEPA 2004). This deterministic approach, which is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk, would be used for ecological risk assessments. This method integrates exposure estimates (estimated environmental concentration [EEC] and toxicological endpoints [e.g., LC_{50} and oral LD_{50}]) to evaluate the potential for adverse effects to species groups (birds, mammals, and fish) representative of legal mandates for managing units of the NWRS. This integration is achieved through risk quotients (RQs) calculated by dividing the EEC by acute and chronic toxicity values selected from standardized toxicological endpoints or published effect (Table G-1).

$$RQ = EEC/Toxicological\ Endpoint$$

The level of risk associated with direct effects of pesticide use would be characterized by comparing calculated RQs to the appropriate Level of Concern (LOC) established by the USEPA (1998 [Table 2]). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use. The following are four exposure-species group

scenarios that would be used to characterize ecological risk to fish and wildlife on the refuge: acute-listed species, acute-nonlisted species, chronic-listed species, and chronic-nonlisted species.

Acute risk would indicate the potential for mortality associated with short-term dietary exposure to pesticides immediately after an application. For characterization of acute risks, median values from LC_{50} and LD_{50} tests would be used as toxicological endpoints for RQ calculations. In contrast, chronic risks would indicate the potential for adverse effects associated with long-term dietary exposure to pesticides from a single application or multiple applications over time (within a season and over years). For characterization of chronic risks, the no observed adverse effect concentration (NOAEC) or no observed effect concentration (NOEC) for reproduction would be used as toxicological endpoints for RQ calculations. Where available, the NOAEC would be preferred over a NOEC value.

Listed species are those federally designated as threatened, endangered, or proposed in accordance with the Endangered Species Act of 1973 (16 U.S. Code [U.S.C.] 1531-1544, 87 Stat. 884, as amended, Public Law 93-205). For listed species, potential adverse effects would be assessed at the individual level because loss of individuals from a population could detrimentally impact a species. In contrast, risks to non-listed species would consider effects at the population level. An RQ<LOC would indicate the proposed pesticide use "may affect, not likely to adversely affect" individuals (listed species), and it would not pose an unacceptable risk for adverse effects to populations (non-listed species) for each taxonomic group (Table G-2). In contrast, an RQ>LOC would indicate a "may affect, likely to adversely affect" for listed species, and it would also pose unacceptable ecological risk for adverse effects to non-listed species.

Table G-2. Presumption of Unacceptable Risk for Birds, Fish, and Mammals

Risk Presumption		Level of Concern	
		Listed Species	Nonlisted Species
Acute	Birds	0.1	0.5
	Fish	0.05	0.5
	Mammals	0.1	0.5
Chronic	Birds	1.0	1.0
	Fish	1.0	1.0
	Mammals	1.0	1.0

Source: EPA (1998).

G.7.2.1 Environmental exposure

Following release into the environment through application, pesticides would experience several different routes of environmental fate. Pesticides that would be sprayed can move through the air (e.g., particle or vapor drift) and may eventually end up in other parts of the environment such as non-target vegetation, soil, or water. Pesticides may be bound to soil particles or organic matter and may be transformed by soil micro-organisms or chemical processes. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water (e.g., surface runoff) or may percolate through the soil to lower soil layers and groundwater (e.g., leaching) (Baker and Miller 1999; Butler et al. 1998; Extension Toxicology Network [EXTOXNET] 1993; Pope et al. 1999; Ramsay et al. 1995). Pesticides that would be injected into the soil may also be subject to the latter two fates.

The aforementioned possibilities are by no means complete, but they do indicate that movement of pesticides in the environment is very complex, with transfers occurring continually among different

environmental compartments. In some cases, these exchanges occur not only between areas that are close together, but may also involve transportation of pesticides over long distances (Barry 2004; Woods 2004).

G.7.2.1.1 Terrestrial exposure

The EEC for exposure to terrestrial wildlife would be quantified using an USEPA screening-level approach (USEPA 2004). This screening-level approach is not affected by product formulation because it evaluates pesticide active ingredient(s). This approach would vary depending upon the proposed pesticide application method: spray or granular.

G.7.2.1.1.1 Terrestrial—spray application

For spray applications, exposure would be determined using the Kanaga nomogram method (Pfleeger et al. 1996; USEPA 2004, 2005a) through the USEPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (USEPA 2005b). To estimate the maximum (initial) pesticide residue on short grass (<20 cm tall) as a general food item category for terrestrial vertebrate species, T-REX input variables would include the following from the pesticide label: maximum pesticide application rate (pounds active ingredient [a.i.] [acid equivalent]/acre) and pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; and fruits, pods, seeds and large insects), short grass was selected because it would yield maximum EECs (240 parts per million [ppm] per lb a.i./acre) for worst-case risk assessments. Short grass is not representative of forage for carnivorous species (e.g., raptors), but it would characterize the maximum potential exposure through the diet of avian and mammalian prey items. Consequently, this approach would provide a conservative screening tool for pesticides that do not biomagnify.

For RQ calculations in T-REX, the model would require the weight of surrogate species and Mineau scaling factors (Mineau et al. 1996). Body weights of bobwhite quail and mallard are included in T-REX by default, but body weights of other organisms (Table G-3) would be entered manually. The Mineau scaling factor accounts for small-bodied bird species that may be more sensitive to pesticide exposure than would be predicted only by body weight. Mineau scaling factors would be entered manually with values ranging from 1 to 1.55 that are unique to a particular pesticide or group of pesticides. If specific information to select a scaling factor is not available, then a value of 1.15 would be used as a default. Alternatively, zero would be entered if it is known that body weight does not influence toxicity of pesticide(s) being assessed. The upper bound estimate output from the T-REX Kanaga nomogram would be used as an EEC for calculation of RQs. This approach would yield a conservative estimate of ecological risk.

Table G-3. Average Body Weight of Selected Terrestrial Wildlife Species Frequently Used in Research to Establish Toxicological Endpoints

Species	Body Weight (kg)
Mammal (15 g)	0.015
House sparrow	0.0277
Mammal (35 g)	0.035
Starling	0.0823
Red-winged blackbird	0.0526
Common grackle	0.114
Japanese quail	0.178
Bobwhite quail	0.178
Rat	0.200
Rock dove (aka pigeon)	0.542
Mammal (1,000 g)	1.000
Mallard	1.082
Ring-necked pheasant	1.135

Source: Dunning (1984).

G.7.2.1.1.2 Terrestrial—granular application

Granular pesticide formulations and pesticide-treated seed pose a unique route of exposure for avian and mammalian species. The pesticide is applied in discrete units that birds or mammals might ingest accidentally with food items, or intentionally as in the case of some bird species actively seeking and picking up gravel or grit to aid digestion or seed as a food source. Granules may also be consumed by wildlife foraging on earthworms, slugs, or other soft-bodied soil organisms to which the granules may adhere.

Terrestrial wildlife RQs for granular formulations or seed treatments would be calculated by dividing the maximum milligrams of a.i. exposed (e.g., EEC) on the surface of an area equal to 1 square foot by the appropriate LD_{50} value multiplied by the surrogate's body weight (Table G-3). An adjustment to surface area calculations would be made for broadcast, banded, and in-furrow applications. An adjustment also would be made for applications with and without incorporation of the granules. Without incorporation, it would be assumed that 100% of the granules remain on the soil surface, available to foraging birds and mammals. Press wheels push granules flat with the soil surface, but they are not incorporated into the soil. If granules are incorporated in the soil during band or T-band applications or after broadcast applications, it would be assumed only 15% of the applied granules remain available to wildlife. It would be assumed that only 1% of the granules are available on the soil surface following in-furrow applications.

EECs for pesticides applied in granular form and as seed treatments would be determined considering potential ingestion rates of avian or mammalian species (e.g., 10%-30% body weight/day). This would provide an estimate of maximum exposure that may occur as a result of granule or seed treatment spills such as those that commonly occur at end rows during application and planting. The availability of granules and seed treatments to terrestrial vertebrates would also be considered by calculating the loading per unit area (LD_{50}/foot^2) for comparison to USEPA LOCs (USEPA 1998). The T-REX version 1.2.3 (USEPA 2005b) contains a submodel that automates Kanaga exposure calculations for granular pesticides and treated seed.

The following formulas would be used to calculate EECs depending upon the type of granular pesticide application:

- In-furrow applications assume a typical value of 1% granules, bait, or seed remain unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}580\ mg/lbs)(1\%\ exposed))] / \{[(43{,}560\ ft.^2/acre)/(row\ spacing\ (ft.))] / (row\ spacing\ (ft.)\}$$

or

$$mg\ a.i./ft^2 = [(lbs\ product/1{,}000\ ft.\ row)(\%\ a.i.)(1{,}000\ ft.\ row)(453{,}580\ mg/lb.)(1\%\ exposed)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Incorporated banded treatments assume that 15% of granules, bait, seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/1{,}000\ row\ ft.)(\%\ a.i.)(453{,}580\ mg/lb.)(1\text{-}\%\ incorporated)] / (1{,}000\ ft.)(band\ width\ (ft.))$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Broadcast treatment without incorporation assumes 100% of granules, bait, seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}590\ mg/lb.)] / (43{,}560\ ft.^2/acre)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

Where:

  - % of pesticide biologically available = 100% without species -specific ingestion rates
  - Conversion for calculating mg a.i./ft.^{2} using ounces: 453,580 mg/lb. /16 = 28,349 mg/oz.

The following equation would be used to calculate an RQ based on the EEC calculated by one of the above equations. The EEC would be divided by the surrogate LD_{50} toxicological endpoint multiplied by the body weight (Table G-3) of the surrogate.

$$RQ = EEC / [LD_{50}\ (mg/kg)\ *\ body\ weight\ (kg)]$$

As with other risk assessments, an RQ>LOC would be a presumption of unacceptable ecological risk. An RQ<LOC would be a presumption of acceptable risk with only minor, temporary, or localized effects to species.

G.7.2.1.2 Aquatic exposure

Exposures to aquatic habitats (e.g., wetlands, meadows, ephemeral pools, water delivery ditches) would be evaluated separately for ground-based pesticide treatments of habitats managed for fish and wildlife compared with cropland/facilities maintenance. The primary exposure pathway for aquatic organisms from any ground-based treatments likely would be particle drift during the pesticide

application. However, different exposure scenarios would be necessary as a result of contrasting application equipment and techniques as well as pesticides used to control pests on agricultural lands (especially those cultivated by cooperative farmers for economic return from crop yields) and facilities maintenance (e.g., roadsides, parking lots, trails) compared with other managed habitats on the refuge. In addition, pesticide applications may be done <25 feet of the high-water mark of aquatic habitats for habitat management treatments, whereas no-spray buffers (≥25 feet) would be used for croplands/facilities maintenance treatments.

G.7.2.1.2.1 Habitat treatments

For the worst-case exposure scenario to non-target aquatic habitats, EECs (Table G-4) would be derived from Urban and Cook (1986). The EECs assume an intentional overspray to an entire, non-target water body (1-foot depth) from a treatment <25 feet from the high-water mark using the maximum application rate (acid basis [see above]). However, use of BMPs for applying pesticides (see Section G.5.2) would likely minimize/eliminate potential drift to non-target aquatic habitats during actual treatments. If there would be unacceptable (acute or chronic) risk to fish and wildlife with the simulated 100% overspray (RQ>LOC), then the proposed pesticide use may be disapproved or the PUP would be approved at a lower application rate to minimize/eliminate unacceptable risk to aquatic organisms (RQ = LOC).

Table G-4. EECs (ppb) of Pesticides in Aquatic Habitats (1-foot depth) Immediately after Direct Application

Lbs/acre	EEC (parts per billion [ppb])
0.10	36.7
0.20	73.5
0.25	91.9
0.30	110.2
0.40	147.0
0.50	183.7
0.75	275.6
1.00	367.5
1.25	459.7
1.50	551.6
1.75	643.5
2.00	735.7
2.25	827.6
2.50	919.4
3.00	1,103.5
4.00	1,471.4
5.00	1,839
6.00	2,207
7.00	2,575
8.00	2,943
9.00	3,311
10.00	3,678

Source: Urban and Cook (1986).

G.7.2.1.2.2 Cropland/facilities maintenance treatments

Field drift studies conducted by the Spray Drift Task Force, which is a joint project of several agricultural chemical businesses, were used to develop a generic spray drift database. From this database, the AgDRIFT computer model was created to satisfy USEPA pesticide registration spray drift data requirements and as a scientific basis to evaluate off-target movement of pesticides from particle drift and assess potential effects of exposure to wildlife. Several versions of the computer model have been developed (i.e., v2.01 through v2.10). The Spray Drift Task Force AgDRIFT model version 2.01 (AgDRIFT 2001; Spray Drift Task Force 2003) would be used to derive EECs resulting from drift of pesticides to refuge aquatic resources from ground-based pesticide applications >25 feet from the high-water mark. The Spray Drift Task Force AgDRIFT model is publicly available at http://www.agdrift.com. At this website, click "AgDRIFT 2.0," then click "Download Now," and follow the instructions to obtain the computer model.

The AgDRIFT model is composed of submodels called tiers. Tier I Ground submodel would be used to assess ground-based applications of pesticides. Tier outputs (EECs) would be calculated with AgDRIFT using the following input variables: maximum application rate (acid basis [see above]), low boom (20 inches), fine to medium droplet size, USEPA-defined wetland, and a ≥25-foot distance (buffer) from treated area to water.

G.7.2.2 Use of information on effects of biological control agents, pesticides, degradates, and adjuvants

NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradates, and adjuvants prepared by another Federal agency, where the scope would be relevant to evaluation of effects from pesticide uses on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the BLM, USFS, the National Park Service, USDA Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s). Incorporating by reference (40 C.F.R. 1502.21) is a technique used to avoid redundancies in analysis. It also would reduce the bulk of a Service NEPA document, which would only identify the documents that are incorporated by reference. In addition, relevant portions would be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

In accordance with the requirements set forth in 43 C.F.R. 46.135, the Service would specifically incorporate through reference ecological risk assessments prepared by the USFS (http://www.fs.fed.us/r6/invasiveplant-eis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm) and BLM (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation are also available in total with the administrative record for the Final EIS titled *Pacific Northwest Region Invasive Plant Program: Preventing and Managing Invasive Plants* (USFS 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS (PEIS)* (BLM 2007). In accordance with 43 C.F.R. 46.120(d), use of existing NEPA documents by supplementing, tiering to, incorporating by reference, or adopting previous NEPA environmental analyses would avoid redundancy and unnecessary paperwork.

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide and adjuvant uses prepared by the USFS would be incorporated by reference:

- 2,4-D
- Chlorsulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl
- Triclopyr
- Nonylphenol polyethoxylate (NPE)–based surfactants

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide uses as well as evaluation of risks associated with pesticide degradates and adjuvants prepared by the BLM would be incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat
- Diuron
- Fluridone
- Imazapic
- Overdrive (diflufenzopyr and dicamba)
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants (*Appendix D – Evaluation of risks from degradates, polyoxyethylene-amine (POEA) and R-11, and endocrine disrupting chemicals*)

G.7.2.3 Assumptions for ecological risk assessments

There are a number of assumptions involved with the ecological risk assessment process for terrestrial and aquatic organisms associated with using the USEPA's process. These assumptions may be risk neutral or may lead to an over- or under-estimation of risk from pesticide exposure depending upon site-specific conditions. These assumptions, their application to the conditions typically encountered, and whether they may lead to recommendations that are risk neutral, underestimate, or overestimate ecological risk from potential pesticide exposure are discussed below.

- Indirect effects would not be evaluated by ecological risk assessments. These effects include the mechanisms of indirect exposure to pesticides: consuming prey items (fish, birds, or

small mammals), reductions in the availability of prey items, and disturbance associated with pesticide application activities.

- Exposure to a pesticide product can be assessed based upon the active ingredient. However, exposure to a chemical mixture (pesticide formulation) may result in effects that are similar or substantially different compared to only the active ingredient. Non-target organisms may be exposed directly to the pesticide formulation or only various constituents of the formulation as they dissipate and partition in the environment. If toxicological information for both the active ingredient and formulated product are available, then data representing the greatest potential toxicity would be selected for use in the risk assessment process (USEPA 2004). As a result, this conservative approach may lead to an overestimation of risk characterization from pesticide exposure.
- Because toxicity tests with listed or candidate species or closely related species are not available, data for surrogate species would be most often used for risk assessments. Specifically, bobwhite quail and mallard duck are the most frequently used surrogates for evaluating potential toxicity to federally listed avian species. Bluegill sunfish, rainbow trout, and fathead minnow are the most common surrogates for evaluating toxicity for freshwater fishes. Sheepshead minnow can be an appropriate surrogate marine species for coastal environments. Rats and mice are the most common surrogates for evaluating toxicity for mammals. Interspecies sensitivity is a major source of uncertainty in pesticide assessments. As a result of this uncertainty, data are selected for the most sensitive species tested within a taxonomic group (birds, fish, and mammals), given the quality of the data is acceptable. If additional toxicity data for more species of organisms in a particular group are available, the selected data would not be limited to the species previously listed as common surrogates.
- The Kanaga nomogram outputs maximum EEC values that may be used to calculate an average daily concentration over a specified interval of time, which is referred to as a time-weighted-average (TWA). The maximum EEC would be selected as the exposure input for both acute and chronic risk assessments in the screening-level evaluations. The initial or maximum EEC derived from the Kanaga nomogram represents the maximum expected instantaneous or acute exposure to a pesticide. Acute toxicity endpoints are determined using a single exposure to a known pesticide concentration typically for 48 to 96 hours. This value is assumed to represent ecological risk from acute exposure to a pesticide. On the other hand, chronic risk to pesticide exposure is a function of pesticide concentration and duration of exposure to the pesticide. An organism's response to chronic pesticide exposure may result from either the concentration of the pesticide, length of exposure, or some combination of both factors. Standardized tests for chronic toxicity typically involve exposing an organism to several different pesticide concentrations for a specified length of time (days, weeks, months, years, or generations). For example, avian reproduction tests include a 10-week exposure phase. Because a single length of time is used in the test, time response data are usually not available for inclusion into risk assessments. Without time response data, it is difficult to determine the concentration that elicits a toxicological response.
- Using maximum EECs for chronic risk estimates may result in an overestimation of risk, particularly for compounds that dissipate rapidly. Conversely, using TWAs for chronic risk estimates may underestimate risk if it is the concentration rather than the duration of exposure that is primarily responsible for the observed adverse effect. The maximum EEC would be used for chronic risk assessments although it may result in an overestimation of risk. TWAs may be used for chronic risk assessments, but they would be applied judiciously considering the potential for an underestimation or overestimation of risk. For example, the number of days exposure exceeds an LOC may influence the suitability of a pesticide use.

The greater the number of days the EEC exceeds the LOC, the greater the ecological risk. This is a qualitative assessment, and is subject to the reviewer's expertise in ecological risk assessment and tolerance for risk.

- The length of time used to calculate the TWA can have a substantial effect on the exposure estimates, and there is no standard method for determining the appropriate duration for this estimate. The T-REX model assumes a 21-week exposure period, which is equivalent to avian reproductive studies designed to establish a steady-state concentration for bioaccumulative compounds. However, this does not necessarily define the true exposure duration needed to elicit a toxicological response. Pesticides that do not bioaccumulate may achieve a steady-state concentration earlier than 21 weeks. The duration of time used for calculating TWAs would require justification and would not exceed the duration of exposure in the chronic toxicity test (approximately 70 days for the standard avian reproduction study). An alternative to using the duration of the chronic toxicity study is to base the TWA on the application interval. In this case, increasing the application interval would suppress both the estimated peak pesticide concentration and the TWA. Another alternative to using TWAs would be to consider the number of days that a chemical is predicted to exceed the LOC.
- Pesticide dissipation is assumed to be first-order in the absence of data suggesting alternative dissipation patterns such as biphasic. Field dissipation data would generally be the most pertinent for assessing exposure in terrestrial species that forage on vegetation. However, these data are often not available and can be misleading, particularly if the compound is prone to "wash-off." Soil half-life is the most common degradation data available. Dissipation or degradation data that would reflect the environmental conditions typical of refuge lands would be used, if available.
- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column.
- Actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species exclusively and permanently occupy the treated area, or adjacent areas receiving pesticide at rates commensurate with the treatment rate. This assumption would produce a maximum estimate of exposure for risk characterization. This assumption would likely lead to an overestimation of exposure for species that do not permanently and exclusively occupy the treated area (USEPA 2004).
- Exposure through incidental ingestion of pesticide-contaminated soil is not considered in the USEPA risk assessment protocols. Research suggests <15% of the diet can consist of incidentally ingested soil depending upon species and feeding strategy (Beyer et al. 1994). An assessment of pesticide concentrations in soil compared to food item categories in the Kanaga nomogram indicates incidental soil ingestion would not likely increase dietary exposure to pesticides. Inclusion of soil into the diet would effectively reduce the overall dietary concentration compared to the present assumption that the entire diet consists of a contaminated food source (Fletcher et al. 1994). An exception to this may be soil-applied pesticides in which exposure from incidental ingestion of soil may increase. Potential for pesticide exposure under this assumption may be underestimated for soil-applied pesticides and overestimated for foliar-applied pesticides. The concentration of a pesticide in soil would likely be less than predicted in food items.
- Exposure through inhalation of pesticides is not considered in the USEPA risk assessment protocols. Such exposure may occur through three potential sources: spray material in droplet form at time of application, vapor phase with the pesticide volatilizing from treated surfaces, and airborne particulates (soil, vegetative matter, and pesticide dusts). The USEPA (1990)

reported that exposure from inhaling spray droplets at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size (particles reaching the lung) in birds is limited to a maximum diameter of 2 to 5 microns. The spray droplet spectra covering the majority of pesticide application scenarios indicate that less than 1% of the applied material is within the respirable particle size. This route of exposure is further limited because the permissible spray drop size distribution for ground pesticide applications is restricted to American Society of Agricultural Engineers (ASAE) medium or coarser drop size distribution.

- Inhalation of a pesticide in the vapor phase may be another source of exposure for some pesticides under certain conditions. This mechanism of exposure to pesticides occurs post-application and pertains to those pesticides that have a high vapor pressure. The USEPA is currently evaluating protocols for modeling inhalation exposure from pesticides including near-field and near-ground air concentrations based upon equilibrium and kinetics-based models. Risk characterization for exposure with this mechanism is unavailable.
- The effect from exposure to dusts contaminated with the pesticide cannot be assessed generically as partitioning issues related to application site soils and chemical properties of the applied pesticides render the exposure potential from this route highly situation-specific.
- Dermal exposure may occur through three potential sources: direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, incidental contact with contaminated vegetation, or contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose a risk to avian wildlife (Driver et al. 1991). However, available research related to wildlife dermal contact with pesticides is extremely limited, with the exception of dermal toxicity values, which are common for some mammals used as human surrogates (rats and mice). The USEPA is currently evaluating protocols for modeling dermal exposure. Risk characterization may be underestimated for this route of exposure, particularly with high-risk pesticides such as some organophosphates or carbamate insecticides. If protocols are established by the USEPA for assessing dermal exposure to pesticides, they would be considered for incorporation into pesticide assessment protocols.
- Exposure to a pesticide may occur from consuming surface water, dew, or other water on treated surfaces. Water-soluble pesticides have the potential to dissolve in surface runoff, and puddles in a treated area may contain pesticide residues. Similarly, pesticides with lower organic carbon partitioning characteristics and higher solubility in water have a greater potential to dissolve in dew and other water associated with plant surfaces. Estimating the extent to which such pesticide loadings to drinking water occur is complex and would depend upon the partitioning characteristics of the active ingredient, soil types in the treatment area, and the meteorology of the treatment area. In addition, the use of various water sources by wildlife is highly species-specific. Currently, risk characterization for this exposure mechanism is not available. The USEPA is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the USEPA for assessing exposure to pesticides through drinking water, these protocols would be incorporated into pesticide risk assessment protocols.
- Risk assessments are based upon the assumption that the entire treatment area would be subject to pesticide application at the rates specified on the label. In most cases, there is potential for uneven application of pesticides due to incidents such as changes in calibration of application equipment, spillage, and localized releases at specific areas in or near the treated field that are associated with mixing, handling, and application equipment, as well as applicator skill. Inappropriate use of pesticides and the occurrence of spills represent a

potential underestimation of risk. However, they are likely not important factors for risk characterization. All pesticide applicators are required to be certified by the state in which they apply pesticides. Certification training includes the safe storage, transport, handling, and mixing of pesticides, equipment calibration, and proper application with annual continuing education.

- The USEPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The USEPA (2004) "believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify." Fletcher et al.'s (1994) research suggests that the pesticide active ingredient residue assumptions used by the USEPA represent a 95th percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates that USEPA residue assumptions for short grass were not exceeded. Baehr and Habig (2000) compared USEPA residue assumptions with distributions of measured pesticide residues for the USEPA's UTAB (Uptake, Translocation, Accumulation, and Biotransformation) database. Overall residue selection level tends to overestimate risk characterization. This is particularly evident when wildlife individuals are likely to have selected a variety of food items acquired from multiple locations. Some food items may be contaminated with pesticide residues whereas others are not contaminated. However, it is important to recognize differences in species' feeding behavior. Some species may consume whole aboveground plant material, but others preferentially select different plant structures. Also, species may preferentially select a food item although multiple food items may be present. Without species-specific knowledge regarding foraging behavior, characterizing ecological risk other than in general terms is not possible.
- Acute and chronic risk assessments rely on comparisons of wildlife dietary residues with LC_{50} or NOEC values expressed as concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed. Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods are not accounting for a potentially important aspect of food requirements.
- There are several other assumptions that can affect non-target species not considered in the risk assessment process. These include possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic and biotic factors), and behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse effects to non-target species, but they are usually characterized in the published literature in only a general manner, limiting their value in the risk assessment process.
- It is assumed that aquatic species exclusively and permanently occupy the water body being assessed. Actual habitat requirements of aquatic species are not considered. With the possible exception of scenarios where pesticides are directly applied to water, it is assumed that no habitat use considerations specific for any species would place the organisms in closer proximity to pesticide use sites. This assumption produces a maximum estimate of exposure or risk characterization. It would likely be realistic for many aquatic species that may be found in aquatic habitats within or in close proximity to treated terrestrial habitats. However,

the spatial distribution of wildlife is usually not random because wildlife distributions are often related to habitat requirements of species. Clumped distributions of wildlife may result in an underestimation or overestimation of risk depending upon where the initial pesticide concentration occurs relative to the species or species habitat.

- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column. Additional chemical exposure from materials associated with suspended solids or food items is not considered because partitioning onto sediments likely is minimal. Adsorption and bioconcentration occur at lower levels for many newer pesticides compared with older, more persistent bioaccumulative compounds. The potential for additional exposure from pesticides with RQs close to the listed species LOC, may be a limitation of risk assessments, where potential pesticide exposure or risk may be underestimated.
- Mass transport losses of pesticide from a water body (except for losses by volatilization, degradation, and sediment partitioning) would not be considered for ecological risk assessment. The water body would be assumed to capture all pesticide active ingredients entering as runoff, drift, and by being adsorbed to eroded soil particles. It would also be assumed that pesticide active ingredient is not lost from the water body by overtopping or flow-through, nor is concentration reduced by dilution. In total, these assumptions would lead to a near maximum possible water-borne concentration. However, this assumption would not account for the potential to concentrate pesticide through evaporative loss. This limitation may have the greatest impact on water bodies with high surface-to-volume ratios such as ephemeral wetlands, where evaporative losses are accentuated and applied pesticides have low rates of degradation and volatilization.
- For acute risk assessments, there would be no averaging time for exposure. An instantaneous peak concentration would be assumed, where instantaneous exposure is sufficient in duration to elicit acute effects comparable to those observed over more protracted exposure periods (typically 48 to 96 hours) tested in the laboratory. In the absence of data regarding time-to-toxic event, analyses, and latent responses to instantaneous exposure, risk would likely be overestimated.
- For chronic exposure risk assessments, the averaging times considered for exposure are commensurate with the duration of invertebrate life-cycle or fish early-life-stage tests (e.g., 21-28 days and 56-60 days, respectively). Response profiles (time to effect and latency of effect) to pesticides likely vary widely with mode of action and species, and should be evaluated on a case-by-case basis as available data allow. Nevertheless, because the USEPA relies on chronic exposure toxicity endpoints based on a finding of no observed effect, the potential for any latent toxicity effects or averaging time assumptions to alter the results of an acceptable chronic risk assessment prediction is limited. The extent to which duration of exposure from water-borne concentrations overestimate or underestimate actual exposure depends on several factors. These include the following: localized meteorological conditions, runoff characteristics of the watershed (e.g., soils, topography), the hydrological characteristics of receiving waters, environmental fate of the pesticide active ingredient, and the method of pesticide application. It should also be understood that chronic effects studies are performed using a method that holds water concentration in a steady state. This method is not likely to reflect conditions associated with pesticide runoff. Pesticide concentrations in the field increase and decrease in surface water on a cycle influenced by rainfall, pesticide use patterns, and degradation rates. As a result of the dependency of this assumption on several undefined variables, risk associated with chronic exposure may underestimate risk in some situations and overestimate risk in others.

- There are several other factors that can affect non-target species not considered in the risk assessment process. These include the following: possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic [not pesticides] and biotic factors), and sublethal effects such as behavioral changes induced by exposure to a pesticide. These factors may exist at some level, contributing to adverse effects to non-target species, but they are not routinely assessed by regulatory agencies. Therefore, information on these factors is not extensive, limiting their value for the risk assessment process. As this type of information becomes available, it would be included, either quantitatively or qualitatively, in this risk assessment process.
- USEPA is required by the Food Quality Protection Act to assess the cumulative risks of pesticides that share common mechanisms of toxicity, or act the same within an organism. Currently, USEPA has identified four groups of pesticides that have a common mechanism of toxicity requiring cumulative risk assessments. These four groups are: the organophosphate insecticides, N-methyl carbamate insecticides, triazine herbicides, and chloroacetanilide herbicides.

G.7.3 Pesticide Mixtures and Degradates

Pesticide products are usually a formulation of several components generally categorized as active ingredients and inert or other ingredients. The term “active ingredient” is defined by FIFRA as preventing, destroying, repelling, or mitigating the effects of a pest, or a plant regulator, defoliant, desiccant, or nitrogen stabilizer. In accordance with FIFRA, the active ingredient(s) must be identified by name(s) on the pesticide label along with its relative composition expressed in percentage(s) by weight. In contrast, inert ingredient(s) are not intended to affect a target pest. Their role in the pesticide formulation is to act as a solvent (keep the active ingredient in a liquid phase), an emulsifying or suspending agent (keep the active ingredient from separating out of solution), or a carrier (such as clay in which the active ingredient is impregnated on the clay particle in dry formulations). For example, if isopropyl alcohol is used as a solvent in a pesticide formulation, then it would be considered an inert ingredient. FIFRA only requires that inert ingredients identified as hazardous and their associated percent composition be declared on a product label, along with the total percentage of all inert ingredients. Inert ingredients that are not classified as hazardous are not required to be identified.

The USEPA (September 1997) issued Pesticide Regulation Notice 97-6, which encouraged manufacturers, formulators, producers, and registrants of pesticide products to voluntarily substitute the term “other ingredients” for “inert ingredients” in the ingredient statement. This change recognized that all components in a pesticide formulation could potentially elicit or contribute to an adverse effect on non-target organisms and, therefore, are not necessarily inert. Whether referred to as “inerts” or “other ingredients,” these constituents within a pesticide product have the potential to affect species or environmental quality. The USEPA categorizes regulated inert ingredients into the following four lists (http://www.epa.gov/opprd001/inerts/index.html):

- List 1 – Inert Ingredients of Toxicological Concern
- List 2 – Potentially Toxic Inert Ingredients
- List 3 – Inerts of Unknown Toxicity

- List 4 – Inerts of Minimal Toxicity

Several of the List 4 compounds are naturally occurring earthen materials (e.g., clay materials, simple salts) that would not elicit toxicological response at applied concentrations. However, some of the inerts (particularly the List 3 compounds and unlisted compounds) may have moderate to high potential toxicity to aquatic species based on MSDSs or published data.

Comprehensively assessing potential effects to non-target fish, wildlife, plants, and/or their habitats from pesticide use is a complex task. It would be preferable to assess the cumulative effects from exposure to the active ingredient, its degradates, and inert ingredients as well as other active ingredients in the spray mixture. However, it would only be feasible to conduct deterministic risk assessments for each component in the spray mixture singly. Limited scientific information is available regarding ecological effects (additive or synergistic) from chemical mixtures that typically rely upon broadly encompassing assumptions. For example, the USFS (2005) found that mixtures of pesticides used in land (forest) management likely would not cause additive or synergistic effects to non-target species based upon a review of scientific literature regarding toxicological effects and interactions of agricultural chemicals (Agency for Toxic Substances and Disease Registry [ATSDR] 2004). Moreover, information on inert ingredients, adjuvants, and degradates is often limited by the availability of and access to reliable toxicological data for these constituents.

Toxicological information regarding "other ingredients" may be available from sources such as the following:

- Toxicology, Occupational Medicine, and Environmental Series (TOMES) (a proprietary toxicological database including USEPA's Integrated Risk Information System (IRIS), the Hazardous Substance Data Bank, and the Registry of Toxic Effects of Chemical Substances [RTECS]).
- USEPA's ECOTOX database, which includes AQUIRE (a database containing scientific papers published on the toxic effects of chemicals to aquatic organisms).
- TOXLINE (a literature searching tool).
- MSDSs from pesticide suppliers.
- Other sources such as the *Farm Chemicals Handbook*.

Because there is a lack of specific inert toxicological data, inert(s) in a pesticide may cause adverse ecological effects. However, inert ingredients typically represent only a small percentage of the pesticide spray mixture, and it would be assumed that negligible effects would be expected to result from inert ingredient(s).

Although the potential effects of degradates should be considered when selecting a pesticide, it is beyond the scope of this assessment process to consider all possible breakdown chemicals of the various product formulations containing an active ingredient. Degradates may be more or less mobile and more or less hazardous in the environment than their parent pesticides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent pesticides and degradates would make assessing potential degradate effects extremely difficult. For example, a less toxic and more mobile, bioaccumulative, or persistent degradate may have potentially greater effects on species and/or degrade environmental quality. The lack of data on the toxicity of degradates for many pesticides would represent a source of uncertainty for assessing risk.

A USEPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not possible to quantify the potential effects of these mixtures. In addition, a quantitative analysis could only be conducted if reliable scientific information allowed a determination of whether the joint action of a mixture would be additive, synergistic, or antagonistic. Such information would not likely exist unless the mode of action would be common among the chemicals and receptors. Moreover, the composition of and exposure to mixtures would be highly site- and/or time-specific and, therefore, it would be nearly impossible to assess potential effects to species and environmental quality.

To minimize or eliminate potential negative effects associated with applying two or more pesticides as a mixture, the use would be conducted in accordance with the labeling requirements. Labels for two or more pesticides applied as a mixture should be completely reviewed, where products with the least potential for negative effects would be selected for use on the refuge. This is especially relevant when a mixture would be applied in a manner that may already have the potential for an effect(s) associated with an individual pesticide (e.g., runoff to ponds in sandy watersheds). Use of a tank mix under these conditions would increase the level of uncertainty in terms of risk to species or potential to degrade environmental quality.

Adjuvants generally function to enhance or prolong the activity of pesticide. For terrestrial herbicides, adjuvants aid in the absorption into plant tissue. "Adjuvant" is a broad term that generally applies to surfactants, selected oils, anti-foaming agents, buffering compounds, drift control agents, compatibility agents, stickers, and spreaders. Adjuvants are not under the same registration requirements as pesticides, and the USEPA does not register or approve the labeling of spray adjuvants. Individual pesticide labels identify types of adjuvants approved for use with the pesticide. In general, adjuvants compose a relatively small portion of the volume of pesticides applied. Selection of adjuvants with limited toxicity and low volumes would be recommended to reduce the potential for the adjuvant to influence the toxicity of the pesticide.

G.7.4 Determining Effects to Soil and Water Quality

The approval process for pesticide uses would consider potential to degrade water quality on and off refuge lands. A pesticide can only affect water quality through movement away from the treatment site. After application, pesticide mobilization can be characterized by one or more of the following (Kerle et al. 1996):

- Attach (sorb) to soil, vegetation, or other surfaces and remain at or near the treated area;
- Attach to soil and move off-site through erosion from runoff or wind;
- Dissolve in water that can be subjected to runoff or leaching.

As an initial screening tool, selected chemical characteristics and rating criteria for a pesticide can be evaluated to assess potential to enter ground and/or surface waters. These would include the following: persistence, sorption coefficient (K_{oc}), groundwater ubiquity score (GUS), and solubility.

Persistence, which is expressed as half-life ($t_{½}$), represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996). Half-life data is usually available for aquatic and terrestrial environments.

Another measure of pesticide persistence is dissipation time (DT_{50}). It represents the time required for 50% of the deposited pesticide to degrade and move from a treated site, whereas half-life describes the rate for degradation only. As for half-life, units of dissipation time are usually expressed in days. Field or foliar dissipation times are the preferred data for use to estimate pesticide concentrations in the environment. However, soil half-life is the most common persistence data cited in published literature. If field or foliar dissipation data are not available, soil half-life data may be used. The average or representative half-life value of most important degradation mechanisms will be selected for quantitative analysis for both terrestrial and aquatic environments.

Mobility of a pesticide is a function of how strongly it is adsorbed to soil particles and organic matter, its solubility in water, and its persistence in the environment. Pesticides strongly adsorbed to soil particles, relatively insoluble in water, and not environmentally persistent would be less likely to move across the soil surface into surface waters or to leach through the soil profile and contaminate groundwater. Conversely, pesticides that are not strongly adsorbed to soil particles, are highly water soluble, and are persistent in the environment would have greater potential to move from the application site (off-site movement).

The degree of pesticide adsorption to soil particles and organic matter (Kerle et al. 1996) is expressed as the soil adsorption coefficient (K_{oc}). The soil adsorption coefficient is measured as micrograms of pesticide per gram of soil (µg/g) and can range from near zero to the thousands. Pesticides with higher K_{oc} values are strongly sorbed to soil and, therefore, would be less subject to movement.

Water solubility describes the amount of pesticide that will dissolve in a known quantity of water. The water solubility of a pesticide is expressed as milligrams of pesticide dissolved in a liter of water (mg/L or ppm). Pesticides with solubility <0.1 ppm are virtually insoluble in water; those with solubility 100 to 1,000 ppm are moderately soluble, and those with solubility >10,000 ppm are highly soluble (U.S. Geological Survey [USGS] 2000). As pesticide solubility increases, there would be greater potential for off-site movement.

The GUS is a quantitative screening tool to estimate a pesticide's potential to move in the environment. It uses soil persistence and adsorption coefficients in the following formula.

$$GUS = log_{10}(t_{½}) \times [4 - log_{10}(K_{oc})]$$

The potential pesticide movement rating would be based upon its GUS value. Pesticides with a GUS <0.1 would considered to have an extremely low potential to move toward groundwater. Values of 1.0 to 2.0 would be low, 2.0 to 3.0 would be moderate, 3.0 to 4.0 would be high, and >4.0 would have a very high potential to move toward groundwater.

Water solubility describes the amount of pesticide dissolving in a specific quantity of water, where it is usually measured as mg/L or ppm. Solubility is useful as a comparative measure because pesticides with higher values are more likely to move by runoff or leaching. GUS, water solubility, $t_{½}$, and K_{oc} values are available for selected pesticides from the Oregon State University (OSU) Extension Pesticide Properties Database at http://npic.orst.edu/ppdmove.htm. Many of the values in this database were derived from the Soil Conservation Service (SCS)/Agricultural Research Service (ARS)/Cooperative Extension service (CES) Pesticide Properties Database for Environmental Decision Making (Wauchope et al. 1992).

Soil properties influence the fate of pesticides in the environment. The following six properties are mostly likely to affect pesticide degradation and the potential for pesticides to move off-site by leaching (vertical movement through the soil) or runoff (lateral movement across the soil surface).

- Permeability is the rate of water movement vertically through the soil. It is affected by soil texture and structure. Coarse-textured soils (e.g., high sand content) have a larger pore size and are generally more permeable than fine-textured soils (i.e., high clay content). The more permeable soils would have a greater potential for pesticides to move vertically down through the soil profile. Soil permeability rates (inches/hour) are usually available in county soil survey reports.
- Soil texture describes the relative percentage of sand, silt, and clay. In general, greater clay content with smaller pore size would lower the likelihood and rate that water would move through the soil profile. Clay also serves to adsorb (bind) pesticides to soil particles. Soils with high clay content would adsorb more pesticide than soils with relatively low clay content. In contrast, sandy soils with coarser texture and lower water-holding capacity would have a greater potential for water to leach through them.
- Soil structure describes soil aggregation. Soils with a well-developed soil structure have a looser, more aggregated structure that would be less likely to be compacted. Both characteristics allow for less restricted flow of water through the soil profile, resulting in greater infiltration.
- Organic matter would be the single most important factor affecting pesticide adsorption in soils. Many pesticides are adsorbed to organic matter, which would reduce their rate of downward movement through the soil profile. Also, soils high in organic matter would tend to hold more water, which may make less water available for leaching.
- Soil moisture affects how fast water would move through the soil. If soils are already wet or saturated before rainfall or irrigation, excess moisture would runoff rather than infiltrate into the soil profile. Soil moisture also would influence microbial and chemical activity in soil, which affects pesticide degradation.
- Soil pH would influence chemical reactions that occur in the soil, which in turn determines whether a pesticide will degrade, the rate of degradation, and, in some instances, which degradation products are produced.

Based upon the aforementioned properties, soils most vulnerable to groundwater contamination would be sandy soils with low organic matter. In contrast, the least vulnerable soils would be well-drained clayey soils with high organic matter. Consequently, pesticides with the lowest potential for movement in conjunction with appropriate BMPs (see below) would be used in an IPM framework to treat pests while minimizing effects to non-target biota and protecting environmental quality.

Along with soil properties, the potential for a pesticide to affect water quality through runoff and leaching would consider site-specific environmental and abiotic conditions including rainfall, water table conditions, and topography (Huddleston 1996).

- Water is necessary to separate pesticides from soil. This can occur in two basic ways. Pesticides that are soluble move easily with runoff water. Pesticide-laden soil particles can be dislodged and transported from the application site in runoff. The concentration of pesticides in the surface runoff would be greatest for the first runoff event following treatment. The rainfall intensity and route of water infiltration into soil, to a large extent, determine pesticide concentrations and losses in surface runoff. The timing of the rainfall after application also

would have an effect. Rainfall interacts with pesticides at a shallow soil depth (¼ to ½ inch), which is called the mixing zone (Baker and Miller 1999). The pesticide/water mixture in the mixing zone would tend to leach down into the soil or runoff depending upon how quickly the soil surface becomes saturated and how rapidly water can infiltrate into the soil. Leaching would decrease the amount of pesticide available near the soil surface (mixing zone) to runoff during the initial rainfall event following application and subsequent rainfall events.

- Terrain slope would affect the potential for surface runoff and the intensity of runoff. Steeper slopes would have greater potential for runoff following a rainfall event. In contrast, soils that are relatively flat would have little potential for runoff, except during intense rainfall events. In addition, soils in lower areas would be more susceptible to leaching as a result of receiving excessive water from surrounding higher elevations.
- Depth to groundwater would be an important factor affecting the potential for pesticides to leach into groundwater. If the distance from the soil surface to the top of the water table is shallow, pesticides would have less distance to travel to reach groundwater. Shallower water tables that persist for longer periods would be more likely to experience groundwater contamination. Soil survey reports are available for individual counties. These reports provide data in tabular format regarding the water table depths and the months during which it persists. In some situations, a hard pan exists above the water table that would prevent pesticide contamination from leaching.

G.7.5 Determining Effects to Air Quality

Pesticides may volatilize from soil and plant surfaces and move from the treated area into the atmosphere. The potential for a pesticide to volatilize is determined by the pesticide's vapor pressure, which would be affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these numbers easier to compare, vapor pressure may be expressed in exponent form ($I \times 10^{-7}$), where "I" represents a vapor pressure index. In general, pesticides with $I<10$ would have a low potential to volatilize, whereas pesticides with $I>1{,}000$ would have a high potential to volatilize (OSU 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA ARS pesticide database.

G.7.6 Preparing a Chemical Profile

The following instructions would be used by Service personnel to complete Chemical Profiles for pesticides. Specifically, profiles would be prepared for pesticide active ingredients (e.g., glyphosate, imazapic) that would be contained in one or more trade name products that are registered and labeled with USEPA. All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) would be completed for a Chemical Profile. If no information is available for a specific field, then "No data is available in references" would be recorded in the profile. Available scientific information would be used to complete Chemical Profiles. Each entry of scientific information would be shown with applicable references.

Completed Chemical Profiles would provide a structured decision-making process using quantitative assessment/screening tools with threshold values (where appropriate) that would be used to evaluate potential biological and other environmental effects to refuge resources. For ecological risk assessments presented in these profiles, the "worst-case scenario" would be evaluated to determine whether a pesticide could be approved for use considering the maximum single application rate specified on pesticide labels for habitat management and croplands/facilities maintenance treatments

pertaining to refuges. Where the "worst-case scenario" likely would only result in minor, temporary, and localized effects to listed and nonlisted species with appropriate BMPs (see Section G.5), the proposed pesticide's use in a PUP would have a scientific basis for approval under any application rate specified on the label that is at or below rates evaluated in a Chemical Profile. In some cases, the Chemical Profile would include a lower application rate than the maximum labeled rate in order to protect refuge resources. As necessary, Chemical Profiles would be periodically updated with new scientific information or as pesticides with the same active ingredient are proposed for use on the refuge in PUPs.

Throughout this section, threshold values (to prevent or minimize potential biological and environmental effects) would be clearly identified for specific information presented in a completed Chemical Profile. Comparison with these threshold values provides an explicit scientific basis to approve or disapprove PUPs for habitat management and cropland/facilities maintenance on refuge lands. In general, PUPs would be approved for pesticides with Chemical Profiles where there would be no exceedances of threshold values. However, BMPs are identified for some screening tools that would minimize/eliminate potential effects (exceedance of the threshold value) as a basis for approving PUPs.

Date: Service personnel would record the date when the Chemical Profile is completed or updated. Chemical Profiles (e.g., currently approved pesticide use patterns) would be periodically reviewed and updated, as necessary. The most recent review date would be recorded on a profile to document when it was last updated.

Trade Name(s): Service personnel would accurately and completely record the trade name(s) from the pesticide label, which includes a suffix that describes the formulation (e.g., WP, DG, EC, L, SP, I, II, or 64). The suffix often distinguishes a specific product among several pesticides with the same active ingredient. Service personnel would record a trade name for each pesticide product with the same active ingredient.

Common Chemical Name(s): Service personnel would record the common name(s) listed on the pesticide label or MSDS for an active ingredient. The common name of a pesticide is listed as the active ingredient on the title page of the product label immediately following the trade name, and the MSDS, Section 2: Composition/Information on Ingredients. A Chemical Profile is completed for each active ingredient.

Pesticide Type: Service personnel would record the type of pesticide for an active ingredient as one of the following: herbicide, dessicant, fungicide, fumigant, growth regulator, insecticide, pisicide, or rodenticide.

EPA Registration Number(s): This number (EPA Reg. No.) appears on the title page of the label and MSDS, Section 1: Chemical Product and Company Description. It is not the EPA Establishment Number, which is usually located near it. Service personnel would record the EPA Reg. No. for each trade name product with an active ingredient based upon PUPs.

Pesticide Class: Service personnel would list the general chemical class for the pesticide (active ingredient). For example, Malathion is an organophosphate and carbaryl is a carbamate.

CAS (Chemical Abstract Service) Number: This number is often located in the second section (Composition/Information on Ingredients) of the MSDS. The MSDS table listing components usually contains this number immediately prior to or following the percent composition.

Other Ingredients: From the most recent MSDS for the proposed pesticide product(s), Service personnel would include any chemicals in the pesticide formulation not listed as the active ingredient and described as toxic or hazardous, or regulated under the Superfund Amendments and Reauthorization Act (SARA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), State Right-to-Know, or other listed authorities. These are usually found in MSDS sections titled "Hazardous Identifications," "Exposure Control/Personal Protection," and "Regulatory Information." If concentrations of other ingredients are available for any compounds identified as toxic or hazardous, then Service personnel would record this information in the Chemical Profile by trade name. MSDS(s) may be obtained from the manufacturer, manufacturer's website, or from an online database maintained by Crop Data Management Systems, Inc. (see list below).

G.7.6.1 Toxicological Endpoints

Toxicological endpoint data would be collected for acute and chronic tests with mammals, birds, and fish. Data would be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then "No data available in references" would be recorded as the data entry. Throughout the Chemical Profile, references (including toxicological endpoint data) would be cited using parentheses (#) following the recorded data.

Mammalian LD_{50}: For test species in the scientific literature, Service personnel would record available data for oral lethal dose (LD_{50}) in mg/kg-bw (body weight) or ppm-bw. The most common test species in scientific literature are rat and mouse. The lowest LD_{50} value found for a rat would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table G-1 in Section G.7.1).

Mammalian LC_{50}: For test species in the scientific literature, Service personnel would record available data for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species in scientific literature are rat and mouse. The lowest LC_{50} value found for a rat would be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Mammalian Reproduction: For test species listed in the scientific literature, Service personnel would record the test results (e.g., Lowest Observed Effect Concentration [LOEC], Lowest Observed Effect Level [LOEL], No Observed Adverse Effect Level [NOAEL], NOAEC) in mg/kg-bw or mg/kg-diet for reproductive test procedure(s) (e.g., generational studies [preferred], fertility, newborn weight). The most common test species available in scientific literature are rats and mice. The lowest NOEC, NOAEC, No Observed Effect Level [NOEL], or NOAEL test results found for a rat would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Avian LD_{50}: For test species available in the scientific literature, Service personnel would record values for oral lethal dose (LD_{50}) in mg/kg-bw or ppm-bw. The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD_{50} value found for an avian

species would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian LC_{50}: For test species available in the scientific literature, Service personnel would record values for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC_{50} value found for an avian species would be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian Reproduction: For test species available in the scientific literature, Service personnel would record test results (e.g., LOEC, LOEL, NOAEC, NOAEL) in mg/kg-bw or mg/kg-diet consumed for reproductive test procedure(s) (e.g., early life cycle, reproductive). The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for an avian species would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Fish LC_{50}: For test freshwater or marine species listed in the scientific literature, Service personnel would record an LC_{50} in ppm or mg/L. The most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow (marine). Test results for many game species may also be available. The lowest LC_{50} value found for a freshwater fish species would be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Fish Early Life Stage (ELS)/Life Cycle: For test freshwater or marine species available in the scientific literature, Service personnel would record test results (e.g., LOEC, NOAEL, NOAEC, Lowest Observable Adverse Effect Concentration [LOAEC] in ppm for test procedure(s) (e.g., early life cycle, life cycle). The most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow. Test results for other game species may also be available. The lowest test value found for a fish species (preferably freshwater) would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Other: For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, Service personnel would record $LC_{50,}$ $LD_{50,}$ LOEC, LOEL, NOAEC, NOAEL, or EC_{50} (environmental concentration) values in ppm or mg/L. The most common test invertebrate species available in scientific literature are the honey bee and the water flea (*Daphnia magna*). Green algae (*Selenastrum capricornutum*) and pondweed (*Lemna minor*) are frequently available test species for aquatic non-vascular and vascular plants, respectively.

Ecological Incident Reports: After a site has been treated with pesticide(s), wildlife may be exposed to these chemical(s). When exposure is high relative to the toxicity of the pesticides, wildlife may be killed or visibly harmed (incapacitated). Such events are called ecological incidents. The USEPA maintains a database (Ecological Incident Information System) of ecological incidents. This database stores information extracted from incident reports submitted by various Federal and state agencies and non-government organizations. Information included in an incident report is date and location of the incident, type and magnitude of effects observed in various species, use(s) of pesticides known or suspected of contributing to the incident, and results of any chemical residue and cholinesterase activity analyses conducted during the investigation.

Incident reports can play an important role in evaluating the effects of pesticides by supplementing quantitative risk assessments. All incident reports for pesticide(s) with the active ingredient and associated information would be recorded.

G.7.6.2 Environmental Fate

Water Solubility: Service personnel would record values for water solubility (S_w), which describes the amount of pesticide that dissolves in a known quantity of water. S_w is expressed as mg/L (ppm). Pesticide S_w values would be categorized as one of the following: insoluble <0.1 ppm, moderately soluble = 100 to 1,000 ppm, highly soluble >10,000 ppm (USGS 2000). As pesticide S_w increases, there would be greater potential to degrade water quality through runoff and leaching.

S_w would be used to evaluate the potential for bioaccumulation in aquatic species (see Octanol-Water Partition Coefficient [K_{ow}] below).

Soil Mobility: Service personnel would record available values for soil adsorption coefficient (K_{oc} [µg/g]). It provides a measure of a chemical's mobility and leaching potential in soil. K_{oc} values are directly proportional to organic content, clay content, and surface area of the soil. K_{oc} data for a pesticide may be available for a variety of soil types (e.g., clay, loam, sand).

K_{oc} values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

Soil Persistence: Service personnel would record values for soil half-life, which represents the length of time (days) required for 50% of the deposited pesticide to degrade (completely or partially) in the soil. Based upon the $t_{½}$ value, soil persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

- If soil $t_{½} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If soil $t_{½} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with K_{oc}, soil $t_{½}$ values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

Soil Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade and move from a treated site, whereas soil $t_{½}$ describes the rate of degradation only. As for $t_{½}$, units of dissipation time are usually expressed in days. Field dissipation time would

be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil $t_{½}$, which is derived in a laboratory. However, soil $t_{½}$ is the most common persistence data available in the published literature. If field dissipation data are not available, soil half-life data would be used in a Chemical Profile. The average or representative half-life value of most important degradation mechanism would be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT_{50} value, environmental persistence in the soil would also be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

- If soil $DT_{50} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If soil $DT_{50} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with K_{oc}, soil DT_{50} values (preferred over soil $t_{½}$) would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below), if available.

Aquatic Persistence: Service personnel would record values for aquatic $t_{½}$, which represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially) in water. Based upon the $t_{½}$ value, aquatic persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

- If aquatic $t_{½} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If aquatic $t_{½} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Aquatic Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade or move (dissipate), whereas aquatic $t_{½}$ describes the rate of degradation only. As for $t_{½}$, units of dissipation time are usually expressed in days. Based upon the DT_{50} value, environmental persistence in aquatic habitats would also be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

- If aquatic $DT_{50} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If aquatic $DT_{50} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Potential to Move to Groundwater: $GUS = \log_{10}(\text{soil } t_{½}) \times [4 - \log_{10}(K_{oc})]$. If a DT_{50} value is available, it would be used rather than a $t_{½}$ value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater would be recorded as one of the following categories: extremely low potential<1.0, low - 1.0 to 2.0, moderate - 2.0 to 3.0, high - 3.0 to 4.0, or very high>4.0.

Threshold for Approving PUPs:

- If $GUS \leq 4.0$, then a PUP would be approved without additional BMPs to protect water quality.
- If $GUS > 4.0$, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Volatilization: Pesticides may volatilize (evaporate) from soil and plant surfaces and move off-target into the atmosphere. The potential for a pesticide to volatilize is a function of its vapor pressure, which is affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these values easier to compare, vapor pressure would be recorded by Service personnel in exponential form ($I \times 10^{-7}$), where "I" represents a vapor pressure index. In general, pesticides with I<10 would have low potential to volatilize, whereas pesticides with I >1,000 would have a high potential to volatilize (OSU 1996). Vapor pressure values

for pesticides are usually available in the pesticide product MSDS or the USDA ARS pesticide database (see References).

Threshold for Approving PUPs:

- If I ≤1,000, then a PUP would be approved without additional BMPs to minimize drift and protect air quality.
- If I >1,000, then a PUP would only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following would be included in the Specific BMPs section to reduce volatilization and potential to drift and degrade air quality:
    - Do not treat when wind velocities are <2 or >10 mph with existing or potential inversion conditions.
    - Apply large-diameter droplets possible for spray treatments.
    - Avoid spraying when air temperatures >85°F.
    - Use the lowest spray height possible above target canopy.
    - Where identified on the pesticide label, soil-incorporate pesticide as soon as possible during or after application.

Octanol-Water Partition Coefficient (K_{ow}): The octanol-water partition coefficient (K_{ow}) is the concentration of a pesticide in octanol and water at equilibrium at a specific temperature. Because octanol is an organic solvent, it is considered a surrogate for natural organic matter. Therefore, K_{ow} would be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If K_{ow} >1,000 or S_w<1 mg/L *and* soil $t_{½}$>30 days, then there would be high potential for a pesticide to bioaccumulate in aquatic species such as fish (USGS 2000).

Threshold for Approving PUPs:

- If the potential for a pesticide to bioaccumulate in aquatic species is not high, then the PUP would be approved.
- If there is a high potential to bioaccumulate in aquatic species (K_{ow}>1,000 or S_w<1 mg/L *and* soil $t_{½}$>30 days), then the PUP would not be approved, except under unusual circumstances where approval would only be granted by the Washington Office.

Bioaccumulation/Bioconcentration: This is the physiological process where pesticide concentrations in tissue increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation would be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate would be recorded as one of the following: low = 0 to 300; moderate = 300 to 1,000; or high >1,000 (Calabrese and Baldwin 1993).

Threshold for Approving PUPs:

- If BAF or BCF≤1,000, then a PUP would be approved without additional BMPs.
- If BAF or BCF>1,000, then a PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.

G.7.6.3 Worst-Case Ecological Risk Assessment

Max Application Rates (acid equivalent [ae]): Service personnel would record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field of a Chemical Profile. These rates can be found in Table CP.1 under the column heading "Max Product Rate – Single Application (lbs/acre – AI on acid equiv basis)." This table would be prepared for a Chemical Profile from information specified in labels for trade name products identified in PUPs. If these data are not available in pesticide labels, "NS" should be written, for "not specified on label" in this table.

EECs: An ECC represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs would be derived by Service personnel using an USEPA screening-level approach (USEPA 2004). For each max application rate (see description under Max Application Rates [acid equivalent]), Service personnel would record two EEC values in a Chemical Profile; these would represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see description for data entry under Presumption of Unacceptable Risk/Risk Quotients, which is the next field for a Chemical Profile.

Presumption of Unacceptable Risk/Risk Quotients: Service personnel would calculate and record acute and chronic RQs for birds, mammals, and fish using the provided tabular formats for habitat management and/or cropland/facilities maintenance treatments. RQs recorded in a Chemical Profile would represent the worst-case assessment for ecological risk. See Section G.7.2 for discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations would be based upon selected acute and chronic toxicological endpoints for fish, and the EEC would be derived from Urban and Cook (1986) assuming 100% overspray to an entire 1-foot-deep water body using the max application rate (ae basis [see above]).

For aquatic assessments associated with cropland/facilities maintenance treatments, RQ calculations would be done by Service personnel based upon selected acute and chronic toxicological endpoints for fish, and an EEC would be derived from the aquatic assessment in AgDRIFT model version 2.01 under Tier I ground-based application with the following input variables: max application rate (ae basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, USEPA-defined wetland, and 25-foot distance (buffer) from treated area to water.

See Section G.7.2.1.2 for more details regarding the calculation of EECs for aquatic habitats for habitat management and cropland/facilities maintenance treatments.

For terrestrial avian and mammalian assessments, RQ calculations would be done by Service personnel based upon dietary exposure, where the "short grass" food item category would represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) would be determined using the Kanaga nomogram method through the USEPA's T-REX version 1.2.3. T-REX input variables would include the following: max application rate (acid basis [see above]) and pesticide half-life (days) in soil to estimate the initial, maximum pesticide residue concentration on general food items for terrestrial vertebrate species in short (<20 cm tall) grass.

For granular pesticide formulations and pesticide-treated seed with a unique route of exposure for terrestrial avian and mammalian wildlife, see Section G.7.2.1.1.2 for the procedure that would be used to calculate RQs.

All calculated RQs in both tables would be compared with Levels of Concern (LOCs) established by USEPA (see Table G-2 in Section G.7.2). If a calculated RQ exceeds an established LOC value (in brackets inside the table), then there would be a potential for an acute or chronic effect (unacceptable risk) to federally listed (T&E) species and nonlisted species. See Section G.7.2 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk.

Threshold for approving PUPs:

- If RQs≤LOCs, then a PUP would be approved without additional BMPs.
- If RQs>LOCs, then a PUP would only be approved with additional BMPs specifically to minimize exposure (ecological risk) to bird, mammal, and/or fish species. One or more BMPs such as the following would be included in the Specific BMPs section to reduce potential risk to nonlisted or listed species:
    - Lower application rate and/or fewer number of applications so RQs≤LOCs.
    - For aquatic assessments (fish) associated with cropland/facilities maintenance, increase the buffer distance beyond 25 feet so RQs≤LOCs.

Justification for Use: Service personnel would describe the reason for using the pesticide-based control of specific pests or groups of pests. In most cases, the pesticide label would provide the appropriate information regarding control of pests to describe in the section.

Specific BMPs: Service personnel would record specific BMPs necessary to minimize or eliminate potential effects to non-target species and/or degradation of environmental quality from drift, surface runoff, or leaching. These BMPs would be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices would be included in PUPs as a basis for approval. If there are no specific BMPs that are appropriate, then Service personnel would describe why the potential effects to refuge resources and/or degradation of environmental quality are outweighed by the overall resource benefit(s) from the proposed pesticide use in the BMPs section of the PUP. See Section G.5 of this document for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that would be additive to any necessary, chemical-specific BMPs.

References: Service personnel would record scientific resources used to provide data/information for a Chemical Profile. They would use the number sequence to uniquely reference data in a Chemical Profile.

The following online data resources are readily available for toxicological endpoint and environmental fate data for pesticides:

1. California Product/Label Database. Department of Pesticide Regulation, California Environmental Protection Agency. (http://www.cdpr.ca.gov/docs/label/labelque.htm#regprods)

2. ECOTOX database. Office of Pesticide Programs, USEPA, Washington, D.C. (http://cfpub.epa.gov/ecotox/)

3. Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University, and University of Idaho through Oregon State University, Corvallis, Oregon. (http://extoxnet.orst.edu/pips/ghindex.html)

4. Food and Agriculture Organization (FAO) specifications and evaluations for plant protection products. Pesticide Management Unit, Plant Protection Services, Food and Agriculture Organization, United Nations. (http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/)

5. Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, USDA, USFS. (http://www.fs.fed.us/foresthealth/pesticide/risk.htm)

6. Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center. (http://entweb.clemson.edu/pesticid/Document/Labels/factshee.htm)

7. Pesticide Fact Sheets. Published by Information Ventures, Inc. for BLM, Department of Interior; Bonneville Power Administration, U.S. Department of Energy; and USFS. (http://infoventures.com/e-hlth/pesticide/pest-fac.html)

8. Pesticide Fact Sheets. National Pesticide Information Center. (http://npic.orst.edu/npicfact.htm)

9. Pesticide Fate Database. USEPA, Washington, D.C. (http://cfpub.epa.gov/pfate/home.cfm).

10. Pesticide product labels and material safety data sheets. Crop Data Management Systems, Inc. (CDMS) (http://www.cdms.net/pfa/LUpdateMsg.asp) or multiple websites maintained by agrichemical companies.

11. Registered Pesticide Products (Oregon database). Oregon Department of Agriculture. (http://www.oda.state.or.us/dbs/pest_products/search.lasso)

12. Regulatory notes. Pest Management Regulatory Agency, Health Canada, Ontario, Canada. (http://www.hc-sc.gc.ca/pmra-arla/)

13. Reptile and Amphibian Toxicology Literature. Canadian Wildlife Service, Environment Canada, Ontario, Canada. (http://www.cws-scf.ec.gc.ca/nwrc-cnrf/ratl/index_e.cfm)

14. Specific Chemical Fact Sheet – New Active Ingredients, Biopesticide Fact Sheet and Registration Fact Sheet. USEPA, Washington, D.C. (http://www.epa.gov/pestidides/factsheets/chemical_fs.htm)

15. U.S. EPA. 1997. Pesticide Regulation (PR) Notice 97-6. Washington, DC: U.S. Environmental Protection Agency. Available: http://www.epa.gov/PR_Notices/pr97-6.html.

16. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Invasive Species Initiative. The Nature Conservancy. (http://tnsweeds.ucdavis.edu/handbook.html)

17. Wildlife Contaminants Online. USGS, Department of Interior, Washington, D.C. (http://www.pwrc.usgs.gov/contaminants-online/)

18. One-liner database. 2000. USEPA, Office of Pesticide Programs, Washington, D.C.

Chemical Profile

Date:			
Trade Name(s):		**Common Chemical Name(s):**	
Pesticide Type:		**EPA Registration Number:**	
Pesticide Class:		**CAS Number:**	
Other Ingredients:			

Toxicological Endpoints

Mammalian LD_{50}:	
Mammalian LC_{50}:	
Mammalian Reproduction:	
Avian LD_{50}:	
Avian LC_{50}:	
Avian Reproduction:	
Fish LC_{50}:	
Fish ELS/Life Cycle:	
Other:	

Ecological Incident Reports

Environmental Fate

Water solubility (S_w):	
Soil Mobility (K_{oc}):	
Soil Persistence ($t_{½}$):	
Soil Dissipation (DT_{50}):	
Aquatic Persistence ($t_{½}$):	
Aquatic Dissipation (DT_{50}):	
Potential to Move to Groundwater (GUS score):	
Volatilization (mm Hg):	
Octanol-Water Partition Coefficient (K_{ow}):	
Bioaccumulation/Biocentration:	**BAF:`** **BCF:**

Worst Case Ecological Risk Assessment

Max Application Rate (ai lbs/acre – ae basis)	**Habitat Management:** **Croplands/Facilities Maintenance:**
EECs	**Terrestrial (Habitat Management):** **Terrestrial (Croplands/Facilities Maintenance):** **Aquatic (Habitat Management):** **Aquatic (Croplands/Facilities Maintenance):**

Habitat Management Treatments:

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Cropland/Facilities Maintenance Treatments:

Presumption of Unacceptable Risk		Risk Quotient (RQ)	
		Listed (T&E) Species	Nonlisted Species
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Justification for Use:	
Specific Best Management Practices (BMPs):	
References:	

Table CP.1 Pesticide Name

Trade Name[a]	Treatment Type[b]	Max Product Rate – Single Application (lbs/acre or gal/acre)	Max Product Rate -Single Application (lbs/acre - AI on acid equiv basis)	Max Number of Applications Per Season	Max Product Rate Per Season (lbs/acre/season or gal/acre/season)	Minimum Time Between Applications (Days)

[a] From each label for a pesticide identified in pesticide use proposals (PUPs), Service personnel would record application information associated with possible/known uses on Service lands.
[b] Treatment type: H – habitat management or CF – cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

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Appendix H. Public Involvement

Scoping Summary Report: Deer Flat NWR Comprehensive Conservation Plan

July 15, 2010-March 31, 2012

H.1 Scoping Effort

Public involvement was sought in the early stages of development of the comprehensive conservation plan and environmental impact statement (CCP/EIS). Prior to beginning of public scoping, the Refuge created a Stakeholder Scoping Team to help identify people and organizations that would be interested in the CCP/EIS process. The team met in June 2010 and brainstormed organizations and individuals that could help provide information to the public about the CCP/EIS process and maximize public involvement, as well as outreach tools that could be used. Invitees to this team included representatives of the business, agricultural, hunting, recreation, conservation, and Hispanic communities.

Public involvement strategies included face-to-face meetings with community organizations, local, State, and Federal agencies, elected officials (or their aides), and Refuge users. To inform the broader public, invite discussion, and solicit feedback, the planning team also held open houses, provided a twice-a-month call-in line, and conducted weekly on-site field outreach. Field outreach included distributing pamphlets to visitors and engaging them in conversation regarding the CCP. The Refuge also maintained a website where CCP information could be found and where the public could print out comment forms or submit emails during the scoping phase. Below is a brief summary of the events, meetings, and outreach tools that were used in our scoping and public involvement efforts.

During the public scoping phase of the CCP, three issues appeared to be of most interest to Refuge stakeholders: surface water recreation, upland recreation, and hunting. Work sessions were created to continue discussion around these themes. Commenters with differing viewpoints and those that appeared willing to look for solutions to difficult issues, as well as local partners that had voiced interest in these themes, were invited to join these topic-based work sessions. The Refuge invited approximately 130 people (or their representatives) to attend the work sessions held from September 23 to September 25, 2010. Of those 130 invitees, 47 attended at least some part of the work sessions. Six members of the public also viewed the work sessions at some point during the three days. To view a summary of the work sessions, please visit the Deer Flat NWR Planning website at http://www.fws.gov/deerflat/refugeplanning.html.

H.1.1. Invitation to the Tribes

- May 27, 2010. Hard copy letters were mailed to Robert Bear, Tribal Chairman of Shoshone-Paiute Tribes; Alonzo Coby, Fort Hall Business Council (FHBC) Chairman of Shoshone-Bannock Tribes; and Samuel Penney, Chairman of the Nez Perce Tribe.
- May 12, 2011. Emails were sent to Robert Bear, Tribal Chairman of the Shoshone-Paiute Tribes, Brooklyn Baptiste, Chairman of the Nez Perce Tribe, and Nathan Small, FHBC Chairman of the Shoshone-Bannock Tribes to invite them to send a representative to the Extended Team Meetings.

- May 18, 2011. Received word from Brian Kelly and Meggan Laxalt-Mackay of the U.S. Fish and Wildlife Service (USFWS) Ecological Services office that the Shoshone-Paiute only want to be consulted through the "Wings and Roots" program. Since this time, Brian Kelly has taken the lead on attempting to reinstate a consultation process with this tribe. Since they requested that they not be consulted outside of this formal program, no further direct contact was made with the tribe by the Ecological Services office. When the consultation process resumes, the Refuge will be a participant.
- May 25, 2011. Called and left messages for the chairmen of the Shoshone-Paiute, Shoshone-Bannock, and Nez Perce Tribes asking how they would like to be involved in the CCP process.
- September 20, 2011. Called and left messages for Nathan Small, FHBC Chairman of Shoshone-Bannock Tribes, and Brooklyn Baptiste, Chairman of the Nez Perce Tribe, asking them how they would like to be involved and letting them know that if there was no response by October 30, we would assume that they were not interested in participating in the process.
- August 29, 2011. Brian Kelly attempted to set up a consultation meeting with the Shoshone-Paiute for September 8, 2011. Unfortunately, the meeting never materialized.
- October 27, 2011. Attempted to contact the Natural Resources departments of the Nez Perce and Shoshone-Bannock Tribes. Left messages for Keith Lawrence and Yvette Tuell.
- November 1, 2011. Keith Lawrence of the Nez Perce Tribe contacted us to let us know that the Natural Resources department was not interested in being involved in the CCP in any way. He suggested that we contact their Cultural Resources department.
- November 3, 2011. Contacted Pat Baird, archeologist for the Nez Perce Tribe, who said that they wanted to be notified of undertakings and that they wanted a hard copy of the draft and final CCP sent to the Nez Perce Tribe archeologist and the tribal chairman. These contacts were added to the mailing list.

H.1.2 Meetings and Communication with Federal, State, or Local Elected Officials and Federal, State, or Local Agencies

H.1.2.1 Interagency Coordination Team

- May 27, 2010. Letters requesting involvement on the CCP Interagency Coordinating Team (ICT) were sent to U.S. senators and representatives, State of Idaho senators and representatives within the Lake Lowell districts, the Governor of Idaho, Canyon County commissioners, the mayors of Caldwell and Nampa, Bureau of Reclamation, Idaho Department of Fish and Game (IDFG), Idaho Department of Environmental Quality (IDEQ), Canyon County Parks Recreation and Waterways (CCPRW), and the Boise Project Board of Control.
- ICT Meetings
    - July 1, 2010. Attendees included representatives of IDEQ, Bureau of Reclamation, Canyon County Parks, Recreation and Waterways (CCPRW), Canyon County Commissioners, Senator Crapo's office, Canyon County District 13, and the City of Caldwell.
    - November 30, 2010. Attendees included representatives of the City of Nampa, State Representative Christy Perry's office, Canyon County Commissioners, CCPRW, Bureau of Reclamation, and the City of Caldwell.

    - May 27, 2011. Attendees included representatives of the City of Caldwell, IDEQ, Canyon County Commissioners, CCPRW, the offices of Senators Crapo and Risch, the office of Congressman Labrador, Canyon County Sheriff's office, Idaho Department of Parks and Recreation, IDFG, and the City of Greenleaf.
- ICT Updates
    - Updates were sent to the coordination team monthly. ICT updates were sent on August 2, 2010; September 9, 2010; October 8, 2010; November 10, 2010; January 12, 2011; February 22, 2011; March 21, 2011; May 4, 2011; June 9, 2011; July 27, 2011; August 30, 2011; September 29, 2011; October 25, 2011; November 30, 2011; December 22, 2011; February 6, 2012.
    - No ICT update was sent in December 2010, because of the meeting held at the end of November.
    - No ICT update was sent in April 2011. An update was sent in early May.
    - January 2012 update was sent the first week of February.
- Current Representatives on the ICT
    - Kathy Alder – Canyon County Commissioner
    - Tom Bicak – Director, CCPRW
    - Tom Dale – Mayor, City of Nampa
    - Joe Decker – Canyon County Public Information Officer
    - Paul Deveau – Project Manager, Boise Project Board of Control
    - Steve Dunn – Natural Resource Specialist, Bureau of Reclamation
    - Phil Hardy – Regional Director for Congressman Raul Labrador
    - Darrin Johnson – Director, Nampa Parks and Recreation
    - Dean Johnson – Lands Resource Supervisor, Idaho Department of Lands
    - Dustin Miller – Environmental Liaison for Governor Otter
    - Susan Miller – Executive Assistant to the Mayor of Caldwell
    - Lauri Monnot – Watershed Coordinator, IDEQ
    - Christy Perry – Representative for Canyon County District 13
    - Scott Reinecker – Regional Director, IDFG
    - John Revier – Deputy Chief of Staff for Congressman Simpson
    - Bryan Ricker – Regional Director for Senator Crapo
    - Mike Roach – Natural Resource Director for Senator Risch

H.1.2.2 Congressional Meetings/Tours (in addition to ICT involvement)

- May 27, 2010. Letters requesting involvement on the CCP ICT were sent to U.S. senators and representatives, State of Idaho senators and representatives within the Lake Lowell districts, the Governor of Idaho, Canyon County commissioners, the mayors of Caldwell and Nampa, Bureau of Reclamation, IDFG, Idaho DEQ, CCPRW, and the Boise Project Board of Control.
- May 26, 2011. Refuge Manager Jennifer Brown-Scott and Assistant Chief of Refuges Ben Harrison met with Senators Crapo and Risch, Congressman Simpson, and staff of Congressman Labrador in Washington D.C. to brief them on the preliminary draft alternatives.
- August 18, 2011. Refuge Manager Jennifer Brown-Scott, Chief of Refuges Robin West, Assistant Regional Director Richard Hannan, and Regional Director Robyn Thorson met with representatives of Senators Crapo and Risch and Congressmen Labrador and Simpson to

discuss public comment and future changes to the preliminary draft alternatives.

H.1.2.3 Presentations for State and County Agencies (in addition to ICT involvement)

- Sent out invitations in June 2010 for a presentation on August 3, 2010. No County employees responded.
- August 4, 2010. Held presentation for Idaho state agencies. Kurt Stieglitz, IDFG; Thomas Woolf, Idaho Department of Agriculture; Jim Vannoy, Idaho Department of Health and Welfare; and David Dahms, Idaho Department of Parks and Recreation attended.
- August 11, 2010. Met with Idaho Department of Lands to discuss management authority.
- October 11, 2011. Met with IDFG and discussed public comments and potential changes to the preliminary draft alternatives.

H.1.3 Communication with the Public, Local Businesses, and Community Organizations

H.1.3.1 Presentations with Community/Business Organizations

- During scoping in summer 2010, we contacted over 40 nongovernmental organizations and State and county agencies to offer CCP question-and-answer sessions. We met with 23 groups, including the following:
    - June 10, 2010. Informational CCP presentation to Caldwell Kiwanis.
    - June 10, 2010. Informational CCP presentation to Southwest Idaho Birders Association.
    - June 16, 2010. Informational CCP presentation to Idaho Bass Federation Nation.
    - July 10, 2010. Brief speech at the Premier Bass Tournament weigh-in.
    - July 12, 2010. Informational CCP presentation to the board of Golden Eagle Audubon Society.
    - July 13, 2010. Informational CCP presentation to the Southern Idaho Sailing Association.
    - July 14, 2010. Informational CCP presentation to the Idaho-Oregon Snake River Water Trail Coalition.
    - July 20, 2010. Informational CCP presentation to the Southwest Irrigation District (SWID) Resource Conservation and Development.
    - July 21, 2010. Informational CCP presentation to the Friends of Deer Flat Refuge.
    - July 26, 2010. Informational CCP presentation to the Intermountain Jet Boat Association.
    - July 27, 2010. Informational CCP presentation to the Kiwanis Club.
    - August 4, 2010. Informational CCP presentation at the Boise Watershed Teacher Workshop.
    - August 9, 2010. Informational CCP presentation to the Western White Water Association.
    - August 10, 2010. Informational CCP presentation to the Idaho Waterfowl Association.
    - August 10, 2010. Brief presentation at the Caldwell Chamber of Commerce luncheon.
    - August 13, 2010. Speech to a floatplane club.
    - August 18, 2010. Informational CCP presentation to the Caldwell Rotary Club.

  - August 23, 2010. Informational CCP presentation to the Snake River Canyon Scenic Byway.
  - August 26, 2010. Informational CCP presentation to the Nampa Association of Realtors.
  - August 31, 2010. Informational CCP presentation to the Caldwell Optimist Club.
- Two requests for CCP presentations were received in the winter of 2011. Presentations were provided to the following organizations.
  - February 14, 2011. Informational CCP presentation to the Woman's Century Club.
  - March 13, 2011. Informational CCP presentation to the Nampa Exchange Club.
- During the preliminary draft alternatives comment period in summer 2011, we contacted 70 nongovernmental organizations to offer CCP question-and-answer sessions. We met with 28 groups, including the following.
  - June 6, 2011. Informational CCP presentation to Idaho Power.
  - June 6, 2011. Informational CCP presentation to Snake River Bassmasters.
  - June 8, 2011. Informational CCP presentation to the Nampa Exchange Club.
  - June 9, 2011. Informational CCP presentation to the Caldwell Kiwanis Club.
  - June 9, 2011. Informational CCP presentation to the Lower Boise Watershed Council.
  - June 14, 2011. Informational CCP presentation to the Nampa Lions Club.
  - June 17, 2011. Informational CCP presentation to a local floatplane club.
  - June 21, 2011. Informational CCP presentation to the Ada County Association of Realtors.
  - June 21, 2011. Informational CCP presentation to the Caldwell Exchange Club.
  - June 21, 2011. Informational CCP presentation to Southwest Idaho Resource Conservation and Development.
  - June 22, 2011. Informational CCP presentation to the Caldwell Optimist Club.
  - June 22, 2011. Informational CCP presentation to the Caldwell Rotary Club.
  - June 28, 2011. Informational CCP presentation to the Treasure Valley Kiwanis Club.
  - June 28, 2011. Informational CCP presentation to the Nampa Rotary Club.
  - June 28, 2011. Informational CCP presentation to Lakeside Bassmasters.
  - June 29, 2011. Informational CCP presentation to the Sunrise Rotary.
  - June 30, 2011. Informational CCP presentation to Idaho Water Sports.
  - July 6, 2011. Informational CCP presentation to Idaho Waterfowl Association.
  - July 7, 2011. Informational CCP presentation to Bass Federation Nation.
  - July 11, 2011. Informational CCP presentation to Western Whitewater Association.
  - July 12, 2011. Informational CCP presentation to Golden Eagle Audubon Society.
  - July 13, 2011. Informational CCP presentation to the Caldwell Chamber of Commerce.
  - July 15, 2011. Informational CCP presentation to the Boise Sailors Association.
  - July 21, 2011. Informational CCP presentation to the Nampa Kiwanis Club.
  - July 21, 2011. Informational CCP presentation to Idaho Bass Federation.
  - July 23, 2011. Informational CCP presentation to the Idaho Recreation Council.
  - July 25, 2011. Informational CCP presentation to the Snake River Canyon Scenic Byway.

H.1.3.2 Public Open Houses/Scoping Sessions

- July 28, 2010. Open House from 12:00 PM to 3:00 PM at the Refuge Visitor Center.

- August 20, 2010. Open House from 10:00 AM to 6:00 PM at the Refuge Visitor Center.
- August 21, 2010. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- September 23-24, 2010. Work Session 1. Participation was by invitation. The work sessions were open to public viewing.
- September 24-25, 2010. Work Session 2. Participation was by invitation. The work sessions were open to public viewing.
- June 3, 2011. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- June 4, 2011. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- July 8, 2011. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- July 9, 2011. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.

H.1.3.3 Field Outreach

- June 26, 2010. Staff outreach at Upper Dam East.
- July 1, 2010. Staff outreach at Gotts Point and Lower Dam Recreation Area.
- July 10, 2010. Staff outreach at Gotts Point, the Lower Dam Recreation Area, and the Lavender Festival.
- July 11, 2010. Staff outreach at the Lavender Festival.
- July 22, 2010. Staff outreach at the Lower Dam Recreation Area.
- July 30, 2010. Staff outreach at the Lower Dam Recreation Area, the Upper Dam, and Gotts Point.
- August 8, 2010. Staff outreach at Access #7, Lower Dam Recreation Area, Upper Dam East, and Upper Dam West.
- August 14, 2010. Staff outreach at the Lower Dam Recreation Area.
- August 27, 2010. Staff outreach at the Upper Dam West, Upper Dam East, Lower Dam Recreation Area, and Gotts Point.
- June 25-26, 2011. Staff outreach at the Boise Recreation Festival.
- July 8-9, 2011. Staff outreach at the Lavender Festival.

H.1.3.4 CCP Hotline

- June 23, 2010. Available 5:00 PM to 7:00 PM
- July 14, 2010. Available 5:00 PM to 7:00 PM
- July 28, 2010. Available 5:00 PM to 7:00 PM
- August 11, 2010. Available 5:00 PM to 7:00 PM
- August 25, 2010. Available 5:00 PM to 7:00 PM
- September 8, 2010. Available 5:00 PM to 7:00 PM

H.1.3.5 News Releases

The following CCP-related news releases were issued to over 100 statewide television, radio, and print media contacts.

- June 21, 2010. Announcement of start of CCP process and opportunities for comment.

- July 19, 2010. Announcement of upcoming open house about management plan.
- September 16, 2010. Announcement of CCP Work Sessions.
- December 28, 2010. Update on status of CCP planning and announcement of release of Planning Update #2.
- May 27, 2011. Announcement of comment period for preliminary draft alternatives.
- October 25, 2011. Update on status of CCP planning and announcement of release of Planning Update #4.

H.1.3.6 Press Coverage (April 1, 2010, to March 31, 2012)

- April 14, 2010. Idaho Press-Tribune, "Deer Flat Prepares to Update Conservation Guidelines."
- May 02, 2010. Idaho Press-Tribune, "County Seeks Full Access to Popular Recreation Spot."
- May 02, 2010. NWCN, "Some Residents Want Vehicle Ban Lifted on Lake Lowell Recreation Spot."
- May 05, 2010. Idaho Press-Tribune, "Public Can Give Views on Lake Lowell Water."
- May 13, 2010. Idaho Press-Tribune, "Find Way to Open Gates at Gotts Point."
- June 16, 2010. Idaho Press-Tribune, "Lake Lowell Flush with Water."
- June 21, 2010. Press release was sent to local press outlets informing the public of the start of public scoping and promoting the CCP hotline.
- June 21, 2010. Idaho Statesman, "Deer Flat National Wildlife Refuge Kicks Off Comprehensive Planning Process, Wants Public Comment."
- July 08, 2010. Idaho Press-Tribune, "Work begins on Deer Flat Wildlife Refuge Plan."
- July 19, 2010. Press release was sent to local press outlets informing them of the July and August open houses.
- July 24, 2010. Idaho Press-Tribune, "Refuge Meeting Plan Set for Wednesday."
- July 29, 2010. Idaho Press-Tribune, "Refuge Seeks to Save Water Sports."
- August 10, 2010. KIVI-TV, "Boaters Beware in Lake Lowell."
- August 10, 2010 KBOI AM 670, "Officials Urge Public Comment on Deer Flat National Refuge Plan."
- August 11, 2010. Idaho Press-Tribune, "Help Save Recreation on Lake Lowell."
- August 12, 2010. KTRV-TV, "Lake Lowell Activities Debate."
- August 13, 2010. KIVI-TV, "Public to Weigh in on Lake Lowell Management Plan."
- August 14, 2010. KBOI, Story about boating, open houses, and comments.
- August 14, 2010. KBOI 2, "Change 'is coming' to Lake Lowell, Boaters Fear Worst."
- August 14, 2010. KTVB and NWCN, "Public Weighs in on Future of Boating at Lake Lowell."
- August 15, 2010. KTVB, "Wildlife Refuge Could Curtail Water Sports on Popular Lake."
- August 15, 2010. Idaho Press-Tribune, "Crowd Defends Lake Use."
- August 17, 2010. Idaho Statesman online blog, "Boaters Gear Up for Fight at Lake Lowell."
- August 24, 2010. KTRV-TV "Canyon County Commissioners Call on Citizens."
- August 26, 2010. Idaho Press-Tribune, "'Save Lake Lowell' Meeting Today."
- August 27, 2010. Idaho Press-Tribune, "'Save Lake Lowell' Group Meets."
- August 29, 2010. Idaho Press-Tribune, Opinion, "Lake's Uses Must Be Balanced."

- August 31, 2010. Idaho Press-Tribune, editorial opinion, "Burden of Proof Should Fall on Closing Refuge."
- August 31, 2010, KBOI AM 670, Sept. Lake Lowell Month to Save Recreation Activities on the Lake."
- September 01, 2010. KTRV-TV, "Commissioners Worry About Losing Lake Lowell."
- September 02, 2010. Idaho Press-Tribune, guest opinion, "We Must Honor Deer Flat's Original Purpose."
- September 02, 2010. Idaho Press-Tribune, "Officials Support Lowell Recreation."
- September 03, 2010. Idaho Press-Tribune, "Lake Lowell Issue Continues Debate."
- September 04, 2010. Idaho Press-Tribune, "Lowell Plan Shapes Future."
- September 08, 2010. Idaho Press-Tribune, Deer Flat editorial opinion, "Wildlife, Recreation Can Co-exist."
- September 08, 2010. Idaho Statesman, "Lake Lowell Recreation Supporters Rally to Influence Refuge Planning."
- September 09, 2010. Idaho Press-Tribune, "Group Spearheads Opposition to Lake Restrictions."
- September 10, 2010. KTVB, "Refuge Managers Receive Hundreds of Comments on Future of Lake Lowell."
- September 11, 2010. Idaho Press-Tribune, "Simpson, Minnick Weigh in on Lake Lowell, Wolves."
- September 12, 2010. Idaho State Journal, "Minnick, Simpson Send Letter Seeking Progress on Wolf Management, Lake Lowell Issues."
- September 13, 2010. Northwest Cable News, "Refuge Managers Receive Hundreds of Comments on Future of Lake Lowell."
- September 15, 2010. ONEARTH Magazine and KBOI, "A Gem in the Desert or Garbage Dump?"
- September 16, 2010. Press release was sent to local press outlets inviting the public to view the September Work Sessions.
- September 17, 2010. Idaho Press-Tribune, "Deer Flat to Host Use Plan Meetings."
- September 21, 2010. Idaho Statesman, "Brainstorming Workshops Planned This Week for Deer Flat Conservation Plan."
- September 23, 2010. KTRV, "Boating Ban among Ideas at Lake Lowell Brainstorming Session."
- January 13, 2011. Idaho Press-Tribune, "Local Leaders Concerned about Deer Flat Outcome."
- February 21, 2011. Idaho Press-Tribune, "Deer Flat Debate Escalates."
- March 17, 2011. Idaho Press-Tribune, "Simpson Seeks Assurances on Lake Lowell."
- April 13, 2011. KTVB, "Canyon County Wants More Control over Wildlife Refuge."
- May 27, 2011. KTVB, "Proposed Changes to Lake Lowell."
- May 28, 2011. Idaho Press-Tribune, "Four Options, One Lake."
- May 28, 2011. Idaho Statesman, "Recreation Restrictions Loom for Lake Lowell."
- May 29, 2011. Westport News.
- June 24, 2011. KTVB, "Idaho Leaders Want More Public Comments on Lake Lowell."
- July, 2011. The Golden Eagle, "Comments Sought on Deer Flat Birding and New Management Plan Proposals."

- July 07, 2011. KTVB and KIVI, "Embroiled in Fight, Idaho Refuge Meets with Public."
- July 09, 2011. KIVI, "The Day Recreation Died."
- July 11, 2011. Capital Press, "Boat Parade Protests 'Death of Recreation'."
- July 21, 2011. Idaho Public Television, "Idaho's Deer Flat National Wildlife Refuge Plan Stirs Controversy."
- July 22, 2011. KIVI, "Community Comes Together to Fight Government Take Over of Lake Lowell."
- July 22, 2011. KTVB, "Canyon County Says Feds Have No Rights on Lake Lowell."
- July 30, 2011. KTVB, "Otter Spars with Feds over Control of Lake Lowell."
- August 25, 2011. Fox News, "Taking Liberties: Birds Vs. Boaters."
- October 20, 2011. Idaho Public Television, "The People's Land."
- October 25, 2011. KTVB, "Updated Conservation Plan for Deer Flat Refuge Released."
- February 2, 2012. Western Canyon Chronicle, "Jan 24th Presentation: Status of Wildlife Conservation Rulemaking for Lake Lowell."
- March 10, 2012. Idaho Press-Tribune, "Lake Lowell Focus of Joint Memorial."
- March 18, 2012. Idaho Press-Tribune, "Canyon County Sheriff Candidates Discuss Lake Lowell, Jail at Forum."

H.1.3.7 Planning Updates

- July 15, 2010. Planning Update 1 was mailed to individuals on the CCP mailing list and adjacent landowners. Copies of the planning update were also available at the Visitor Center and made available at outreach events. Adjacent landowners in Malheur County were accidentally left off of the initial mailing. They received Planning Update 1 and Planning Update 2 in December. This planning update let the public know of the Refuge's intent to begin a planning process, provided an overview of the CCP process, and requested public comment.
- November 29, 2010. Planning Update 2 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of comments received during the summer scoping period.
- May 27, 2011. Planning Update 3 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of preliminary draft alternatives and requested public comment.
- October 25, 2011. Planning Update 4 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of comments received after the release of the preliminary draft alternatives and explained some of the changes that would be made based on those comments.

H.1.3.8 Other Tools

- The Refuge website featured CCP information, Refuge fact sheets, frequently asked questions, and comment forms.
- CCP information flyers and outreach "business cards" were placed in over 40 local businesses.
- CCP informational "half sheets" and/or outreach "business cards" were handed out at every presentation and outreach event and were passed out during field outreach.
- Refuge and CCP fact sheets were created and made available at presentations and outreach events, and in the Visitor Center.
- The Refuge created CCP messages that played on the Headquarters/Visitor Center phone lines if someone was put on hold or called after business hours.
- Participated in Senator Crapo's press conference at the Lower Dam Recreation Area on August 14, 2010.
- Article in the Southwest Idaho Birders Association July newsletter
- Article in the Idaho Bass Federation Nation spring newsletter
- Article in the Deer Flat NWR Volunteer newsletter

H.1.3.9 Federal Register Notices

- July 15, 2010. Federal Register published notice of intent to prepare a CCP/EIS and a request for comments.

H.1.3.10 Field Reviews

- June 16-19, 2008. Wildlife and Habitat Management Field Review on Refuge. Approximately 30 participants.
- September 9-11, 2008. Public Uses Field Review on Refuge. Approximately 25 participants.

H.2 Summary of Responses

More than 900 comments were received between the release of the Notice of Intent and Planning Update 1 and the release of the preliminary draft alternatives and Planning Update 3. And over 300 comments were received after the preliminary draft alternatives and Planning Update 3 were released to the public. These comments described concerns and provided suggestions for managing the Refuge. Comments were received by mail, email, phone, in person, and by fax. In addition to these comments, two petitions signed by a total of 669 people were received, as well as two form letters sent/signed by an additional 93 people.

Comment Delivery Types	
Email	870
Comment card	132
Letter	169
Meeting	5
Phone	31
Petition	2
Form letter	2

The majority of comments were received from Idaho; however, comments were also received from Arizona, California, Michigan, Nevada New Jersey, Vermont, Washington, and Wyoming. Each idea formulated in a comment was categorized into a theme and subtheme. Some comments included thoughts on several different topics, which were each categorized into their own theme and subtheme. Thoughts contained within comments fell into 29 themes and 68 subthemes; the number of individual ideas received within each theme is presented in Table 1. To view a list of categorized comments, please visit the Deer Flat Planning website at http://www.fws.gov/deerflat/refugeplanning.html.

H.3 Comment Content Summaries

H.3.1 Alternatives

Comments were received that supported or opposed the different alternatives. The ideas and concerns addressed by these comments are summarized under each individual theme below.

H.3.2 Refuge Access

H.3.2.1 Gotts Point

Comments received both requested that Gotts Point be reopened and pointed out the positive aspects to having the area closed to vehicles. Comments voiced concern that anglers are not physically able to walk to the point, requested access to Gotts Point for wind sports, asked for better disabled access, asked for improved law enforcement, and requested that the area be closed at night if it is reopened. Reasons for keeping Gotts Point closed included the reduction of trash and vandalism. Gotts Point was referred to as a favorite fishing spot, the best shoreline fishing spot, and a good spot for bank fishing. It was difficult to discern whether some of the commenters knew that Gotts Point is currently open to walkers.

H.3.2.2 Refuge Access

These comments included the desire for closed areas to be open, better access to the water's edge with stairs on every beach, and keeping gates open as much as possible.

H.3.2.3 Trails

Trails in new areas (including a trail around the entire lake), improved paths to the lake providing easier access for human-powered boats, and use of fire breaks as trails were suggested in some of the submitted comments. Some comments proposed the use of paths for walking, bicycling, horseback riding, and running, while others asked for jogging, dog-walking, and horseback riding to be restricted to roads. Some comments also suggested wildlife-dependent and nonwildlife-dependent uses be allowed on separate trails and that the trails be used to increase education. A bicycle trail around the entire Refuge was also suggested. The new trail proposals found in the action alternatives received mixed reviews. Comments were received that thought the boardwalk was both a good idea and overly ambitious, while only positive feedback was received about the trail in Murphy's Neck. There was also a request for a trail from Parking Lot 5.

H.3.3 Planning Process

Comments included discussion of priority and non-priority recreation definitions, the quality of scientific information, requests for extension of the comment period, and approval of the planning process.

H.3.4 Wildlife-dependent Recreation

H.3.4.1 Environmental Education

Most of these comments expressed support for environmental education. Some comments stated that recreational activities give them the opportunity to help their families learn about the environment. There was also support for the educational programs provided by the Refuge.

H.3.4.2 Fishing

In general, the comments expressed support for maintaining fishing opportunities on the Refuge. Comments involving access suggested more docks, more shoreline fishing access, easier access to shoreline fishing, and continuation of wading access. Concern was raised that fishing access would be reduced under some of the alternatives through an increase in closed areas and no-wake zones. A reduction of carp in Lake Lowell was requested by a few commenters. The Refuge received comments that both opposed and applauded the proposal of lead-free fishing tackle and barbless hooks. The Refuge also received comments that both requested the continuation of bass tournaments and asked for their removal.

H.3.4.3 Hunting

The Refuge received comments that opposed hunting on the Refuge, as well as comments that were in favor of maintaining or expanding hunting. The comments that opposed hunting on the Refuge cited the safety of nonhunters, disturbance to birds, and a belief that hunting should not be allowed on refuges as some of the reasons for this view. The comments requesting an expansion in the Refuge hunt were variable and included deer hunting, predator hunting, squirrel hunting, and goose hunting at Lake Lowell and turkey hunting on the Snake River Islands Unit.

Comments suggested specific hunting changes, including preventing sky busting and overcrowding, instituting a 25-shell daily limit per hunter, restricting the number of hunters in each access point, restricting waterfowl hunting to three to four days a week on Federal and State-owned waters, reopening of gates if ice thaws before the end of hunting season, and prohibition of electronic calling and decoys on Lake Lowell. And, there were some comments addressing Refuge-proposed hunting changes including not instituting a 25-shell daily limit per hunter and some disagreement over the creation of a permit system. Comments addressed the re-alignment of the hunt areas under the action alternatives (Alternatives 2 to 4). Comments against the re-alignment of the hunt areas stated that there has been no conflict between waterfowl and upland hunters to date, and a reduction in huntable area accessed by shore and re-alignment could increase crowding. If there is a conflict between different types of hunters, as was also stated, it was proposed that it be resolved by separation in time, instead of space. Comments also stated that upland hunting is better on the south side of the lake than in the Eastside Recreation Area.

There were several different ideas concerning deer hunting on the Refuge, including not hunting deer, providing a youth hunt, providing an archery season, hunting deer only if it is necessary for habitat management, and hunting deer to reduce depredation on neighboring lands.

H.3.4.4 Wildlife Observation

Comments discussed the enjoyment that people get from viewing the wildlife and landscapes of the Refuge and requested additional webcams.

H.3.5 Other Recreation

H.3.5.1 Boating

Comments requested that the Refuge continue to have boating and referenced recreational boating as a mode for fishing. There was concern that removing boating could negatively impact the economy of the surrounding area. The comments focusing on additional opportunities included the general request for more boating opportunities as well as the removal of the on-water curfew, the ability to use the canal for nonmotorized boats, and crew training and racing on the lake. Opening rentals for row boats, kayaks, and other nonmotorized watercraft was another idea provided to the Refuge.

H.3.5.2 Motorized Boating

Comments received covered the spectrum from continuing to allow motorized boating with no restrictions to removing all motorized boating from the lake. Some comments suggested that motorized boating should not be changed in any way from the status quo, while others mentioned limitations to boating, including hours of use, motor size, months of use, increased no-wake zone, speed limits, allowing boating in the West Pool only, lake zoning, emissions requirements, shorter boating season, limits on numbers, use of only electric motors, and an enforced decibel level. Some comments voiced the opposite view—they did not want horsepower limits, time restrictions, or seasonal restrictions. Some other ideas that were received in response to the proposed alternatives included a wave elimination device or staggered dike system along the shoreline, limits on speed, smaller no-wake zones, a larger no-wake zone in the East Pool than that in the status quo, seasonal closures only around nesting sites and sensitive areas, permanent no-wake zones adjacent to emergent vegetation, the use of electric motors in sensitive areas, allowing water sports only (no fishing) in the West Pool, reduction or elimination of power boats, allowing nonmotorized boats on the lake year-round, and prohibiting two-stroke motors. It was also suggested that boating as a mode of transportation for sport fishing be managed separately from other types of boating. The elimination of personal water craft, sport boating, motorized boats, and/or large boats from some or all of the lake were also proposed. The Refuge also received comments that thought the wildlife populations and recreational boating current co-exist, while others felt that some motorized boating activities are not compatible with enhancing wildlife. Comments raised the concern that restricting high-speed boating to the West Pool may increase safety issues.

Comments were received that expressed an understanding of the need to protect habitats and wildlife, and reduce negative effects to wildlife-dependent users. Some thought the proposed alternatives met this need, some thought the restrictions on boating did not go far enough, and others thought that the restrictions proposed in Alternative 3 were too drastic.

Some of the questions that were raised included: Is the impact of wakes important when the lake is subject to high wind events and do high-speed boats affect grebes if they are not in or very near the smartweed?

H.3.5.3 Nonmotorized Boating

Comments varied from suggestions to allow only nonmotorized boats on the lake to not allowing anyone but high-speed users in the West Pool. Comments also provided these additional thoughts: increase sailing regattas, nonmotorized vessels have little or no effect on wildlife, open the lake to nonmotorized boating year-round, no-wake zones make nonmotorized use more enjoyable, provide secure canoe racks and a canoe launch, allow nonmotorized craft along the shoreline east of Parking Lot 1 (at least after July 1), allow rowing team races, and allow wind sports from Gotts Point, the Upper Dam boat launch, or Parking Lot 3.

H.3.5.4 Other Non-priority Public Uses

Some comments were received that asked the Refuge to remain a multiuse facility, not to close the Refuge to recreational uses, to reclassify the Refuge as a Recreation Area, to maintain its public uses in their current state, to allow swimming (including expanded swimming areas), dogs, horses, and/or bicycles, to allow new uses like kite flying, trapping, and remote control vehicle access, to allow lake use year-round, and to allow cross-country team practice. Other comments advocated for on-trail only use during nesting season, increased restrictions such as elimination of motors, radios, and cell phones, and the removal/banning of dogs, trapping, and some other uses all together. Some concerns addressed in comments included the economic impacts of any changes, the increased impacts to other reservoirs, lack of water for launching boats in the West Pool, and potential reduction in the ability for families to spend time together. Other comments suggested that proposed changes would negatively impact the local community. Some comments proposed that wildlife and humans are co-existing currently, that a human-made reservoir cannot be a national wildlife refuge, and that user access should be based on money spent in the community. Others thought that since Lake Lowell is part of a national wildlife refuge, it should be managed better for wildlife or only for wildlife and irrigation. Some comments questioned how dogs, bikes, or horses could be more disturbing than motor boats.

Some ideas on how to provide for wildlife, wildlife-dependent recreation, and nonwildlife-dependent recreational uses included implementation of no-wake zones, seasonal closures, partitioning uses, and implementation of a permit based on completion of an environmental education program. The Refuge heard both positive and negative comments about fee implementation.

There seemed to be some confusion over the uses allowed under the action alternatives, as some commenters were concerned that all recreational uses would be removed from Lake Lowell.

H.3.6 Habitat Management

H.3.6.1 Grain Farming

These comments wanted to see wildlife-friendly crops planted on the Refuge. Reasons given were to provide a wildlife food source, provide areas for sportsmen to hunt, and take over areas that are currently weeds. There was a question asked about future crop management and meeting wildlife goals.

H.3.6.2 Off-refuge Issues

Comments suggested that future development around the Refuge be restricted and proposed the use of a buffer zone adjacent to the Refuge's boundary. Concern was voiced over the loss of wildlife feeding habitat adjacent to both units of the Refuge.

H.3.6.3 Predator Management

Comments voiced concern over the predation levels on the Snake River Islands Unit, requested a predator management plan involving public participation, and requested access to the Refuge at night for predator control.

H.3.6.4 Water Issues

Comments showed concern over reduced water quality due to agricultural return flows and gas-powered motors, invasive aquatic species, and the use of herbicides; proposed water quality testing; and discussed the need to improve the water quality of Lake Lowell. There were also comments that showed concern over the preservation of water rights and how water levels, both in Lake Lowell and in the Snake River, affect wildlife.

H.3.6.5 Wildlife/Habitat Management

Comments discussed the need to manage noxious and invasive weeds on both Refuge units. The use of goats, prescribed fire, and cattle were some of the suggestions offered to provide weed control. It was also suggested that desirable nonnative plants be used for management along with native plants.

The comments regarding wildlife and habitat management were varied. They ranged from positive comments about Refuge wildlife to the sentiment that the Refuge has been neglected for several years. Suggestions for habitat management included removal of dead trees and brush, creation of pheasant habitat, planting trees for eventual timber harvest, use of prescribed fire, increasing cattle grazing, wildfire suppression and rehabilitation of burned areas, planting of "wildlife friendly" plants, and keeping Lake Lowell full in the fall. Some comments that were received questioned the amount of impact that uses have had on wildlife and pointed out the need for data collection on many topics.

H.3.7 Refuge Administration

H.3.7.1 Refuge Administration

Comments concerning Refuge administration ranged from positive comments about Refuge management and requests that the Refuge be managed as a wildlife refuge (wildlife first), to comments that pointed out a general lack of management, voiced general opposition to the Federal government, and requested that the Refuge be removed from its ownership. There seemed to be some confusion over current and past ownership of Lake Lowell, with some comments assuming that involvement in the area by the Federal government was a recent occurrence. Some comments wanted to remind the Refuge that the lake was created for irrigation, while others questioned the jurisdiction of the Refuge to manage public uses or mistakenly thought that the lake had a recreation purpose. Other comments pointed out the importance of local research and data collection, requested

additional land acquisition, and questioned where funding would come from for any additional administration.

H.3.8 General Visitor Experience

H.3.8.1 Visitor Experience

These comments expressed visitors' enjoyment of the Refuge because it is a place to recreate close to home and mostly reflected a positive visitor experience.

H.3.8.2 Visitor Facilities

Comments requested more parking, overnight facilities, better maintained bathrooms and dumpsters, better boat ramps, and better facilities for the disabled public. Some comments expressed a positive view of Refuge facilities.

H.3.8.3 Visitor Services

These comments included approval of the visitor center and requests for more welcome and orientation information.

H.3.9 Other

H.3.9.1 Collaboration

These comments focused on partnering with Canyon County, local colleges, and other non-profit organizations to patrol and clean up the Refuge.

H.3.9.2 Law Enforcement

These comments asked for more enforcement of hunting, vandalism, littering, fighting and public drunkenness, underage drinking, and night use laws and regulations. There was also concern raised over the ability to enforce the proposed no-wake zones, permit program for hunting, hunting safety zones, off-leash dogs, and other rules. Hiring additional law enforcement, security patrols, agreements with other law enforcement agencies, and gates that close at dark were suggested as solutions. The question of jurisdiction over fishing regulations and recreational activities was also raised.

H.3.9.3 Miscellaneous

These comments included an overall observation of wildlife and habitat of the Refuge, support for the local mosquito abatement district, and a request to have the lake open one month earlier and close one month later.

H.3.9.4 Public Safety and Health

Comments pointed out concerns over littering, dumping, and *Escherichia coli*; the need for an emergency phone or life guard at the swimming areas; and concerns over interactions with dogs. There were also requests to ban alcohol at the Refuge and to clean up the Refuge to keep fires to a minimum.

H.4 Major Issues

H.4.1 Issues Within the Scope of the CCP/EIS

The following major issues were identified from the comments received. These are not the only issues addressed in the CCP, but represent some of the larger, more complex questions that are examined.

Threats to Refuge Resources: What actions should the Service take to reduce threats to Refuge wildlife and habitats such as human disturbance to wildlife, invasive species, global climate change, and degradation of water quality? Many of these threats are much larger in scope than just the Refuge. They will be addressed at various scales depending on available information and what is most appropriate and relevant to the Refuge.

Habitat Restoration: What wildlife species and habitats should be the focus of Refuge management?

Wildlife: What can be done to reduce disturbance to feeding, nesting, and resting areas used by wildlife?

Research: What kind of surveys and studies will the Refuge need to inform future management?

Public Uses: What uses are compatible and appropriate at Deer Flat National Wildlife Refuge? How can the Refuge provide the best wildlife-dependent recreational opportunities possible without negatively impacting wildlife or Refuge habitat? Which nonwildlife-dependent uses can the Refuge provide without negatively impacting wildlife-dependent users, wildlife, or Refuge habitat? What should the Service do to enhance public enjoyment, understanding, appreciation, and stewardship of Refuge resources? What can the Refuge do to improve the safety and quality of Refuge hunt programs?

Refuge Administration: What partnerships can be formed to increase public awareness of the Refuge, management of public use programs, and management of Refuge habitat and wildlife resources? How can the Refuge provide increased safety for Refuge visitors and enforcement of Refuge regulations? Should the Refuge institute a fee to fund increased facility management, public use programming, and/or law enforcement?

Facilities: What structures and facilities are needed for Refuge administration and to improve public use opportunities, and are there opportunities to remove other structures to enhance habitat conditions?

H.4.2 Issues Outside the Scope of the CCP/EIS

The issues listed below were found to be outside the scope of the CCP/EIS.

Deer Hunting: A new Lake Lowell Unit deer hunt was addressed in a recent environmental assessment (USFWS 2011a) and hunt package. The hunt was approved in September 2012 and began in October 2012. Because impacts of the Lake Lowell deer hunt were so recently assessed, the Lake Lowell deer hunt is outside of the scope of the CCP.

Development: Development that reduces habitat, impacts wildlife, or increases pollution outside of the Refuge borders could impact the wildlife and habitats of the Refuge. The CCP may discuss partnering with local entities to identify areas of concern for future development, but the Refuge will not be attempting to restrict or direct future county or city development within the CCP. Managing development outside the Refuge's boundary is within the management control of city and county governments, not within the management control of the USFWS.

Fisheries Management: Service policy requires us to develop a fisheries management plan. The plan will be developed in close coordination with IDFG.

Lake Lowell water levels: The Refuge received comments expressing concern that using the water in Lake Lowell to meet biological goals and objectives would reduce the amount of water available to local irrigators. The Refuge is an overlay refuge on a Reclamation reservoir, and Reclamation has primary jurisdiction over the manipulation of water levels of Lake Lowell. The executive order that established Deer Flat NWR states the Refuge does not have the legal authority to manipulate water levels.

Reclamation Zone Activities: The Reclamation Zones are located to the west of the Lower Dam and to the north of the Upper Dam. These areas are within the boundary of the Refuge but are legally managed by Reclamation. Management of all activities in these areas is outside the scope of the CCP.

Refuge Boundary: No modifications to the Refuge boundary were considered or are proposed in this Draft CCP/EIS. Individual boundary issues are researched as issues arise.

Restructuring of Priority and Nonpriority Recreational Activities: Because the concept of priority/nonpriority and wildlife-dependent/nonwildlife-dependent activities are found in the National Wildlife Refuge System Administration Act of 1966, as amended, and are a matter of law, making changes to these categories is not within the scope of the CCP.

Snake River boating: The Snake River is considered navigable waters and is not managed by the Service. This issue is not within the jurisdiction of Deer Flat NWR, and therefore it is outside the scope of the CCP.

Snake River Water Flows: Water levels in both the Snake River and Lake Lowell are outside the management control of the USFWS.

Water Quality Control: Although water quality is extremely important to the health of the wildlife and habitats of Deer Flat NWR, many of the forces influencing water quality are not within the management control of the USFWS. Refuge staff may partner with other agencies to create solutions to the water quality problem and assist in implementation of the total maximum daily load plan proposed by the Department of Environmental Quality.

Appendix I. Refuge Establishment History

- February 25, 1909, President Theodore Roosevelt signed Executive Order (E.O.) 1032 establishing several reservoir sites in the western United States, including the Deer Flat Reservoir, "as preserves and breeding grounds for native birds," subject to Bureau of Reclamation (Reclamation) uses and any other existing rights. The E.O. also states, "It is unlawful for any person to hunt, trap, capture, willfully disturb or kill any bird of any kind whatever, or take the eggs of such birds within the limits of these reservations, except under such rules and regulations as may be prescribed by the Secretary of Agriculture."

- January 12, 1937, Migratory Bird Conservation Commission (MBCC) Memorandum Number 13, "Snake River Migratory Waterfowl Refuge, Canyon and Owyhee Counties, Idaho," stated in the History section: "This unit embraces a group of islands in the Snake River. Its strategic location on that flyway and its proximity to the Deer Flat Reservation makes it an important refuge possibility. The islands within the proposed refuge limits fall in three legal classifications: natural islands surveyed by the General Land Office prior to 1890 when Idaho became a state; natural islands not survey by the General Land Office and therefore public domain; islands formed since 1890, titles to which are vested in Idaho. The purpose is to purchase some 640 acres of privately owned and State owned islands, and obtain jurisdiction over the public lands through E.O. Then arrange with the Idaho State Fish and Game Commission to close a portion of the adjacent river as a sanctuary…."

- July 12, 1937, President Franklin D. Roosevelt issued E.O. 7655 "Establishing Deer Flat Migratory Waterfowl Refuge, Idaho," revoking and superseding E.O. 1032. E.O. 7655 states "to effectuate further the purposes of the Migratory Bird Conservation Act (45 Stat. 1222), it is ordered that all lands owned or controlled by the United States within the following described area comprising 10,252.76 acres, more or less, in Canyon County, Idaho, be, and they are hereby, reserved and set apart for the use of the Department of Agriculture, subject to existing valid rights, as a refuge and breeding ground for migratory birds and other wildlife: Provided, that any private lands within the area described shall become a part of the refuge hereby established upon the acquisition of title thereto or lease thereof by the United States … Most of the above-described lands have been withdrawn for use in connection with the Deer Flat Reclamation Project and are primarily under the jurisdiction of the Department of the Interior; and the reservation herein made of such lands shall be subject to the use thereof by the said Department for reclamation work and incidental purposes.

- Executive Order No. 1032 of February 25, 1909, in so far as it reserved certain lands within a reservoir site in Idaho as the Deer Flat Bird Reservation, as modified, is hereby revoked. This refuge shall be known as the Deer Flat Migratory Waterfowl Refuge" (Federal Register, Volume 2, Number 135, Page 1454, July 15, 1937).

- August 17, 1937, President Franklin D. Roosevelt issued E.O. 7691 "Establishing the Snake River Migratory Waterfowl Refuge, Idaho": "to effectuate further the purposes of the Migratory Bird Conservation Act (45 Stat. 1222), it is ordered that all islands in the Snake River within the exterior limits of the following described area, owned or controlled by the United States, or of which the United States has the use for migratory bird refuge purposes, be, and they are hereby, withdrawn from settlement, location, sale, or entry, and reserved and set apart, subject to valid existing rights, for the use of the Department of Agriculture as a

refuge and breeding ground for migratory birds and other wildlife; *Provided,* that upon the acquisition of title to or lease of any privately-owned island by the United States, or upon the termination of any private right to or appropriation of any public-land island within the area, or upon the acquisition of control by the United States of any island within area, in any other manner, such islands shall be reserved and become part of the refuge….

- This refuge shall be known as the Snake River Migratory Waterfowl Refuge."

- July 27, 1940, Presidential Proclamation No. 2416 (54 Stat. 2720) changed the name of the "Deer Flat Migratory Waterfowl Refuge" to the "Deer Flat National Wildlife Refuge" and changed the name of the "Snake River Migratory Waterfowl Refuge" to the "Snake River National Wildlife Refuge."

- February 20, 1951, MBCC Memorandum Number 9 *Deer Flat National Wildlife Refuge, Canyon County, Idaho*, gave purchase approval for 74.34 acres (Tract 5 for 61 acres from J.B. De Motto and Tract 8 for 13.34 acres, with an easement for electric power line from G.M. Jenkins).

- MBCC Memorandum Number 9 also stated, "The Deer Flat Refuge is an important link in the system of national wildlife refuges in the Pacific Flyway. It is primarily a resting and feeding ground for ducks and geese and a considerable number of geese winter on the area. This refuge will be of even greater importance if proposed power impoundments on the Snake River are completed. Such impoundments will eliminate many small islands in the Snake River that are presently serving as feeding areas for waterfowl. The primary need on this refuge is additional land areas that can be planted to food for waterfowl. There is presented for consideration at this time two tracts of land that can be developed for feeding purposes"

- December 2, 1953, as mitigation for wildlife losses resulting from construction of the C.J. Strike Reservoir, the Idaho Power Company purchased and donated Dilly Island (21.26 acres) to the Service (November 22, 1971, Region 1 Realty Supervisor's memo and January 27, 1964, Service memo to the files).

- January 26, 1955, Public Land Order (PLO) 1060 "Reserving Certain Public Lands As Addition to Deer Flat National Wildlife Refuge" stated "Subject to valid existing rights, the following described public lands in Canyon County, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining but not the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge" (adding 280 acres to the Refuge).

- February 15, 1955, MBCC Memorandum Number 8, "Deer Flat National Wildlife Refuge, Canyon County, Idaho," gave purchase approval for Tract 51 (80 acres) from M.H. Leavitt, Canyon County, Idaho. Exceptions were rights-of-way for ditches, tunnels, telephone and power lines, and mineral rights in the State of Idaho. The option for purchase provided for the conveyance of 15 water shares in the Nampa and Meridian Irrigation District, which is sufficient to irrigate 15 acres of land.

- MBCC Memorandum Number 8 stated, "The Deer Flat Refuge is an important link in the system of national wildlife refuges in the Pacific Flyway, and is one of the principal wintering grounds for mallard and Canada geese in that flyway. Between 500,000 and 800,000 ducks and geese winter on this refuge each year. It is the terminus of a distinct flight from the prairie provinces of Canada. The Irrigation District which operates the reservoir draws down the water heavily in the early summer, and a considerable acreage of flats is exposed for the growth of smartweed and the important dwarfish "tealgrass," both of which are of great appeal to geese and other waterfowl as food. Under the refuge management program, the Fish and Wildlife Service has reclaimed substantial part so these flats of a dense, smothering growth of willows which formerly covered the area. The construction of dams on the Snake and other rivers in this area for flood and power purposes has drawn increased numbers of waterfowl to this vicinity, and has created the problem of providing additional food to take care of the flocks and to prevent crop depredation. Also, there is a pressing need for additional marshlands that can be developed and used for nesting purposes…There is presented for consideration at this time a tract of land located immediately east of the existing refuge. This tract consists of both marsh and agricultural land, and its acquisition will increase the effectiveness of the refuge."

- October 21, 1955, PLO 1239 added one tract of 10.25 acres to the refuge stating, "The lands are withdrawn for reclamation purposes by Departmental orders of December 22, 1903 and February 7, 1906."

- March 7, 1958, PLO 1597 "Reserving Lands for Use of the U.S. Fish and Wildlife Service in Connection with Deer Flat National Wildlife Refuge" added 120 acres to the Refuge: "1. Subject to valid existing rights and the provisions of existing withdrawals, the following described public lands in Idaho are hereby withdrawn from all forms of appropriation under public land laws, including the mining but not the mineral leasing laws, or the act of July 31, 1947 (61 Stat. 367: 30 U.S. Code [U.S.C.] 601-604) as amended, and reserved for use of the Service as an addition to the Deer Flat National Wildlife Refuge. 2. The Bureau of Land Management shall continue to administer and dispose of sand, gravel, and other road building material in the NE ¼, SW ¼, Section 26, pursuant to the act of July 31, 1937, supra subject to such provisions as it shall prescribe to insure that the surface of the lands be restored as nearly as possible to their original condition. 3. This order shall take precedence over but shall not otherwise affect the Department Order of April 2, 1935, establishing Grazing District No. 1."

- April 8, 1963, PLO 3016 "Addition to Deer Flat National Wildlife Refuge" added 26 islands to the refuge (264.41 acres, including a small portion of McCrea Island) on the Idaho side of the Snake River between Homedale and Farewell Bend. "Subject to valid existing rights, all islands owned by the United States within the exterior limits of the following described areas in the Snake River, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws, and reserved for use of the Bureau of Sport Fisheries and Wildlife."

- April 26, 1963, PLO 3047 added 32 acres to the Lake Lowell Unit of the refuge.

- June 28, 1963, PLO 3110, "Abolishment of Snake River National Wildlife Refuge; Transfer of Lands to Deer Flat National Wildlife Refuge," stated "The Snake River National Wildlife

Refuge, heretofore established by E.O. 7691…is hereby abolished, and the lands now comprising the said refuge are transferred to and consolidated with the Deer Flat National Wildlife Refuge. The lands consist of islands in the Snake River and are located within the following described areas…."

- July 31, 1963, PLO 3168, "Withdrawing Public Lands for Use of the Bureau of Sport Fisheries and Wildlife, an Addition to the Deer Flat National Wildlife Refuge," added 11 islands in Idaho and part of a twelfth (159.53 acres) on the Oregon side of the Snake River between Homedale and Farewell Bend. The PLO stated, "1. Subject to valid existing rights, all islands owned by the United States within the exterior limits of the following described areas in the Snake River, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws, and reserved for use of [the Service]…2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R. [Code of Federal Regulations], but shall be subordinate to the use of the lands for wildlife purposes."

- , but shall be subordinate to the use of the lands for wildlife purposes."

- June 3, 1965, PLO 3661, "Partial Revocation of the Executive Order No. 7655 (Deer Flat National Wildlife Refuge)," added approximately 0.93 acres to the Lake Lowell Unit of the Refuge, stating "The land is acquired."

- February 12, 1968, PLO 4366, "Addition to Deer Flat National Wildlife Refuge," added Fields Island (2.91 acres) to the Refuge, located in both Idaho and Oregon. "1. Subject to valid existing rights, the following described lands, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws (30 U.S.C., Ch. 2), but not from leasing under the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge… 2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R.

- May 28, 1968, PLO 4425, "Addition to Deer Flat National Wildlife Refuge," added 16.9 acres to the Snake River Islands Unit of the Refuge. "1. Subject to valid existing rights, the following described lands, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws (30 U.S.C., Ch. 2), but not from leasing under the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge…. 2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R., but shall be subordinate to the use of the lands for wildlife purposes."

- November 20, 1968, the Bureau of Sport Fisheries and Wildlife signed a memorandum of understanding (MOU) with the City of Marsing, Idaho, allowing the city use of Marsing Island as a park and recreation area; on February 23, 1972, the Bureau reported the island as excess property to the General Services Administration (GSA) and on May 11, 1972, the MOU between the Bureau and the City of Marsing was terminated. On June 21, 1972,

Marsing Island was assigned to the Reclamation by GSA and later deeded to the City of Marsing.

- October 24, 1975, PLO 5545 added 175 acres to the Lake Lowell Unit of the refuge, stating, "Except for any private lands which may be involved, the lands described in paragraph 1. above remain withdrawn from all forms of appropriation under the public land laws, including the mining laws, for the Payette-Boise Reclamation Project."

- On June 26, 2002, a lawsuit with the State of Idaho regarding ownership of islands in the Snake River was settled. The State of Idaho had filed suit on September 15, 1997, claiming title to islands and portions of islands that were part of the Snake River Island Unit of the Refuge. The suit was based on the State's contention that these islands were formed after statehood (July 4, 1890) and, therefore, belonged to the State. The State laid claim to 63 of the islands that were part of the Refuge at the time. In 1936, certain islands in the Snake River had been identified as under Federal or State ownership by Idaho and Service personnel, ownership determinations that were not founded on science. In its defense, the Service contracted various experts to gather data and refute the State's claim. Work was conducted on the geomorphology, soil, and location of the ordinary high water mark. Based on the findings of these scientific investigations, a settlement was negotiated, whereupon, a few islands previously identified as part of the Refuge became State property, and several islands previously thought to be State property became part of the Refuge.

Document continues on next page.

Appendix J. Contributors

J.1 Core Planning Team

The core planning team consists of persons responsible for the preparation and completion of the CCP/EIS. They are the primary strategists, analysts, and writers. To avoid scheduling and logistical conflicts, the core team has a limited number of participants. This CCP is the result of extensive, collaborative, and enthusiastic efforts by the members of the core planning team below.

Name	Title	Organization
Jennifer Brown-Scott	Refuge Manager, Deer Flat NWR	FWS
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Carl Mitchell	Former Wildlife Biologist, Southeast Idaho Refuges Complex	FWS
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J.2 Internal Extended Planning Team and Reviewers

In addition to the core planning team, the following FWS staff participated on the extended team. Extended team members provided technical expertise, assisted with data collection, and/or reviewed and provided feedback during drafting of the CCP/EIS.

Name	Title	Organization
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Name	Title	Organization
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Mike Gregg	Wildlife Biologist	FWS
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Nick Valentine	Archaeologist/Museum Specialist, Region 1	FWS
Robin West	Regional Chief, NWRS, Region 1	FWS

J.3 External Extended Planning Team and Reviewers

In addition to the core planning team, the following external subject-matter experts participated on the extended team. Extended team members provided technical expertise, assisted with data collection, and reviewed and provided feedback during drafting of the CCP/EIS.

Name	Title	Organization
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Vern Case	Director, Riverside Irrigation	Board of Idaho Water Users

Name	Title	Organization
	District and Chairman	Association
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David Dahms	Boating Program Manager	Idaho Department of Parks and Recreation
Wendy Davis	Recreation Program Supervisor	Nampa Parks and Recreation
Paul Deveau	Project Manager	Boise Project Board of Control
Jeff Dillon	Regional Fishery Manager	IDFG
Greg Humphreys	Environmental Protection Specialist	Federal Highways Administration
Darrin Johnson	Director	Nampa Parks and Recreation
Ben Keyes	Lieutenant, Marine Patrol Section	Canyon County Sheriff's Office
Lynne Koontz	Economist	USGS
Joe Kozfkay	Fisheries Biologist	IDFG
Susan Law	Alternative Transportation Planner	Federal Highways Administration
Philip Milburn	Wildlife Biologist	ODFW
Steve Nadeau	Regional Wildlife Manager	IDFG
Tim Page	Assistant Project Manager	Boise Project Board of Control
Jake Powell	Wildlife Biologist	IDFG
Scott Reinecker	Southwest Regional Manager	IDFG
Deb Root	Planner	Canyon County Development Services
Natalie Sexton	Wildlife Biologist (Human Dimensions)	USGS
Rick Ward	Environmental Staff Biologist	IDFG
Craig Wiedmeier	Licensing Supervisor	IDFG

J.4 Involved in Pre-Planning Meetings and Not on Extended Team

The following people participated in wildlife and habitat and/or public use reviews during preplanning and did not subsequently participate on the extended team.

Name	Title	Organization
Paul Bicak	Former Marine Patrol	Canyon County Sheriff's Office
Tom Bicak	Director	Canyon County Parks, Recreation, and Waterways
Jim Budolfson	Retired	Reclamation
Greg Burak	Environmental Staff Biologist	IDFG
Ed Burnett	Director	Canyon County Mosquito Abatement District
A.J. Church	Former Staff	Office of Senator Mike Crapo

Name	Title	Organization
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Bruce Haak	Non-game Wildlife Biologist	IDFG
Dennis Hardy	Recreational Maintenance Foreman	IDFG
David Hopper	Fish and Wildlife Biologist, Snake River Fish and Wildlife Office	FWS
Matt How	Visitor Services and Communication, Region 1	FWS
Steve Humphries	Biologist	Ducks Unlimited
Lyndell Jackson	Former President	Friends of Deer Flat Wildlife Refuge
David Loper	Director, Environmental Health Services	Southwest District Health
Jim Martell	Director	Canyon County Weed and Gopher Control
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Lauri Monnot	Watershed Coordinator	IDEQ
Michael Morse	Contaminant Specialist, Snake River Fish and Wildlife Office	FWS
Andy Ogden	Wildlife Habitat Biologist	IDFG
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Lynnette Wilfling	Member	Friends of Deer Flat Wildlife Refuge
Bruce Zoellick	Fisheries Biologist	BLM

Appendix K. Fire Management Plan

Appendix K. Fire Management Plan

WILDLAND FIRE MANAGEMENT PLAN

DEER FLAT NATIONAL WILDLIFE REFUGE

2009

Prepared by: _____ 12/21/2009
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Submitted By: _____ 01/26/2010
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Pacific Region, U.S. Fish and Wildlife Service

Approved: _____ 3/15/10
FOR: Robyn Thorson, Regional Director — Date
Pacific Region, U.S. Fish and Wildlife Service

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1.0 Introduction

This plan is written as an operational guide for managing the wildland fire and prescribed fire programs at Deer Flat National Wildlife Refuge (Refuge) which includes two fire management units (FMU) the Lake Lowell FMU and the Snake River Islands (FMU). It defines levels of protection needed to ensure safety, protect facilities and resources, and to restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems.

The two FMUs were originally two separate wildlife refuges both serving as a refuge and breeding ground for migratory birds and other wildlife until becoming one in 1963. Habitat protection from wildland fire and the use of prescribed fire along with mechanical fuel reduction to manipulate habitat as outlined in this plan will be used to address the needs of wildlife to meet the resource goals and objectives for the refuge.

1.1 Purpose of the Fire Management Plan (FMP)

This plan is written to meet Department and Service requirements that every area with burnable vegetation must have an approved FMP. (620 DM 1.4) It enables the Refuge to meet a Service requirement that Refuges review and/or revise FMPs at a minimum of five-year intervals or when significant land use changes are proposed. (621 FW 2)

The goal of wildland fire management is to plan and implement actions that help accomplish the mission of the National Wildlife Refuge System, which is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Completion of an FMP enables Deer Flat National Wildlife Refuge to consider a full range of appropriate suppression strategies and to conduct prescribed fires; without it, prescribed fires cannot be conducted and only wildfire suppression strategies may be implemented.

This FMP identifies and integrates all wildland fire management and related activities. It defines a program to manage wildland fires and to assure that wildland fire management goals and components are coordinated.

1.2 General Description of Refuge

Deer Flat National Wildlife Refuge is located in Idaho's Treasure Valley along the southwest border of the city of Nampa. The refuge encompasses 11,860 acres in two units: Lake Lowell and the Snake River Islands. These units lie within two states (Idaho and Oregon) and five counties (Canyon, Payette, Owyhee, Washington in Idaho, and Malheur in Oregon). The Snake River Islands Unit, which includes over 100 islands, are spread over 113 miles of river. The islands range in size from less than an acre to over 50 acres, with total acreage of 1,220 acres. The Lake Lowell unit is an overlay of an off-stream Bureau of Reclamation irrigation project.

With the increase in population and the urban development of previously natural areas, the Refuge sees thousands of visitors each year seeking recreation opportunities. The refuge offers boating, fishing, and wildlife viewing among other activities. High visitor use coupled with the flashy fuels found on the Refuge, create added fire management concerns.

A map of the Refuge can be found in Appendix A of this document.

1.3 Significant Values to Protect

Key Critical Values to Protect

- The Refuge is adjacent to three federally listed Communities at Risk, (Nampa, Marsing, Caldwell).
- Air quality is a concern at the Refuge due to its location in the Treasure Valley, which is a non attainment area for ozone and pm.2.5 (Appendix A).
- Appropriate measures will be taken to protect sites with cultural significance during wildland fire suppression efforts. Prescribed fire mechanical fuels reduction planning will include a review of known sites that may be impacted.
- The Refuge stands as an important sanctuary for outdoor enthusiasts and hosts thousands of visitors every year who wish to pursue recreational opportunities such as boating, fishing, and wildlife viewing among other activities.
- Private property with homes and outbuildings surround the Refuge separated only by a road or fence. Refuge facilities and structures also lie scattered near grass and sagebrush fuels which could put them at risk in the event of a fire.
- The Refuge was designated to protect habitat for migratory birds along the Pacific Flyway. Much of the native habitats found on the Refuge are not fire tolerant. High intensity fires could result in the loss of important habitat for waterfowl, upland birds, and song birds.
- Eagle nesting/roosting areas along the lake need to be protected from unplanned wildfire.
- Water quality issues affecting Lake Lowell from any potential wildfire will be mitigated.

2.0 Policy, Land Management Planning, and Partnerships

2.1 Implementation of Fire Policy

Specific planning documents, legislation, organizations and associated policies provide guidance for fire management actions described in this FMP are summarized below.

2.1.1 Federal Interagency Wildland Fire Policy

This FMP implements these guiding principles of federal wildland fire policy:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the planning process. Federal agency land and resource management plans set the objectives for the use and desired future condition of the various public lands.
- Fire management plans, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.
- Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives,
- Fire management plans and activities are based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.

- Federal, State, tribal, local, interagency, and international coordination and cooperation are essential.
- Standardization of policies and procedures among federal agencies is an ongoing objective.

2.1.2 National Fire Plan

This FMP meets the policy and direction criteria in the 2001 National Fire Plan because it emphasizes the following primary goals of the 10 Year Comprehensive Strategy and Cohesive Strategy for Protecting People and Sustaining Natural Resources:

- Improving fire prevention and suppression.
- Reducing hazardous fuels.
- Restoring fire-adapted ecosystems.
- Promoting community assistance.

2.1.3 Department of the Interior (DOI) Fire Policy

This FMP incorporates and adheres to DOI policy stated in 620 DM 1 by giving full consideration to use of wildland fire as a natural process and tool during the land management planning process and by providing for the following:

- Wildland fires, whether on or adjacent to lands administered by the Department, which threaten life, improvements, or are determined to be a threat to natural and cultural resources or improvements under the Department's jurisdiction, will be considered emergencies and their suppression given priority over other Departmental programs.
- Bureaus shall cooperate in the development of interagency preparedness plans to ensure timely recognition of approaching critical wildland fire situations; to establish processes for analyzing situations and establishing priorities, and for implementing appropriate management responses to these situations.
- Bureaus will enforce rules and regulations concerning the unauthorized ignition of wildland fires, and aggressively pursue violations.

2.1.4 U.S. Fish and Wildlife Service Fire Policy

By addressing the range of potential wildland fire occurrences and including a full range of appropriate management responses, this FMP meets FWS wildland fire policy. It is consistent with the FWS Fire Management Handbook and the Interagency Standards for Fire and Fire Aviation Management Operations, which are supplemental policy.

This plan affirms these key elements of FWS fire policy (621 FW 1):

- Firefighter and public safety is the first priority of the wildland fire management program and all associated activities.
- Only trained and qualified leaders and agency administrators will be responsible for, and conduct, wildland fire management duties and operations.
- Trained and certified employees will participate in the wildland fire management program as the situation requires, and non-certified employees will provide needed support as necessary.

- Fire management planning, preparedness, wildfire, and prescribed fire operations, other hazardous fuel operations, monitoring, and research will be conducted on an interagency basis with involvement by all partners to the extent practicable.
- The responsible agency administrator has coordinated, reviewed, and approved this FMP to ensure consistency with approved land management plans, values to be protected, and natural and cultural resource management plans, and that it addresses public health issues related to smoke and air quality.
- Fire, as an ecological process, has been integrated into resource management plans and activities on a landscape scale, across agency boundaries, based upon the best available science.
- Wildland fire is used to meet identified resource management objectives and benefits when appropriate.
- Prescribed fire and other treatment types will be employed whenever they are the appropriate tool to reduce hazardous fuels and the associated risk of wildfire to human life, property, and cultural and natural resources and to manage our lands for habitats as mandated by statute, treaty, and other authorities.
- Appropriate management response will consider firefighter and public safety, cost effectiveness, values to protect, and natural and cultural resource objectives.
- Staff members will work with local cooperators and the public to prevent unauthorized ignition of wildfires on our lands.

2.1.5 Refuge Specific Fire Management Policy

A Comprehensive Conservation Plan has not been completed for the Refuge. Under the National Environmental Policy Act, a categorical exclusion has been prepared and can be found in Appendix C. In compliance with the ESA, an Intra-Service Section 7 consultation was also completed and is on file at the refuge headquarters.

2.2 Land/Resource Management Policy

2.2.1 Land/Resource Planning Docurments

The Deer Flat National Wildlife Refuge operates under the direction of a land management plan that was created in 1995. The Refuge is in the initial planning stages of the Comprehensive Conservation Plan process.

2.2.2 Compliance with Regulatory Acts

Threatened and Endangered Species Compliance

A 2007 Intra-Service Section 7 Biological Evaluation for normal refuge operations including prescribed fire and mechanical fuels reduction projects has been signed by the Refuge Manager; copies are on file at the refuge headquarters.

Cultural Resource Compliance

In order to comply with National Historic Preservation Act of 1966 and Archeological Resources Preservation Act of 1979 regulations, a Request for Cultural Resource Compliance will be completed on a project by project basis and submitted to the regional office. The completed Cultural Resource Compliance documents are on file at refuge headquarters.

NEPA Compliance
A Categorical Exclusion for fire management operations (wildland fire suppression, prescribed fire, and mechanical fuels reduction) was signed by the Refuge Manager and is included in Appendix C of this document. This Categorical Exclusion will be reviewed annually.

2.3.1 Internal Partnerships
FWS Pacific Region Regional Office fire management program determined that all fire management operations in southern Idaho for FWS will be the responsibility of Zone Fire Management Officer currently stationed at the Southeast Idaho National Wildlife Refuge Complex office in Pocatello, Idaho.

Fire Prevention and Education Specialist
The U.S. Fish and Wildlife Service Pacific Northwest Region Refuges Fire Management group and the Branch of Fire Management have a memorandum of understanding (MOU) outlining the jointly funded fire management specialist position. The MOU outlines the responsibilities of both parties related to the position. For the region, the position works as the prevention and education specialist. The Refuge is designated as the official duty station and the Southwest Idaho National Wildlife Refuge Complex Fire Management Officer holds the supervisory responsibility for the position. The signed agreement is located in Appendix F of this plan.

2.3.2 External Partnerships
Deer Flat National Wildlife Refuge participates in multiple external partnerships related to fire management with federal, state, and local agencies and departments. The refuge enters into partnerships and official agreements when there is a mutual benefit to those involved.

BLM Agreement
Due to the lack of a dedicated fire crew stationed at the Refuge, Deer Flat NWR has entered into an intragovernmental agreement with the Boise District Bureau of Land Management. Under the agreement, located in Appendix F of this plan, the BLM will provide wildland fire suppression and dispatch services for lands located within the Refuge. This includes initial attack and preliminary fire investigation. The FWS will pay $2000 to the BLM annually to offset costs.

Local Fire Departments
The Fire Departments of Nampa, Caldwell, Marsing, and Upper Deer Flat border the Refuge and Refuge land falls within their fire protection districts. The Refuge staff is actively pursuing interagency agreements with these departments some of which have existing cooperative agreements with the Bureau of Land Management.

Fire Program Analysis Participation
Deer Flat NWR is a chartered member of the Southwest Idaho Wildland Fire Cooperative Fire Planning Unit formed to support and contribute to the development of landscape scale interagency fire planning and budgeting as directed by national fire policy and the Office of Business Management. Cooperating agencies in the fire planning unit are the Boise and Payette National Forests, Boise District Bureau of

Land Management, Idaho Department of Lands Southwest Idaho Supervisory Area, and Southern Idaho Timber Protective Association.

Idaho State Fire Plan Working Group

The Idaho State Fire Plan Working Group (ISFPWG) is a multi-agency collaborative body charged with assisting counties with their County Wildfire Protection Plans and their associated countywide working groups, dissemination of information, and oversight and prioritization of grant assistance programs in order to facilitate the implementation of the National Fire Plan in Idaho. The Regional Fire Outreach Coordinator housed at the Refuge represents the FWS as a part of this group. They participate in ISFPWG subcommittees as appropriate. Subcommittees include those focused on fire education, restoration, and communication to promote state-wide projects and emphasis items.

County Wildfire Protection Plan

Canyon County has developed a County Wildfire Protection Plan (CWPP) that identifies potential fuel reduction opportunities in the area. As part of Canyon County, Deer Flat NWR is mentioned in the plan. The CWPP is posted at this website Idaho Department of Lands CWPP.

Treasure Valley Fire Prevention and Safety Cooperative

Deer Flat NWR is an active member of the Treasure Valley Fire Prevention and Safety Cooperative partnering with the Boise National Forest, Boise District Bureau of Land Management, Idaho Department of Lands, State Fire Marshal's Office, and the city fire departments of Caldwell, Nampa, Meridian, and Boise. The mission of the Cooperative is to promote an interagency exchange of ideas and resources to deliver consistent messages to the public about fire education topics.

Bureau of Reclamation

A memorandum of understanding (MOU) exists between the Refuge and the Bureau of Reclamation (BOR) to outline joint responsibilities for the operation and management of the lands and waters within the Lake Lowell Fire Management Unit at the Refuge. This MOU can be found on file at the Refuge headquarters.

3.0 Fire Management Unit Characteristics

A fire management unit (FMU) is an area that shares common objectives, physiological/biological/social characteristics and constraints, that result in desired conditions as stated in land management plans (i.e., CCP, HMP), which set it apart from the characteristics of an adjacent FMU.

Considering fire history and occurrence the wildland fire program complexity at Deer Flat NWR is moderate. The CCP for Deer Flat NWR is currently under development and when completed will further define future desired conditions for the refuge. In the interim this FMP will identify the Lake Lowell area of the Refuge as one FMU and the Snake River Islands as the other FMU.

3.1 Area Wide Management Considerations

The following sections addresses management considerations for the FMUs including fire management objectives, constraints, fuels, fire regime and condition classes, standards, fire potential of major vegetation types, and burned area rehabilitation.

3.1.1 Management Goals, Objectives and Constraints from CCP's and other Planning Documents

The CCP process for Deer Flat NWR is currently in the planning/development phase; management goals and objectives were obtained from draft planning documents. The following general fire management goals and objectives have been developed by refuge staff and regional biologists in the interim.

To the extent practicable, use prescribed fire in conjunction with water management, grazing, mowing, and/or other mechanical manipulations and chemical applications, on emergent wetland, woody riparian, herbaceous upland and/or wet meadow vegetation, in order to provide desirable vegetation species composition and/or structure, including, but not limited to:

Goals

- Maintain and protect lacustrine habitats associated with Lake Lowell.
- Enhance, maintain, and protect riparian forest benefiting migratory birds and other riparian-dependent species.
- Enhance, maintain, and protect wetland habitats for the benefit of migratory birds and other wildlife.
- Enhance, maintain, and protect shrub steppe habitats characteristic of the area.
- Protect agricultural crop areas which provide support to migrating waterfowl and resident wildlife as well as providing fuel breaks.
- Gather scientific information (inventories, monitoring, research, and assessments) to support adaptive management decisions under objectives for Goals 1-6.

Objectives

- Use mechanical, physical, biological, and chemical means to eradicate, control or contain invasive plants, woody species, and shrubs such as Russian olive, salt cedar, and scotch thistle.
- Enhance, maintain, and protect riparian forests through use of prescribed fire, mechanical or chemical treatment.
- Enhance, maintain, and protect emergent wetlands through use of prescribed fire, mechanical or chemical treatment to result in 30-70 percent of a mosaic of desired native emergent vegetation including cattail, bulrushes, sedges, rushes, smartweeds, and wild millet to support a diverse assemblage of wetland-dependent wildlife and birds.
- Enhance, maintain, and protect shrub steppe through use of prescribed fire, mechanical or chemical treatment to create a mosaic of shrubs and herbaceous understory.
- Monitoring activities will be conducted to evaluate achievement of objectives for prescribed fire, mechanical or chemical treatments as appropriate.
- Rehabilitation of burned areas will take place to reduce the infestation of invasive species, to protect water quality, and to restore native sagebrush steppe habitat.

3.1.2 Management Goals, Objectives and Constraints from other Sources

The following operational standards are pertinent to the Refuge, as found in the FWS manual (095 FW 3):

- Manage fire suppression to minimize risks to firefighter and public safety.
- An initial action and an appropriate management response are required for every wildfire on or threatening refuge lands.

- The range of appropriate management responses to wildfires may include direct or indirect attack of high and/or low intensities or surveillance and monitoring to ensure fire spread will be limited to a designated area.
- Reduce and maintain fuels in WUI areas to provide for public and firefighter health and safety.
- Reduce and maintain fuels in non-WUI areas to provide for firefighter health and safety and to protect habitats critical to endangered species, migratory birds, and ecosystem integrity.
- Use prescribed fire as a tool to restore ecosystem integrity and endangered species habitat.
- Prepare and implement an effective fire prevention plan to minimize unwanted fires.
- Investigate all unplanned human-caused fires.
- Retardants and foams will not be used within 300 feet of any waterway.
- Minimize and, where necessary, mitigate human-induced impacts to resources, natural processes, or improvements attributable to wildland fire activities.
- Ground disturbed by suppression activities will be rehabilitated.
- Heavy equipment use will be closely monitored to minimize impacts on cultural resources.
- Heavy equipment use will be closely coordinated with the Refuge Manager or resource advisor to limit habitat damage. Due to soft ground conditions many areas of the refuge are unsuitable to heavy equipment usage.
- Prevent the further spread of invasive plants.
- Maintain close working relationship with interagency partners to accomplish wildland fire suppression and prescribed fire treatments.
- Maintain Intergovernmental Agreements with interagency partners for dispatch services.
- Promote public understanding of refuge fire management programs and objectives.

3.1.2.1 Cost Effectiveness

Maximizing the cost effectiveness of any fire operation is the responsibility of all involved, including those that authorize, direct, or implement those operations. Cost effectiveness is the most economical use of the resources necessary to accomplish project/incident objectives. Accomplishing these objectives safely and efficiently will not be sacrificed for the sole purpose of "cost saving". Care will be taken to ensure that expenditures are commensurate with values to be protected. Many factors outside of the biophysical environment may influence spending decisions, including those of the social, political, and economic realms. The following tools will be used to provide information to make the most cost effective decision possible:

- Employ state-of-the-art decision support tools
- Provide a clear description of Refuge objectives in this Fire management Plan to aid in alternative development
- Through cost-share agreements, distribute the decision process to all parties involved in wildland fire management

3.1.3 Common Characteristics of the Fire Management Units

Climate and Topography

The entire Refuge is influenced by its location in the Snake River Valley. Elevation at the visitor center is about 2,550 feet above sea level with an average rainfall between 8 and 11 inches. During the summer the climate is generally arid with little rainfall between May and October. Temperature extremes can range from minus 25 degrees to 110 degrees Fahrenheit. The growing season averages six months.

Winds tend to follow the orientation of the valleys with an occasional destructive wind blowing due to the passing of a cold front or thunderstorm.

The FMUs share similar topography with rolling sagebrush hills scattered along relative flat areas.

Deer Flat NWR Climate

	Spring	**Summer**	**Fall**
Average Max Temp (F)	65	91	66
Average Min Temp (F)	37	54	36
Average Mean Relative Humidity (%)	50	37	47
Average Min Relative Humidity (%)	26	17	26

Normal Fire Season

Due to the arid conditions of this area, fires can occur almost any month of the year. The majority of the fires have occurred during June to August time frame. Most fires are human-caused due to high visitor use.

Fire History

From 1997 to 2007 the Refuge has experienced 30 wildfires for a total of 320 acres. The majority and largest fires have occurred in the sagebrush steppe habitat with a few occurring in the dense riparian area next to Lake Lowell. The majority of all of the fires recorded on the Refuge have been human-caused. Fire frequency on the Refuge has ranged from 16 fires in one year (1977) to a gap of five years without a fire (from 1951 to 1956). See fire history spreadsheet in Appendix E.

Wildlife Species

The Refuge is a major waterfowl wintering area in southwest Idaho and eastern Oregon. In spring and summer, water is released from Lake Lowell to irrigate surrounding farm fields. This draw-down of the lake exposes mud flats that provide abundant habitat for shorebirds. The lake also produces a bumper crop of aquatic vegetation for birds to feed on, particularly smartweed. In fall, smartweed seeds provide a feast for migratory ducks heading south. In winter, Lake Lowell is home to as many as 150,000 ducks and 15,000 Canada geese, and to the many bald eagles and other raptors attracted to the bounty provided by the large flocks of waterfowl. The refuge also has marsh areas where the water is manipulated to provide feeding, nesting, and resting habitat for mallards, sora rails, yellow-headed blackbirds, and other wildlife.

Habitats surrounding the lake include riparian forest, shrub-steppe uplands, and crops. The riparian forest is predominantly cottonwood, peachleaf willow, and coyote willow. These forested areas provide food, nesting sites, and cover from predators for a variety of tree-dependent species, including a variety of song birds.

Sagebrush, rabbitbrush, and the bunchgrass Great Basin wild rye dominate the uplands near the lake and on the islands. Herbivores like rabbits, gophers, mule deer, and grasshoppers, feed on upland plants and rely on those plants for nesting sites and cover. Approximately 240 acres of refuge land is irrigated cropland managed to provide food and cover for wildlife.

Local farmers grow corn, beans, peas, wheat, and alfalfa. The farmers keep a share of the crop and leave the rest for wildlife. Pheasants, deer, quail and other wildlife feed and nest in these fields. In fall and

winter, local Canada geese, as well as migrant geese and other waterfowl from the north, harvest the abundant food available in refuge fields.

Other species occurring on the refuge include red-tailed hawks, northern harriers, American kestrels, great-horned owls, western screech owls, long-eared owls, and northern saw-whet owls Kestrels, screech owls, and saw-whet owls use wood duck nest boxes extensively for their nesting and winter roosting. The Refuge also has a resident mule deer population. Other refuge resident mammals include red fox, coyote, raccoon, badger, muskrat, fox squirrel, cottontail rabbit, and various small rodents. Beaver use the area along the New York Canal with numerous bank dens but the population is very small. On occasion river otters are sighted on the lake.

The 101 islands of the Snake River FMU are distributed along 113 river miles between the Canyon-Ada County line in Idaho and Farewell Bend in Oregon. The islands provide a variety of habitats, including areas dominated by grasses and sagebrush. The Snake River Islands provide an important nesting habitat for Canada geese, ducks, herons, shorebirds, gulls, cormorants, and various songbirds. The islands are open to public use with the exception of a closure from February 1 to May 31, to protect nesting birds.

No currently listed threatened or endangered species are known to inhabit the Refuge although rare and sensitive species such as Bald Eagles, utilize the refuge. These species can be especially sensitive to disturbance during their nesting seasons.

Water Quality

Migratory birds and the aquatic life that inhabit the Refuge rely on healthy water. Any use of fire suppression chemicals such as foam or fire retardant will comply with the standards outlined in Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations.

Water quality could also be affected by run-off and sediments which could result from an intense burn on a slope followed by precipitation.

Prescribed Fire & Mechanical History

Prescribed fires have not been conducted at the Refuge in the last 10 years due to concerns with smoke management, proximity to wildland urban interface, and the lack of fire personnel on site. However, 18 mechanical treatments for 1,002 acres have been completed at Deer Flat during the last decade on the Lake Lowell FMU (Appendix E). Treatments include mastication in riparian forests, Russian olive tree removal and chipping, and disking firelines. 11.5 miles of firelines are annually disked to reduce the potential risk of wildfire spreading off of the refuge. The disk lines have been tested during wildfire incidents in the past ten years and have been a key factor during suppression efforts. Mechanical and prescribed burn treatments have been proposed for the Snake River FMU although none have been completed.

Vegetation

The vegetation/habitat for the Refuges is described in the individual FMU characteristics with acreage and percentages. Vegetation types can be generally described as grasslands (FM 1/3), and shrub (FM 2/6), and forest (FM 8/10).

Fuel Model 1: Agricultural field.

Fuel Model 1: Grassland.

Fuel Model 1: Lacustrine emergent.

Fuel Model 2: Sagebrush and grass.

Fuel Model 3: Emergent.

Fuel Model 6: Sagebrush.

Fuel Model 6: Willow.

Fuel Model 10: Cottonwood forest.

Fire Behavior

Fire behavior outputs in the table below were from the BehavePlus 3.0.2 program. In this model, fires are assumed to be spreading as a series of steady state ignitions through uniform fuels under uniform weather conditions. Spread is also assumed to be from surface fire only. The fire behavior outputs are modeled to represent a potential summer fire (July/August). Weather data used in the modeling is 20 year data from the Boise South RAWS station (102601) located at the Boise Airport. Weather inputs to the BehavePlus runs: July, Temp 70-89, RH 11-38, 1-hr fuel moisture/FDFM 2/5%, 10-hr fuel moisture 7%, 100-hr fuel moisture 8%, live herbaceous moisture 78%, live woody moisture 79% wind speed 5/15 mph, time of day 1400, slope 0-5%.

Fire Behavior Outputs by NFFL Fuel Models

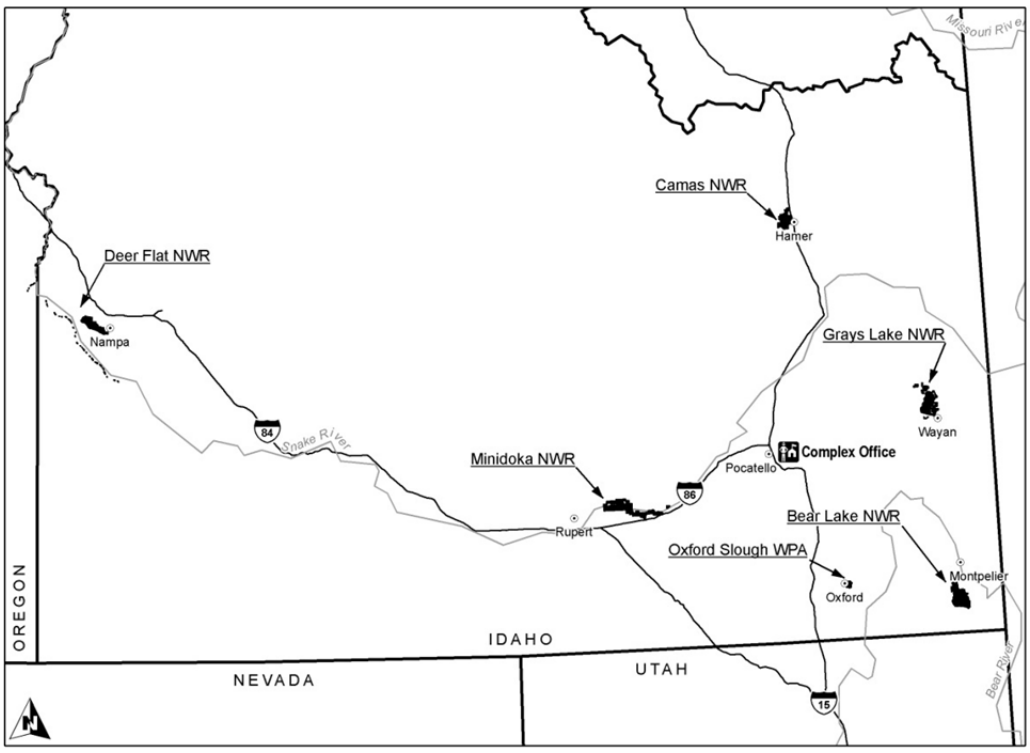
Fuel Model	Rate of Spread (ch/hr)	Flame Length (ft)
1	99-665	4-12
2	34-314	6-18
6	36-207	6-15
8	2-10	1-3
10	10-55	5-13

3.2 Fire Management Units

Fire Management Units (FMUs) are areas which have common wildland fire management objectives and strategies, are manageable units from a wildland fire standpoint, and can be based on natural or manmade fuel breaks. There are two FMUs at Deer Flat NWR.

Fire Management Units

FWS Fire Management Units within the FMP	Total Acres	Burnable Acres
Lake Lowell	10,548	5,039
Snake River Islands	1,220	1,220
Totals	11,768	6,259



3.2 Lake Lowell Fire Management Unit

3.2.1 Lake Lowell FMU Characteristics

Deer Flat National Wildlife Refuge was established in 1909 as a resting and breeding ground for migratory birds and other wildlife with an emphasis on wintering waterfowl. The Lake Lowell FMU is located in the state's largest metropolitan area, the Treasure Valley, which creates a complex situation for fire managers. This FMU lies entirely in Canyon County which has a rich history in farming and agricultural activities. In recent years, population and urbanization are increasing rapidly with agricultural areas being developed throughout the county. County managers anticipate an average annual increase in population of 5.5 percent over the next several years. Much of the Refuge is bordered by private property with homes and outbuildings directly adjacent to refuge land resulting in a wildland urban interface situation raising concerns about managing fire on the Refuge. The potential for a fire to burn off of the Refuge onto private property must be considered during all fire activities at Deer Flat NWR. Four fire departments have jurisdictional responsibility for this private land (AppendixA).

The habitats in the Lake Lowell FMU include wetlands (lacustrine and emergent), cottonwood and willow forests, shrub steppe uplands, and cultivated agricultural areas, (see table below).

Fuel Model Composition Lake Lowell FMU

Vegetation Type	Fuel Model	Acres	Percent
Cultivated Agricultural Land	FM 1	328	2.5%

Lacustrine, Emergent Wetland	FM 1	1,248	12%
Emergent Wetland	FM 3	43	.04%
Cottonwood Forest	FM 8/10	1,131	11%
Willow Forest	FM 6	1,152	11%
Shrub Wetland	FM 6	342	3.2%
Shrub steppe Upland	FM 6	762	7%
Lake Lowell open water		5,480	52%
Administrative sites		62	.05%
Total		**10,548**	100

3.2.2 Lake Lowell FMU Fire Environment

All fire operations in the Lake Lowell FMU must consider the wildland urban interface situation which exists. A thorough safety and risk management analysis must be completed to ensure firefighter and public safety.

With the number of visitors the Refuge gets annually, the presence of the public is almost certain during fire operations. The traffic and other considerations must be considered when making tactical decisions.

Mainly due to the invasion of non-native cheatgrass, the shrub steppe upland vegetation around the Refuge has a history of frequent, fast moving intense fires. The heavy down/dead fuel loading in the Cottonwood Forest surrounding Lake Lowell has posed control and mop-up problems during past wildfire incidents.

Along the shore of the lake, a band of debris or organic layer exists that can complicate mop-up efforts with long term smoldering requiring lots of water to extinguish. The band is affected by the level of the water in the lake. As the lake level goes up the layer of organic matter may be submerged. As the lake level goes down particularly in summer/fall when water levels are low, the band may require consideration.

3.2.3 Lake Lowell FMU Objectives and Constraints

- Due to concerns with the wildland urban interface situation around Lake Lowell, wildfires in this FMU will be aggressively suppressed.
- Hazardous fuels treatments will be applied where appropriate; mechanical treatments will be considered over prescribed burning to limit the smoke impacts to the valley.
- The waterfowl nesting season at the Refuge ranges from mid-April to late summer. Prescribed fire and mechanical fuel reduction treatments will not usually take place during this time to avoid disturbing nesting habitat.
- Downed and standing dead trees will be protected when feasible to provide nesting and foraging habitat for migratory birds.
- Firebreaks, disk lines, or native plant vegetated areas (greenbelts) will be created and/or maintained to mitigate the risk of wildfire moving into areas of concern such as the wildland urban interface or rare and sensitive habitats.
- Prescribed fire, mechanical treatment (disking, moving, etc.), or chemical treatment will be used to set back succession or to remove extensive emergent stands.

3.2.4 Lake Lowell FMU Values to Protect

- High priority will be given to any wildfire on the Refuge threatening private property. The Federally designated Community at Risk of Caldwell, Nampa, and Marsing are adjacent to the Refuge.
- Sagebrush/grassland habitats located on the north side of the Refuge.
- Sensitive areas of the Refuge are the riparian habitat along Lake Lowell.
- Cultural resource sites (documented at refuge headquarters).
- Refuge structures scattered along the north shore of the lake including refuge headquarters, residences, maintenance area, etc.

3.3.1 Snake River Island FMU Characteristics

The Snake River Islands FMU, which includes over 100 islands, is spread over 113 miles of river. The islands range in size from less than an acre to over 50 acres, with total acreage of 1,220 acres. Islands within the Snake River are the primary nesting area of southwest Idaho's "local/resident" Canada goose population. Geese nest on nearly all of the refuge islands.

A wide variety of raptors use the islands throughout the year including American kestrel, great horned owl, long-eared owl, northern harrier, osprey, screech owl, barn owl, saw-whet owl, prairie falcon, red-tailed hawk, and turkey vulture.

Islands in this FMU vary greatly in their vegetative cover. Islands at the upstream end are fairly open in the middle and are dominated by shrubs such as sagebrush and greasewood. Islands in the downstream section are more heavily vegetated with some large stands of cottonwood with an open grassy middle. All of the islands have some willow invasion along their edge depending upon the amount of river washing. Russian olive is also an aggressive invader on many of the islands. A vegetation acreage break down for this FMU is not available, vegetation/fuel models present include FM 1,2,6,8.

3.3.2 Snake River Island FMU Fire Environment

Access to and from any fire operation on one of the Snake River Islands will have to be made by boat or helicopter which could slow response time or make determining a safety zone before approaching the fire critical.

Consideration must also be given to the proximity to the mainland and expected fire behavior. In one known case, a fire has spotted from one of the islands to the mainland near Marsing. Historically, the shore has been sparsely populated with private structures, but development has increased and the number of homes has increased creating more concern should a fire ignite.

3.3.3 Snake River Islands FMU Objectives and Constraints

- The full range of appropriate management response (AMR) will be considered to any unplanned ignition; however, due to island being surrounded by water and access problems the suppression strategy typically will be a limited perimeter control strategy. A more aggressive strategy will be used if the fire spots off the island onto the shore and poses a threat to values to protect.
- Use prescribed fire, mechanical, and/or chemical manipulation to enhance habitat where appropriate.
- Any mechanical or prescribed fire treatment completed will have to be followed up with chemical treatments to limit the spread of invasive vegetation.

- The waterfowl and raptor nesting season at the refuges ranges from mid-April to late summer. Prescribed fire and mechanical fuel reduction treatments will not usually take place during this time to avoid disturbing nesting habitat.
- Downed and standing dead trees will be protected when feasible to provide nesting and foraging habitat for migratory birds.

3.3.4 Snake River Islands FMU Values to Protect

- Habitat for water fowl nesting.
- River bank private property.

4.0 Wildland Fire Operational Guidance

The procedures used to *implement* the fire management plan (FMP) for Deer Flat NWR are covered in this section. Information pertaining to this management is either directly provided or references are cited as to where it may be located.

USF&WS wildland fire management policy states that every wildland fire will be assessed following a decision support process that examines the full range of appropriate management responses (AMR).

This policy also provides that wildland fires may be managed for one or more objectives based on land and resource management plan direction. When two or more wildland fires burn together they will be managed as a single wildland fire and may also be managed for one or more objectives based on land and resource management plan direction as an event moves across the landscape and fuels and weather conditions change.

As stated before, the purpose of fire suppression is to put the fire out in a safe, effective, and efficient manner. Fires are easier and less expensive to suppress when they are contained to small areas on the Complex. Thus, the following procedures will be followed for all wildland fires to ensure optimum resource protection and firefighter safety.

4.1.1 Appropriate Management Response

Evaluation and selection of an appropriate management response to a wildfire will include:

- Consideration of risks to public and firefighter safety.
- Threats to the values to protect.
- Costs of various mitigation strategies and tactics.
- Potential resource benefits.

Wildfires will be staffed or monitored during active burning periods as needed to ensure that appropriate mitigation actions can be made to protect values threatened.

All wildfires will be supervised by a qualified incident commander (IC) whose responsibility is to:

- Assess the fire situation and make a report to dispatch as soon as possible.
- Use guidance in this FMP or a delegation of Authority to determine and implement an appropriate management response.
- Determine organization, resource needs, strategy and tactics.

- Brief incoming and assigned resources on the organization, strategy and tactics, weather and fire behavior, LCES (lookouts, communication, escape routes, and safety zones) and radio frequencies.
- Order resources needed for the AMR through the designated dispatch office.
- Manage the incident until relieved or the incident is under control.

The FMP and a Delegation of Authority can provide a general strategy to an IC, who has discretion to select and implement appropriate tactics within the limits described for the FMU(s), including when and where to use minimum impact suppression tactics (MIST) unless otherwise specified. All resources, including mutual aid resources, will report to the IC (in person or by radio) and receive an assignment prior to tactical deployment.

Critical protection areas, such as refuge headquarters, neighboring residences and ranches, and adjacent private croplands, will receive priority consideration in fire control planning efforts. In all cases, the primary concerns of fire suppression personnel shall be the safety, and if needed, all individuals not involved in the suppression effort may be evacuated.

General AMR Constraints

- Close proximity to private property and residences, (WUI and Communities at Risk).
- Lack of a cultural resource inventory. Limited cultural resource surveys have been completed at the refuge, (completed surveys are on file at the refuge office).
- Soft ground/moist-soil conditions which preclude the use of conventional fire equipment.
- Tracts of continuous vegetation, lack of adequate fire/fuel breaks, and lack of interior and boundary refuge roads.

Interagency Operations

As mentioned in 2.3.2 the Refuge coordinates with the BLM in fire management operations. The Refuge coordinates with this agency for dispatch services through Boise Interagency Logistics Center. Any wildfire AMR actions would be coordinated through the appropriate dispatch centers with neighboring federal agencies.

4.1.2 Preparedness

Deer Flat NWR is not funded for a dedicated fire crew. The Regional Fire Education Specialist is currently stationed at the refuge ½ time and may be available to coordinate initial attack activities. The FWS has an Intragovernmental agreement with Boise BLM for initial attack fire response. The SE Idaho NWRC FMO and Deer Flat NWR Project Leader will meet with federal and local cooperators (BLM and Nampa Fire Department) annually prior to fire season, to review the respective agreements. This may include contact information and fire suppression policies and procedures.

The normal fire season for the refuge was discussed in section 3.1.3; prior to and during fire season the following tasks will be implemented and completed.

- The Complex FMO will work with the Refuge Project Leader to update Delegations of Authority with suppression constraints.
- Fire qualified personnel work with the Complex FMO to schedule annual medical examinations prior to the start of fire season.

- Fire qualified personnel will complete fitness testing, complete the annual refresher, and are issued full personal protective equipment (PPE) prior to the start of fire season.
- Prior to fire season the Refuge step-up plan will be reviewed by the Complex FMO and the Refuge Project Leader; the plan will be implemented during fire season according to daily fire weather forecasts.

Annual Refuge Fire Readiness Activities

Activities – Complete before end of month	J	F	M	A	M	J	J	A	S	O	N	D
Update Interagency Fire Agreements/AOP's		*x*										
Winterize Fire Management Equipment										*x*		
Inventory Fire Engine and Cache			*x*									
Update Delegation of Authority			*x*									
Annual Fire Physical		*x*										
Annual Refresher Training			*x*									
Annual Fitness Testing			*x*									
Review and Update Fire Management Plan				*x*								

Supplies and Equipment

Deer Flat NWR maintains a small fire cache at the shop for use on fires including tools, nomex, pumps, and water handling equipment. Prior to the fire season all refuge fire suppression equipment will be inspected to determine readiness. All equipment will be brought to a duty ready status. Equipment will be checked to ensure the refuge has enough gear to meet the normal unit strength requirements.

Communications

The Refuge utilizes BLM communications systems, including repeaters and radio frequencies for fire operations. The FWS has a radio frequency use MOU with the Idaho State BLM which is included in Appendix F. Canyon County Fire Radio Frequencies are included in Appendix G.

4.1.3 Detection

The fire detection system relies on reports of fires by the public, law enforcement agencies and refuge staff. Regardless of how any fires are discovered they need to be reported to the Refuge Project Leader, Complex FMO, and Boise Dispatch (384-3400) immediately so suppression actions can be started without delay. Information for fire size-up/information to be provided to Boise Dispatch Center can be found in the Initial Attack Size Up document in Appendix G.

4.1.4 Dispatch, Initial Response, and Initial Attack

The Refuge is a cooperator in the response area for the Boise Dispatch Center. Mobilization of fire resources to and from the Refuge is handled through Boise Dispatch.

As stated above (Appendix F), the Boise District Bureau of Land Management will provide primary initial attack services for Deer Flat NWR. Initial attack shall include a determination of fire cause. The Project Leader will coordinate with Boise Dispatch for the need for further fire investigation. The Zone Law Enforcement Officer will also be informed of any suspected human-caused fire.

All fire communications will operate on the assigned frequencies located in Appendix F.

Upon discovery of a fire, all subsequent actions will be based on the following:

- The Project Leader or designee will provide the IC with a Delegation of Authority.
- The Incident Commander (IC) will locate, size-up, and coordinate suppression actions. The IC will start the Incident Organizer to document actions, fire behavior and weather conditions.
- Provide for firefighter and public safety.
- Considering the current and predicted fire conditions, the IC will assess the need for additional suppression resources and estimate the final size of the fire. The potential for spread outside of the refuge should be predicted, as well as the total suppression force required to initiate effective containment action at the beginning of each burning period.
- The IC will assess the need for law enforcement personnel for traffic control, investigations, evacuations, etc. and make the request to the dispatch center.
- Document decisions in the Incident Organizer and provide the FMO a copy after the incident is out.
- Should a wildland fire move into an extended attack the IC will coordinate with the Refuge staff and Boise Dispatch Center to complete a Wildland Fire Decision Support System

4.1.5 Extended Attack and Large Fire Management

The Wildland Fire Decision Support System (WFDSS) process will be used when a wildfire escapes initial attack. The refuge staff will request assistance from the Regional Office fire management staff or BLM partners to prepare the analysis.

Extended attack fires will be managed in accordance with the Interagency Standards for Fire and Aviation Operations (Redbook).

4.1.6 Aviation Operations

Aircraft may be used in all phases of fire management operations. All aircraft must be National Business Center Aviation Management Directorate or Forest Service approved. Air operations at Deer Flat NWR will be coordinated through Boise Dispatch Center and must adhere to all DOI aviation policy.

4.1.7 Reviews and Investigations

Reviews and investigations are used by wildland fire and aviation managers to assess and improve the effectiveness and safety of organizational operations. Brief descriptions of various reviews and associated procedures and requirements, including those for serious wildland fire accidents, entrapments, and fire trespass are listed in the corresponding Red Book chapter.

Incident Commanders and Single Resource Bosses will ensure After Action Reviews (AAR) take place in a timely manner and that any significant issues are brought to the attention of the Complex FMO and Refuge Project Leader.

4.1.9 Reports

The Complex FMO or designee will complete and file an Individual Fire Report (DI-1202) in the FWS Fire Management Information System (FMIS) for the following types of fires within 10 days of a fire being declared out:

- All wildfires on FWS and FWS-protected lands.

- Wildfires threatening our lands on which we take action.
- All escaped prescribed fires. When a fire exceeds and cannot be brought back into prescription, it will be declared a wildfire. A separate new report will be filed to report acres burned by the wildfire from the time of declaration to the time of being declared out.
- All false alarms responded to by Refuge fire staff.

4.2 Hazardous Fuels Management

All prescribed fire treatments on the Refuge will follow guidance outlined in the Interagency Standards for Fire and Fire Aviation Operations (chapter 17) and the Interagency Fire Planning and Implementation Procedures Reference Guide. See 3.1 for specific prescribed fire objectives.

4.2.1 Prescribed Fire program for Hazardous Fuels and Habitats

The overall objective in the use of prescribed fire in refuge resource management will be to reduce hazard fuels and to promote habitat diversity. Refuge staff will carefully analyze the needs of hazardous fuels reduction in each FMU in relation to habitat objectives on the refuge. Variables to be considered in each proposed treatment area include previous treatments, vegetation type, endangered species, and hazardous fuels reduction.

The prescribed fire program activities at the Refuge qualify as categorical exclusions consistent with Departmental NEPA regulations at 43 CFR 46.210, 43 CFR 46.205,and Departmental NEPA procedures at 516 DM 8.

4.2.1.1 Program Overview

Prescribed fire can be a useful tool for restoring and maintaining natural conditions and processes at the Refuge. Research burning may also be conducted when determined to be necessary for accomplishment of research project objectives. The goals of prescribed fire are for hazard fuel reduction and to meet resource management objectives. Specific management needs for the Refuge will be determined annually by the Refuge staff and Complex FMO. Burn objectives, fire frequency rotation, firing methodology, and prescriptions will vary from year to year. Burn plans will be updated to reflect any variations. The Refuge Project Leader will approve prescribed fire plans after review of the plan by the Complex FMO.

Due to the proximity to the wildland urban interface and smoke concerns, no prescribed fire treatments have been implemented at the Refuge in the last 10 years. Prescribed fire can be a viable habitat treatment tool for the refuge if smoke and WUI issues are properly mitigated.

The prescribed burn window for the Refuge is generally late-fall to early-Spring. This can depend on the loading and type of vegetation being burned. Detailed prescribed burn plans will be developed for each planned treatment which will address fuel loading, weather conditions, adjacent properties, and potential smoke concerns. Specific FMU hazardous fuels objectives and history is described in chapter 3.

Some specific objectives for the Refuge program include:

- Conduct a vigorous hazardous fuels reduction program with the highest professional and technological standards
- Identify the hazardous fuels reduction method most appropriate to specific situations and areas
- Efficiently accomplish resource management objectives through the application of prescribed fire, mechanical, and chemical fuel reduction methods

- Continually evaluate the hazardous fuels reduction program to better meet program goals by refining prescriptions treatments and monitoring methods, and by integrating applicable technical and scientific advancements

4.2.1.2 Effect of National and Regional Preparedness Levels

Prescribed fires may be ignited during National Preparedness Level 4 or 5 as specified in the National Interagency Mobilization Guide. The normal prescribed burn window for the Refuge is early spring and late fall; national and regional preparedness levels are low at this time of year.

4.2.1.3 Project Planning

The FMO will coordinate with the Project Leader to identify high priority fuels treatment projects. All prescribed fire treatments on the Refuge will follow guidance outlined in the Interagency Fire Planning and Implementation Procedures Reference Guide.

All prescribed fires will have prescribed burn plans. The prescribed burn plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. The required burn plan elements are outlined in the Interagency Fire Planning and Implementation Procedures Reference Guide and will be included in all Refuge burn plans.

The Prescribed Fire Plan Preparer will conduct a field reconnaissance of the proposed burn location with the Project Leader to discuss objectives, special concerns, and gather all necessary information to write the burn plan.

Every Prescribed Fire Plan must receive a technical review. The Technical Reviewer and Prescribed Fire Plan Preparer must be qualified or have been previously qualified as a Prescribed Fire Burn Boss at an experience level equal to or higher than the complexity being reviewed. The Technical Reviewer must be someone other than the primary preparer of the plan. An off-unit technical review is encouraged to provide an additional independent perspective. It is acceptable for other specialists to review certain portions of the plan however; a primary Technical Reviewer must be designated as technical review signatory. Either the Prescribed Fire Plan Preparer or Technical Reviewer must be currently qualified, less physical fitness requirement.

The Project Leader has final approval authority for all Prescribed Fire Plans, unless special circumstances warrant higher review and concurrence (such as may occur during higher Preparedness Levels or for extremely large, complex projects). Although the Project Leader has final approval authority for the Prescribed Fire Plan and the "GO/NO-GO" checklist, the Prescribed Fire Burn Boss has the responsibility to make the on-site tactical decisions to safely complete the project. The Prescribed Fire Burn Boss ensures that all prescription, staffing, equipment, and other plan specifications are met before, during, and after the prescribed fire.

4.2.1.4 Project Implementation

Execution of prescribed burns will only be undertaken by qualified personnel. The Prescribed Burn Boss will fill all required positions to conduct the burn with qualified personnel. All personnel listed in the burn plan must be available for the duration of the burn or the burn will not be initiated.

Weather information from the National Weather Service, RAWS station, and other local weather stations will be monitored by the burn boss the week before planned ignition to determine if suitable conditions exist for project completion. A spot weather forecast will be requested, (via the internet) from the Boise NWS office for each day of planned ignition. The burn boss or designee will monitor onsite weather every ½ hour during unit ignition.

When all prescription criteria are within the acceptable range, the Prescribed Burn Boss will select an ignition time based on current and predicted weather forecasts. The Burn Boss will
Ensure that the Agency Administrator GO/NO-GO Checklist is valid and complete and sign the Prescribed Fire GO/NO-GO Checklist the morning of planned ignition.

A thorough briefing will be given by the Prescribed Burn Boss and specific assignments and placement of personnel will be discussed, (using briefing outline in Prescribed Fire Plan). A spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if all elements are still within the approved ranges. If all prescription elements are met, a test fire will be ignited to determine on-site fire behavior conditions as affected by current weather. If conditions are not satisfactory, the test fire will be suppressed and the burn will be rescheduled. If conditions are satisfactory the burn will continue as planned.

A prescribed fire must be declared a wildfire by those identified in the burn plan when that person(s) determines that the contingency actions have failed or are likely to fail and cannot be mitigated. An escaped prescribed fire must be declared a wildfire when the fire has spread outside the project boundary, or is likely to do so, and cannot be contained by the end of the next burning period. A prescribed fire can be converted to a wildfire for reasons other than an escape. An appropriate management response will be made to such incidents and a formal analysis (WFDSS) undertaken when needed. The Project Leader will be notified of an escaped prescribed fire.

The public will be informed of upcoming planned prescribed fires through press releases in local newspapers. Neighbors to the refuge will be called and local law enforcement agencies and fire departments will be call and informed of the burn before planned ignition. Notification calls will be documented and saved in the Prescribed Plan file.

4.2.1.5 Smoke Management

The US Fish and Wildlife Service in south Idaho participates in the Montana/Idaho Airshed Group. The group members include all of the federal agencies, state land management agencies, and private forest products companies. The intent of the Airshed Group is to limit negative impacts from prescribed burns through scientific monitoring of weather conditions and formal coordination of burns.

Prior to the burn season the Fire Management Officer submits a list of planned burn projects to the Missoula Monitoring Unit via internet. This information creates a data base describing the type of burn, number of acres in each unit, and unit location and elevation. Each burn unit is assigned an identification number. The day before the planned ignition, the burn boss accesses the internet data base to submit a proposed prescribed burn for the following day. The program coordinator and a meteorologist provide timely restriction messages for airsheds with planned burning.

The Missoula Monitoring Unit issues daily decisions which can restrict burning when atmospheric conditions are not conducive to good smoke dispersion. Restrictions may be directed by airshed, elevation or by special impact zones around populated areas. The burn boss will access the daily decision

notice from the monitoring unit via the internet. Prescribed burn projects will not be conducted if the Missoula Monitoring Unit posts a burning restriction for the airshed in which the refuge is located.

Deer Flat NWR is located in the Treasure Valley which is a non-attainment area for air quality, (Ozone and PM 2.5). Any prescribed fire treatments conducted will take special consideration for the non-attainment area. Critical and other smoke sensitive areas will be addressed with more detail in each burn plan. See Non-Attainment Map in Appendix A.

4.2.1.6 After Action and Escaped Fire Reviews

The Burn Boss will ensure an informal After Action Review (AAR) is conducted for each operational period on a prescribed fire.

All prescribed fires declared a wildfire will have an investigative review initiated by the Project Leader. The level and scope of the review will be determined by policy and procedures of the Interagency Standards for Fire and Aviation Operations and the FWS Fire Management Handbook.

4.2.1.7 Reports

Burn plans will specify information to be included in a project file. The Burn Boss will ensure this information is provided to the Project Leader and/or Zone Fire Management Officer as specified. This includes documenting conditions and fire behavior during the prescribed fire to assess how well actual fire characteristics fit those predicted, documenting any unanticipated difficulties encountered during implementation, and assessing how well the fire accomplished the intended objectives.

The Burn Boss will complete an Individual Fire Report (DI-1202) with the Complex FMO, who will file an Individual Fire Report (DI-1202) electronically within 10 days of it being declared out. The Complex FMO or assistant will also complete a prescribed fire critique and FFI monitoring report within one month of project completion.

4.2.2 Non-Fire Hazardous Fuels Treatment Program

Non-fire treatment strategies are those that do not involve the use of prescribed fire to meet stated objectives. For the Refuge, mechanical and chemical treatment strategies are available as non-fire management tools. The following objectives for non-fire treatments of hazardous fuels at the Refuge include:

- Establish defensible space along wildland-urban interface boundary and around Refuge improvements and structures.
- Protect habitat from wildfire trespass.
- Restore early successional habitats to promote native species while minimizing invasive species encroachment.
- Maintain fuel loadings within natural ranges of variability for major vegetation types.
- Aid in control of invasive plants and weeds that contribute to the fuel hazard.

Any work requiring heavy equipment, such as mowing, hydro-axe work, fuel break construction, or vegetation removal, should be done with low ground-pressure vehicles to the extent possible when the site is dry enough to prevent damage to soils. Non-fire treatments may be restricted during the nesting season from mid May to early August in areas that provide important habitat for trust wildlife resources.

The Refuge has an active program of mowing and disking fire breaks along the refuge boundary. Fire breaks are mowed/disked generally in late spring to early summer, (see Appendix A for disk line map).

4.2.3 Process to Identify Hazardous Fuels Treatments

The development of prescribed fire and non-fire hazardous fuel management priorities will be an ongoing process determined annually between the refuge staff and Project Leader based on changing habitat conditions on the Refuge, changes in management objectives, and changes in management techniques or new information. The Complex FMO and Refuge staff will coordinate with federal and state partners and review existing County Wildfire Protection Plans (CWPP) when developing potential hazardous fuels treatments in WUI areas.

4.3 Emergency Stabilization and Rehabilitation

Emergency stabilization (ES) and burned area rehabilitation (BAR) are part of a holistic approach to addressing post wildfire issues which also includes suppression activity damage repair and long-term (>3 years) restoration.

ES is planned actions performed by burned area emergency response (BAER) teams within one year of wildfire containment to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources.

BAR is efforts undertaken within three years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire. The process concludes with long-term restoration.

The incident management team, local fire resources, or refuge staff begins the process by repairing suppression activity damage. These actions are charged to the fire suppression accounting code. Fire suppression activity damage rehabilitation involves short-term actions to repair and rehabilitate damage to lands, resources, and facilities caused by the wildland fire suppression effort or activities. This includes dozer lines, camps, and staging areas; damaged facilities (fences, buildings, bridges, etc.); handlines; roads; etc. The Project Leader should ensure this work is complete before incident demobilization, or as soon thereafter as possible or practicable. Damage caused by backfires and burnouts to stop fire spread falls under fire damage restoration and does not qualify as damage caused by suppression action.

The Project Leader will coordinate with the Incident Commander, Complex FMO, and Regional Office fire staff to determine if an ES or BAR plan is needed for a Wildland fire incident. The Project Leader will form an interdisciplinary team which could include fire and resource specialists to develop and write the ESR Plan. The ES or BAR plans must include provisions for monitoring and evaluation of treatments and techniques, and a procedure for collecting, archiving, and disseminating results. For multi-agency fires, we will do joint planning and implementation. Plans must ensure that the treatments proposed are environmentally, culturally, and socially acceptable, and comply with legal requirements. Each ES or BAR Plan will include a cost/risk analysis of proposed emergency rehabilitation treatment actions to assist agency administrators and reviewing authorities in assessing the proposed actions. The level and sophistication of the analysis should be commensurate with the scope and complexity of the plan.

ES plans should be submitted to the Regional Fire Management Coordinator (RFMC) within 7 calendar days of the wildfire containment. If additional time is needed, extensions may be negotiated with the (RFMC). BAR plans must be submitted before the end of the fiscal year in which the wildfire fire occurs.

Additional ES and BAR guidance may be found in the FWS Directives (095 FW3) and the Interagency Burned Area Emergency Response Guidebook.

4.4 Prevention, Mitigation, and Education

The fire education program for the Refuge will include fire prevention, mitigation, and information specific to the ecological aspects of fire and its interaction with refuge habitats. The program will be aimed at increasing public understanding of the complexities of the overall fire program and will seek to influence attitudes and behavior of adults and children. Attention will be given to social groups, elected officials, schools, and all other interested parties of any age.

Fire education messages will include how and why fire burns the way it does and the effects – both negative and positive – that fire has on plant, wildlife, and human populations. Focus will be given to the effect fuel, weather, and topography have on fire behavior clearly demonstrating the effect manipulation of fuels can have on the opportunity for a fire to burn through a given area.

All education efforts will be consistent with approved Service national and regional messaging. These efforts will be interagency when appropriate.

The fire prevention goal for the Refuge will be to prevent unwanted human-caused fires. High visitor use due to close proximity to large population areas increases the likelihood of careless human ignitions. Although campfires are not allowed on the Refuge, abandoned campfires are one of the concerns to be addressed in fire prevention efforts. Debris burning on neighboring private land, smoking, and fires ignited from vehicles also share some concern and will be addressed in conjunction with other agencies to protect human life and property, natural resources, and prevent damage to cultural resources or physical facilities.

During the typical fire season prevention efforts will be elevated commensurate with fire danger. Refuge employees must be kept informed about changes in the fire situation. Visitor contacts, signing, handouts and interpretive programs may be utilized to increase visitor and neighbor awareness of fire hazards. Due to lack of staffing on the Refuge, collaboration with interagency partners such as local fire departments, the Bureau of Land Management, the Forest Service, and the Idaho Department of Lands is critical for maintaining a fire prevention presence with the public. The Refuge will support interagency fire prevention efforts through use of severity funding, increased personnel presence, large scale campaigns, etc.

During periods of extreme or prolonged fire danger emergency restrictions regarding refuge operations or area closures may become necessary. Such restrictions will usually be consistent with those implemented by cooperators as outlined in the Southern Idaho Fire Restrictions and Closures Guide. The Complex FMO will recommend when such restrictions may be necessary. Closures will be authorized by the Project Leader in consultation with the Complex FMO.

The Refuge is bordered by private property which could be at risk to wildfire should one start on the refuge. Light fuels such as cheatgrass in some areas near private property elevate the risk of rapid fire spread. These areas will be addressed in (CWPP) and treated by chemical, mechanical or prescribed fire means as appropriate to reduce the risk. Refuge personnel will work with interagency partners to educate the community on fire mitigation techniques, consequences of doing or not doing the prescribed treatment, and issues related to any resulting smoke. A message of personal responsibility and Firewise principles will be included in any public contacts regarding fire mitigation.

Fire Investigation
Fire management personnel will attempt to locate and protect the probable point of origin and record pertinent information required to determine fire cause. They will be alert for possible evidence, protect the scene and report findings to the fireline supervisor.

Prompt and efficient investigation of all suspicious fires will be carried out. However, fire management personnel should not question suspects or pursue the fire investigation unless they are currently law enforcement commission qualified.

Personnel and services of other agencies may be utilized to investigate wildland fire arson or fire incidents involving structures. All fire investigations should follow the guidelines outlined in 4.1-2 of the Fire Management Handbook (2000).

For fires of suspicious origin the IC or Project Leader may request a Fire Investigator through Boise Dispatch.

Public Information and Education
Educating the public on the value of fire as a natural process and as an effective tool to reduce risk to communities and resources from wildfire is important to increasing public understanding and support for the fire management program. The Refuge will use the most appropriate and effective means to explain the overall fire and smoke management program as well as other mitigation techniques such as mechanical and chemical treatments. This may include supplemental handouts, signs, personal contacts, auto tour routes, or media releases. When possible, interpretive presentations will address the fire management program and explain the role of fire in the environment.

The public will be notified of planned prescribed burning in advance of any actions via news releases and direct phone contact to neighboring residences. The role of wildland fire and prescribed fire may be incorporated into presentations that are given to various user groups and visiting public.

5. Monitoring and Evaluation
Monitoring and evaluation are part of the Refuge fire management program. They provide the means by which Refuge personnel are able to determine if applicable sections of the fire management plan are being implemented as planned and if fire-related goals and objectives are being achieved.

5.1 Fire Management Plan

5.1.1 Annual Fire Management Plan Review
This FMP will be reviewed annually and updated as needed, upon local agency administrator approval. Revisions of FMPs with Regional review and concurrence are required every five years and following completion of a new (or significantly revised) CCP or habitat management plan.

5.1.2 Fire Management Plan Terminology
Terms in the FMP are defined in the National Wildfire Coordinating Group Glossary, located at http://www.nwcg.gov/pms/pubs/glossary. Any terms used not in the glossary are defined below.

5.2 Treatment Effectiveness

Basic monitoring to determine habitat response will generally use photo-points, which will be re-visited and photographed during subsequent seasons. Comparisons over time will aid in determining if burn objectives and resource objectives are being met. More complex monitoring efforts may be undertaken for research-related prescribed burns, or to answer questions about the effects of prescribed fire on specific wildlife or other habitat parameters. Such monitoring can require vegetation transects, breeding bird point counts, presence/absence of target species, etc. An excellent reference resource for monitoring procedures can be found within the Fire Monitoring Handbook, USDI, and National Park Service, 2007.

List of Appendices

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Appendix B: Refuge Staff Fire Contact List
Appendix C: Categorical Exclusion for Fire Management Operations
Appendix D: Deer Flat NWR Climate Charts and Graphs
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Appendices A-J are available at request from the Refuge.

Appendix K: Annual Updates

FWS REVIEW CHECKLIST (LONG FORM)
FOR
DEER FLAT NATIONAL WILDLIFE REFUGE
FIRE MANAGEMENT PLANS

Name of Plan Reviewed for Annual Update Process: Deer Flat National Wildlife Refuge	Review Date: 4/16/2012
Refuge or Unit Name (Include Complex if applicable): Deer Flat National Wildlife Refuge	
Fire Staff Reviewer(s) Name and Phone Number: Lance Roberts, 208-237-6615 ext.107	Fire Staff Reviewer(s) Signature (for review approval):
Refuge Reviewer(s) Name and Phone Number: Jennifer Brown-Scott, 208-467-9278	Refuge Reviewer(s) Signature (for review approval):
Amendment Completed and attached to Plan	Date:
Review information sent to Regional Office	Date:
Review date entered in Database (Regional Office)	Date:

Please review the Fire Management Plan (FMP) and complete the columns as follows: A check-mark in the "No Update" column means that this portion of your FMP has been reviewed and determined not to need an update; if a row requires an update (answering yes to the question (s)), check the "Update Needed" column and provide an explanation of the changes in the "Notes/Comments" section. This information will be included in the amendment (including chapter, section and comments) to be attached to the plan annually following the review. Be sure to adequately describe the changes so they are easily understandable to the outside reader. Put an N/A in the "No Update" column for lines that do not pertain to your refuge/unit to make it easier for future reviewers to complete the annual review process.

If the reviewers determine that the changes are substantial and the original intent of the document is compromised, then a revision of the document should be completed. The review discussion between the line officer and the fire staff may support that conclusion but the responsibility for making this decision rests with the unit line officer.

If the reviewers determine that the changes are substantial and the original intent of the document is compromised, then a revision of the document should be completed. This responsibility for making this decision rests at the Unit Line Officer level.

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
		Chapter 1. Introduction			
X		1.1	Purpose of the Fire Management Plan		
X		1.2	General Description Of Refuge		
X		1.3	Significant values to Protect		
		Chapter 2. Policy, Land Management Planning, and Partnerships			
		2.1	**Fire Policy**		
X		2.1.1	Federal Interagency Policy change?		
X			• Terminology changes?		
X		2.1.3	DOI policy change? (e.g., Departmental manuals).		
X		2.1.4	Service policy change?		
X		2.1.5	Regional/unit-specific policy change?		
		2.2	**Land/Resource Management Planning**		
		2.2.1	Planning Documents:		
X			• Does Habitat Management Plan (HMP) align with FMP at unit? Is it being revised? Does management wan HMP and FMP revisions to take place simultaneously?		
X			• Is the Comprehensive Conservation Plan (CCP) currently being developed? Revised?	CCP date:	
			• Others: (list) •		
X		**2.2.2**	Environmental Compliance – are your compliance documents up to date in the following areas?		
X			• National Environmental Policy Act (NEPA)	What type? Categorical Exclusion	
X			• Endangered Species Act (ESA)	Date of consultation:	
X			• National Historic Preservation Act (NHPA)		
X			• Archaeological Resources Protection Act (ARPA)		
			• Others: (list) •		
		2.3	**Partnerships**		
		2.3.1	Internal Partnerships changes? (Use spaces below to add new partnerships)		
	X		• Fire Prevention and Education Specialist	This position is no longer filled.	
			•		
		2.3.2	External Partnerships changes?		
	X		• Boise BLM fire assistance agreement	New Intergovernmental agreement signed and 2012 Annual Operating Plan attached	
	X		• Local Fire Departments	The refuge has a Cooperative Fire Protection Agreement with the Nampa Fire Department	
	X		• Idaho State Fire Plan Working Group	The Fire Prevention and Education Specialist is vacant and will not be filled, no FWS representation currently on this group.	
	X		• Treasure Valley Fire Protection and Safety Cooperative	The Fire Prevention and Education Specialist is vacant and will not be filled, no FWS representation currently on this group.	
		Chapter 3. Fire Management Unit Characteristics			
		3.1	**FMP-wide Management Considerations**		

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
X		3.1.1	Management Goals, Objectives and Constraints from CCPs and other planning documents.		
X		3.1.2	Management Goals, Objectives, and Constraints from other Sources.		
X		3.1.3	Common Characteristics of the FMUs		
			•		
		3.2	**Fire Management Units**		
X		3.2.1	Lake Lowell FMU Characteristics		
X		3.2.2	Lake Lowell FMU Fire Environment		
X		3.2.3	Lake Lowell FMU Objectives and Constraints		
X		3.2.4	Lake Lowell FMU Values to Protect		
X		3.3.1	Snake River Island FMU Characteristics		
X		3.3.2	Snake River Island FMU Fire Environment		
X		3.3.3	Snake River Island FMU Objectives and Constraints		
X		3.3.4	Snake River Island FMU Values to Protect		
		Chapter 4. Wildland Fire Operational Guidance			
		4.1	**Management of Unplanned Ignitions**		
X		4.1.1	Appropriate Management Response		
	X	4.1.2	Preparedness	The Fire Prevention and Education Specialist is vacant and will not be filled, currently no fire qualified personnel are stationed at the Refuge.	
X		4.1.3	Fire Detection		
X		4.1.4	Dispatch, initial Response and Initial Attack		
X		4.1.5	Extended Attack and Large Fire Management		
X		4.1.6	Aviation Operations		
X		4.1.7	Reviews and Investigations		
X		4.1.8	Reports		
		4.2	**Hazardous Fuels Management**		
X		4.2.1	Prescribed Fire Program for Hazardous Fuels and Habitats		
X		4.2.1.1	Program Overview		
X		4.2.1.2	Effect of National and Regional Preparedness Levels		
X		4.2.1.3	Project Planning		
X		4.2.1.4	Project Implementation		
	X	4.2.1.5	Smoke Management	Updated to include FWS directives regarding clean air/prescribed fire and current Airshed Group operation language.	
X		4.2.1.6	After Action and Escaped Fire Reviews		
X		4.2.1.7	Reports		
X		4.2.2	Non-fire Hazardous Fuels Treatment Program		
X		4.2.3	Process to Identify Hazardous Fuels Treatments		
X		4.3	Emergency Stabilization and Rehabilitation		
X		4.4	Prevention, Mitigation and Education		
X		5.0	Monitoring and Evaluation		
X		5.1	Fire Management Plan		

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
X		5.1.1	Annual FMP Review		
X		5.1.2	Fire Management Plan Terminology		
X		5.2	Treatment Effectiveness		
		Appendices			
	X	A	Maps	Updated maps	
	X	B	Refuge Staff Fire Contact List	Updated	
X		C	Categorical Exclusion for Fire Management Operations		
X		D	Deer Flat NWR Climate Charts and Graphs		
X		E	Prescribed and Wildfire History		
	X	F	Interagency Agreements & Delegations	Updated	
	X	G	Initial Attack Fire Size Up	Updated	
X		H	Behave Plus Runs		
	X	I	Radio Frequency List	Updated	
	X	J	Step-up Plan	Updated	
		K	FMP Review Checklist	Added for 2012	

Appendix L. Lake Use Study

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Deer Flat National Wildlife Refuge—Lake Lowell Water Based Recreation Data Summary

By Rudy M. Schuster

U.S. Department of the Interior
U.S. Geological Survey

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Deer Flat National Wildlife Refuge—Lake Lowell Visitor Use Data Summary

By Rudy M. Schuster

Introduction

Established in 1909, Deer Flat National Wildlife Refuge is one of the oldest refuges in the National Wildlife Refuge System. The Refuge has two units, Lake Lowell and the Snake River Islands. The Lake Lowell Unit is 10,636 acres and includes the almost 9,000-acre Lake Lowell and surrounding lands. The Refuge offers the six priority wildlife-dependent activities (fishing, hunting, wildlife observation, wildlife interpretation, wildlife photography and environmental education) as defined in The National Wildlife Refuge System Administration Act as amended by the Refuge System Improvement Act of 1997 as well as other non-wildlife-dependent activities. The purpose of this study is to describe use characteristics of recreational boaters on Lake Lowell. This study does not address use in other parts of the Refuge or other recreational activities.

The sampling and data collection consisted of observations of boat activity made from fixed vantage points on the west and east pools of Lake Lowell to develop vessels-at-one-time (VAOT) estimates for three areas: the West Pool, the Headquarters section of the East Pool, and the East section of the East Pool. A complete description of the sampling locations and a map are provided below.

Traffic counters were also used to collect data on the number of vehicles entering the parking lots. Data were collected between April 15 and September 30, 2011.

Sampling Methods: Lake Lowell

Boater Observation Data Collection Methods

Observers were located on-shore at three vantage points (see Figure 1) that provided a view of activity on the Lake. The observers collected data in 20 minute intervals (three times an hour). Based on the sampling blocks (described below), there was a maximum of 10 observation periods when vessels were counted per sampling day, per observer. Boat activity was recorded the first time the boat was observed during the 20 minute observation period. However, any individual boat could be counted again at the next observation period. Thus, each observation is a stand-alone VAOT estimate for that observation period. The following data was collected at each observation period: time of day, type of vessel, and vessel size, activity, and speed. Compliance with the no-wake postings were recorded within the no-wake portion of the East section of the East Pool only since neither the Headquarters section of the East Pool or the West Pool have large no-wake zones. Data were collected on a field data sheet. Following each survey, weather conditions, average wind speed, average temperature, and water surface conditions were also recorded to summarize the conditions during the survey period. A copy of the boater observation data collection sheet can be found in Appendix 1. The observation categories are listed in Table 1.

Table 1. Categories for variables on observation collection sheet

Variable	Categories							
Vessel Type	Motorboat	Pontoon boat	Human powered	Sail boat	Personal watercraft	Kite board	Wind surfer	Other

Speed	Idle	Slow	Plowing	Cruising	Planing	Under Sail	Paddling
Activity	Travel	Milling	Skiing & Tubing	Fishing	Recreation-other		
Size	Less than 16 feet	16 to 25 feet	26 to 39 feet				

Travel was defined as a vessel moving through the survey area in a single direction from one point to another. Milling was assigned to vessels transitioning through the survey area in several directions (greater than two headings) with no apparent destination. Vessels classified as ski/tubing or fishing included only those that were actively engaged in those activities. The mere observation of fishing poles, skis, wakeboards, inner tubes, or other recreational equipment on a vessel did not result in an activity being classified as fishing or ski/tubing. Vessels classified as recreational included wind surfers and kite boarders, or vessels anchored with people swimming nearby or picnicking and not fishing and/or observing wildlife.

Speed classifications were qualitatively determined for each vessel pass observed in the survey area based largely on Gorzelany (2005). Speed classifications assigned to vessels under power included Idle, Slow, Plowing, Cruising, and Planing. Wind powered (i.e. under sail) and human powered (i.e. oar/paddle) speeds were recorded as applicable following the same criteria listed below. Speed classifications were defined as follows:

- Idle Speed – The minimum speed that maintains steerage of a vessel, or the speed at which a vessel is normally docked. Little or no displacement of water is observable from either the bow or stern, and the vessel remains level in the water at all times. This speed is estimated at approximately one to three miles per hour.
- Slow Speed – The speed at which all vessels are completely off plane and fully settled in the water. Some minimal water displacement at either the bow or stern (or both) may be observed. This speed is estimated at approximately five to seven miles per hour.

- Plowing Speed – An intermediate speed between cruising speed and slow speed. The bow of the vessel typically rides higher than the stern, and substantial displacement of water occurs. Depending on the size and type of vessel, plowing may occur at a variety of speeds. This speed designation is used specifically for vessels with planing-type hulls. For the purpose of this study, Plowing Speed is estimated at approximately eight to 10 miles per hour.
- Cruising Speed – A qualitative speed designation uniquely applied to a relatively fast moving vessel with a non-planing type hull (i.e. a pontoon boat or displacement hull vessel). This speed classification is identified by noticeable water displacement from the bow and/or stern and an observed speed faster than the previously defined speed classifications. Vessels at Cruising Speed are estimated to travel at speeds between 11 and 20 miles per hour.
- Planing Speed - A vessel traveling at sufficient speed to partially raise the bow out of the water. The majority of planing vessels are estimated to travel at speeds in excess of 15mph, however vessel planing speeds vary widely depending on vessel size and hull design.

Vessel speed was qualitatively determined and is therefore subject to individual observer interpretation. Physical and environmental factors, including wind speed/direction, may affect vessel speed as well as the degree of water displacement from the bow and/or stern. Observers were instructed to consider these factors and request the opinion of their fellow observer (when possible) if they were undecided between two vessel speeds. In instances where a decision between two speeds was difficult, observers selected the slower speed. This may provide a potential underestimate or more conservative assessment.

Boater compliance was evaluated for the no wake zone in the east section of the east pool and classified as either compliant (a vessel which is maintaining a speed that did not produce a wake) or non-compliant (a vessel that was determined to be producing a wake in an area posted as "no wake"). This assessment was made by the observer in the field.

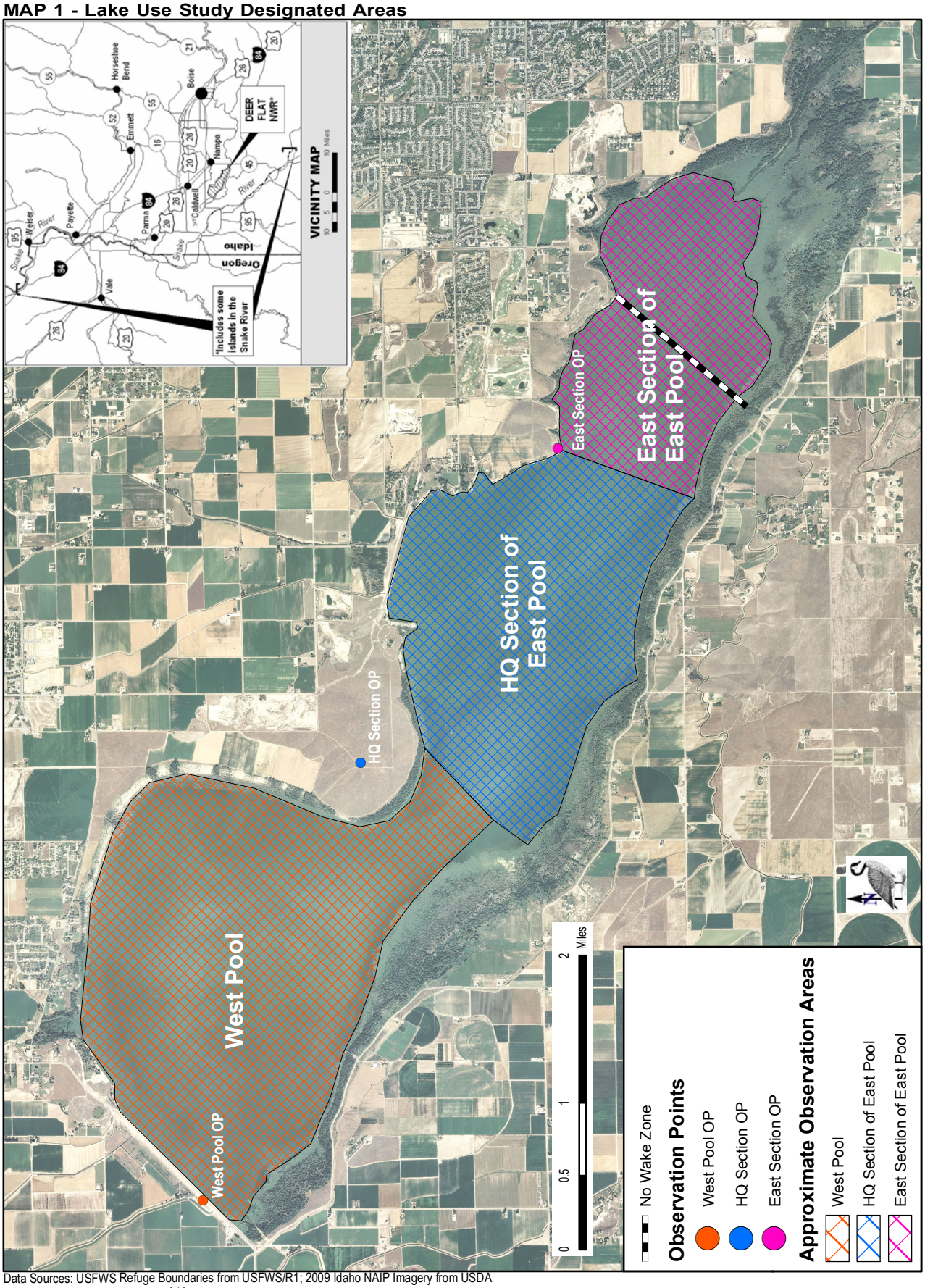
Efforts were made throughout the survey to ensure the quality and consistency of the data collected. Training sessions were conducted at each site prior to study commencement. The training session allowed the observers to gain familiarity with the field data collection sheets, data collection methods, and geographic characteristics unique to each survey site. Binoculars and spotting scopes were available to observers.

Boater Observation Sampling Locations, Time Blocks, & Sampling Schedule

Use levels on the Lake were organized into three categories: 1) Low use, 2) High use, and 3) Peak use days. *Peak use days* are times that are known to be the highest levels of use on the lake (e.g. Memorial Day, Labor Day). *High use days* are non-holiday days when use levels are known to be high (e.g. weekends in August, opening day). Finally, *low use days* are week days and other less popular times. For the purposes of this study, these use estimates were made based on the expert judgment of Refuge management.

Lake Lowell was organized into the following three use zones for the purpose of this study. The west pool was observed from the *Lower Dam* observation point. Two vantage points were necessary in the east pool due to the topography of the area; the east section of the east pool was observed from the *Viewing Platform* east of the Visitor Center (Headquarters section of the East Pool or Headquarters section) and the *Gotts Point* observation point (East section of the East Pool or East section). Refer to Map 1.

MAP 1 - Lake Use Study Designated Areas



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-9 Map Date: 05/03/2012

The plan included allowing observers to be in the field collecting data between 7am and 9pm. Five time blocks were used for the study. The blocks were three hours long; except for block 5 that was a two hour block. The time blocks used were: 7am to 10am; 10am to 1pm; 1pm to 4pm; 4pm to 7pm; and 7pm to 9pm. These time blocks accounted for the variation in recreation activity styles (e.g., morning fishing, afternoon water skiing, after dinner cruising). Actual observation times in the field were dependent on the random schedule generated and the availability of observers from the Refuge. The full sampling schedule can be found in Appendix 2. The schedule was stratified into the three zones on the Lake as described in the sampling location section. A combination of purposive and random methods were used to design the schedule. Peak use days were purposively sampled. Peak days represent potential boater conflicts and other stresses on the system that are important for management to identify and understand. Low and high use days were randomly selected.

The following definitions apply to the sampling schedule. A *Sampling Day* is a single date that sampling took place (e.g. April 15 or July 4). A S*ampling Block* is the three hour block that the field technician spends in the field. A *Sampling Episode* is when data is being collected from one of the vantage points (e.g. on April 15 observations will be made at the Gotts Point vantage point). An *Observation period* is when the field technician records boat data on the lake. One observation period occurs every 20 minutes, allowing for a maximum of 10 observation periods during each three hour sampling block.

There are a total of 169 potential sampling days between April 15, 2011 and September 30, 2011: 9 holiday days (3 holiday weekends), 42 regular weekend days, and 118 regular weekdays. The original sampling plan included the following. Each of the 3 lake zones would be sampled twice on peak use holiday weekends. This would result in a total of 6 sampling days during peak use times. Each zone would be sampled 3 times in each time block during high use days, resulting in 15 sampling days during

high use days. Finally, each zone would be sampled 4 days in each time block during low use times, resulting in 20 sampling days on low use days.

Minor modifications were necessary due to issues such as weather, availability of field personnel, and other unforeseen issues. Prior to each field day the data collection team consulted local weather forecasts to avoid poor weather that may influence boat traffic patterns or compromise personal safety. When possible, the next available sampling day of the same use type in the same use zone was selected to replace the missed sampling episode.

The final sampling schedule resulted in the following number of observations at each location: 903 observations at the west pool; 740 observations at the Headquarters section of the East Pool; and 453 observations at the East section of the East Pool. The data collection methods produced a diversity of types of use days (low, medium, and high), times of day, and locations on the Lake. However, the results may not apply to locations, days, and times of the day that were not included in the analyses.

Parking Lot and Vehicle Count Method

An NC-200 Portable Traffic Analyzer which utilizes Vehicle Magnetic Imaging was used to count vehicles entering the parking areas. These devices count vehicles in only one direction of travel. Traffic counters and support for using the counters was provided by U.S. Department of Transportation, Central Federal Lands Highway Division (CFLHD) located in Lakewood Colorado.

A sampling schedule was designed to collect traffic data from each of the use level days at five different parking areas. The parking areas were: 1) Upper Dam West Entrance, 2) Upper Dam East Entrance, 3) Parking Lot 1, 4) Lower Dam Recreation Area Entrance, and 5) Parking Lot 7. Traffic data collection consisted of setting up the counter and collecting data for 14 continuous days. This occurred twice for each parking area. The 14 day sampling periods included all three use level designations (low use days, high use days, and peak use days). The two week periods were: May 19 to June 1 and

September 1 to September 14. A technical issue meant that data were collected at Parking Lot 7 only in September.

A single set-up configuration was designed for each of the parking areas and used during both sampling episodes. A research technician was stationed at the parking area to do a one-time calibration of the traffic count method. For a two-hour period the observer counted the number of vehicles entering the area and the number of boats. Observer vehicle counts were compared to traffic counter data to confirm the accuracy of the counters.

A ratio of vehicles with trailers and without was established to estimate the total number of vessels entering the system on the sample days. The ratio was created using data from regular parking lot vehicle counts performed by Refuge staff and volunteers. One parking lot count consisted of a Refuge volunteer spending one hour in each parking lot and counting the number of vehicles, trailers, number of people per vehicle, and their apparent activity. Data were used from a total of 87 parking lot counts across all lots with traffic counters. Counts were conducted throughout the 2011 season (May to September), distributed across times of the day (morning, afternoon, evening), and conducted on weekdays and weekends. Specific day and time blocks for parking lot counts were determined by a pre-existing random sampling schedule established by the refuge.

Ratio weights were established by dividing the average number of trailers by the average number of vehicles observed during the observations for that lot. For example, if 100 vehicles entered a parking area and 50 of them were pulling trailers, the ratio weight used for that lot would be 0.50. A weight of 0.50 indicates that half of the vehicles were pulling trailers. Outliers in the data were adjusted because there is the possibility of peak use levels during holiday events. Any values beyond three standard deviations from the average were brought into the third standard deviation based on data for each individual lot. Only two outliers were identified and adjusted.

Results

Number of Vessels Observed

This section reports the number of vessels-at-one-time (VAOT) observed in the East section of the East Pool, Headquarters section of the East Pool, and West Pool for the particular time block. The range provides a sense of the variation in Lake use. The observations were made at 20 minute intervals. The data are stratified by the use level categories: weekday low use, weekend high use, and holiday peak use. The results are shown in Tables 2, 3, and 4.

East section of the East Pool

Use in the East section of the East Pool during low use and high use days was not very different; with the exception of one day when the peak number of vessels on a weekend day was 11. The highest number of vessels observed on the East section of the East Pool was 23 during the 4th of July weekend.

Table 2. East section of the East Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/13/11	Weekday low use	1:00 pm to 3:40 pm	2	7	5
8/15/11	Weekday low use	4:00 pm to 6:40 pm	1	1	
9/16/11	Weekday low use	10:00 am to 12:40 pm	1	2	1
4/30/11	Weekend high use	1:00 pm to 3:40 pm	1	3	2
6/4/11	Weekend high use	10:00 am to 12:40 pm	6	11	5
7/16/11	Weekend high use	7:00 pm to 8:40 pm	3	8	5
8/14/11	Weekend high use	10:00 am to 12:40 pm	2	8	6
7/2/11	Holiday peak use	4:00 pm to 6:40 pm	11	23	12
9/5/11	Holiday peak use	10:00 am to 12:20 pm	1	8	7

Headquarters section of the East Pool

Peak use in the Headquarters section of the East Pool on low use days ranged from 1 to 11 vessels. Peak use on weekend high use days ranged from 4 to 51 vessels. However, the report of 51 is not consistent with other counts from this area. The observer indicated that the number was accurate and that July 10th 2011 was an unusually high use day. Holiday peak use days were similar to other weekend high use days; peak use ranged from 6 to 14. Use levels in the Headquarters section of the East Pool were consistent across the three use strata.

Table 3. Headquarters section of the East Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/5/11	Weekday low use	10:00 am to 12:40 pm	1	11	10
5/23/11	Weekday low use	1:00 pm to 4:00 pm	1	2	1
6/24/11	Weekday low use	10:00 am to 12:40 pm	3	10	7
7/19/11	Weekday low use	7:40 pm to 8:20 pm	3	4	1
8/10/11	Weekday low use	1:00 pm to 3:40 pm	2	10	8
9/1/11	Weekday low use	12:00 pm to 12:20 pm	1	1	
9/26/11	Weekday low use	4:00 pm to 6:00 pm	1	3	2
4/24/11	Weekend high use	10 am to 12:40 pm	1	4	3
6/18/11	Weekend high use	1:00 pm to 1:20 pm	3	4	1
7/10/11	Weekend high use	4:30 pm to 7:00 pm	30	51	21
8/6/11	Weekend high use	10:00 am to 12:40 pm	5	11	6
8/28/11	Weekend high use	4:00 pm to 7:00 pm	1	13	12
5/30/11	Holiday peak use	1:00 pm to 4:00 pm	1	6	5
9/3/11	Holiday peak use	10 am to 12:40 pm	3	14	11

West Pool

Peak use in the West Pool on low use days ranged from 1 to 21 vessels. The peak of 21 vessels on August 5th 2011 was again not consistent with other low use day observations. The next highest report was 9. Weekend high use peak use ranged from 1 to 23 vessels. Finally, peak use on holiday peak use days ranged from 3 to 19 vessels. In general, the low use days are lower than both the weekend and holiday days. The weekend and holiday days were similar. The highest number of vessels observed in the West Pool was 23 at one time.

Table 4. West Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/3/11	Weekday low use	9:00 pm to 9:40 pm	1	2	1
5/18/11	Weekday low use	11:00 am to 12:40 pm	2	1	1
6/29/11	Weekday low use	1:00 pm to 3:20 pm	2	2	
7/11/11	Weekday low use	10:00 am to 12:40 pm	3	5	2
8/5/11	Weekday low use	7:00 pm to 9:00 pm	10	21	11
8/23/11	Weekday low use	7:00 pm to 9:00 pm	1	9	8
9/21/11	Weekday low use	1:00 pm to 3:40 pm	4	8	4
4/16/11	Weekend high use	3:00 pm to 6:00 pm	3	19	16
5/7/11	Weekend high use	4:00 pm to 7:00 pm	1	1	
6/12/11	Weekend high use	10:00 am to 12:40 pm	1	21	20
7/24/11	Weekend high use	7:00 pm to 9:00 pm	4	21	17
8/20/11	Weekend high use	1:00 pm to 3:40 pm	6	23	17
5/29/11	Holiday peak use	10:00 am to 12:40 pm	1	3	2
7/3/11	Holiday peak use	7:00 pm to 8:40 pm	11	19	8

Boater Characteristic Description

Results of the boater characteristics data are reported in both raw numbers and percentages of boats observed. Percentages allow for comparison across the three pools. The observers collected data in 20 minute intervals; one observation every 20 minutes.

Vessel Type

Results of the vessel type data are shown in Table 5. The majority of vessels on Lake Lowell are motorboats. The Headquarters section of the East Pool has the most pontoon boats (3%) compared to the West Pool and East section of the East Pool (2% and <1%, respectively). The distribution of human powered boats was similar. Less than 1% of all boats observed were sailboats in the Headquarters section of the East Pool and none were observed in the West Pool or East section of the East Pool. The largest percentage of personal watercraft were observed in the Headquarters section of the East Pool (7%); closely followed by the West Pool (6%) and finally the East section of the East Pool (4%). No windsurfers were observed.

Table 5. Vessel type summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Motorboat	799	88%	613	85%	415	92%	1827	88%
Pontoon Boat	19	2%	19	3%	1	<1%	39	2%
Human powered[1]	27	3%	30	4%	16	3%	73	3%
Sailboat			6	<1%			6	<1%
Personal watercraft	57	6%	54	7%	19	4%	130	6
Kite surfer								
Wind surfer								
Other	1	<1%					1	<1%
Total observations	903		722		451		2073	

[1]Kayak\canoe\float

Vessel Size

The vessel size data are shown in Table 6. Almost all of the vessels are 25 feet long or less. The majority are 16 to 25 feet long. The smaller vessels (<16 feet) appear to use the West Pool and Headquarters section of the East Pool more than the East section of the East Pool. Less than 1% of the vessels observed were larger than 25 feet. Most of them were observed in the West and Headquarters section of the East Pools.

Table 6. Vessel size summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Less than 16 feet	134	14%	99	14%	37	8%	270	13%
16 to 25 feet	759	84%	615	85%	414	92%	1788	86%
26 to 39 feet	7	<1%	8	<1%			15	<1%
Total observations	900		722		451		2073	

Location in the Pool

The location data are shown in Table 7. The totals indicate that the majority of boaters were observed in open water. The East section of the East Pool had the largest variation with 64% on open water, 15% in emergent beds, 18% on the edge of emergent beds, and 3% at the bank. The West Pool had the second most variation and the Headquarters section of the East Pool was the most homogeneous.

Table 7. Location summary data for all observations

	West Pool	Headquarters section	East section	Total

	#	%	#	%	#	%	#	%
Open Water	652	72%	602	83%	288	64%	1542	74%
Emergent bed	105	12%	24	3%	69	15%	198	9%
Edge of emergent bed	76	8%	40	6%	83	18%	199	9%
Bank	15	2%	7	<1%	11	3%	33	2%
Dock	55	6%	48	7%			103	5%
Total observations	903		721		451		2075	

Recreational boating activity

The recreational activity data are shown in Table 8. Most boats were engaged in some kind of activity when observed; the totals show that only 21% of observed vessels were traveling or milling. The most popular activity was fishing (38% of total observations). Fishing was the most popular activity on both the West Pool and the East section of the East Pool and second most popular on the Headquarters section of the East Pool. Skiing and tubing was the second most popular activity overall. Skiing and tubing was the most popular activity on the Headquarters section of the East Pool and second most popular on the West Pool and East section of the East Pool. Travel was the third most popular activity on all three pools.

Table 8. Activity summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Travel	179	20%	149	21%	61	13%	389	19%
Milling	17	2%	17	2%	9	2%	43	2%
Skiing & Tubing	198	22%	209	29%	96	21%	503	24%
Fishing	360	40%	195	27%	238	53%	793	38%
Recreation[1]	91	10%	96	13%	45	10%	232	11%
Docked	57	6%	56	8%	2	1%	115	6%
Total observations	902		722		451		2075	

[1]Vessels classified as recreational included wind surfers and kite boarders, or vessels anchored with people swimming nearby or picnicking and not fishing and/or observing wildlife.

Activity summary for locations in pools

Tables 9, 10, and 11 show that the majority of people in all three Pools were located in open water (East section 72%; HQ section 83%, West Pool 64%). The most popular activities in open water were consistent in the three pools: skiing & tubing, fishing and travel. Almost all of the boats in the emergent beds and on the edge of the emergent beds were being used for the activity of fishing.

Table 9. Location of Activities in West Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	162	25%	16	2%	196	30%	191	29%	84	13%	2	<1%	652
Emergent Bed	4	4%					100	95%	1	1%			105
Edge of Emergent Bed	6	8%	1	1%	2	3%	67	88%					76
Bank	5	33%					1	7%	6	40%	3	20%	15
Dock	2[2]	4%					1	2%			52	95%	55

1Percentage of vessels being used for this activity of the total number of vessels observed in this location
2 Two vessels were observed pulling away or approaching the dock and were classified as traveling while in proximity to the dock.

Table 10. Location of Activities in Headquarters section of the East Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	145	24%	17	3%	209	35%	136	23%	91	15%	4	1%	602
Emergent Bed	4	17%					20	83%					24
Edge of Emergent Bed							39	97%	1	3%			40
Bank									4	57%	3	43%	7
Dock											48	100%	48

1Percentage of vessels being used for this activity of the total number of vessels observed in this location

Table 11. Location of Activities in East section of the East Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	60	21%	9	3%	95	33%	80	28%	44	15%			288
Emergent Bed	1	1%					67	97%	1	1%			69
Edge of Emergent Bed							83	100%					83
Bank					1	9%	8	73%			2	18%	11
Dock													

1Percentage of vessels being used for this activity of the total number of vessels observed in this location

Compliance with no wake zone

The compliance data for the no wake zone in the East section of the East Pool are shown in Table 12. Vessels were classified as either Compliant – A vessel which is maintaining a speed that did not produce a wake, or Non-compliant – A vessel that was determined to be producing a wake in an area posted as "no wake." Vessel speed was qualitatively determined and is therefore subject to individual observer interpretation. Physical and environmental factors, including wind speed/direction, may affect vessel speed as well as the degree of water displacement from the bow and/or stern. Observers were instructed to consider these factors and request the opinion of their fellow observer (when possible) if they were undecided between two vessel speeds. In instances where a decision between two speeds was difficult, observers selected the slower speed. This may provide a potential underestimate or more conservative assessment. A total of 346 vessels were observed in the East section of the East Pool no wake zone. Of the vessels in the no wake zone, 88% were compliant and 12% were not.

Table 12. Compliance summary for vessels in East section of the East Pool no wake zone

	#	%
Compliant	303	88%
Non-compliant	43	12%

Total observations	346

Vessel Speed

The largest percentage of the observed vessels were idling (see Table 13). This is consistent with the recreational activity summary indicating that most vessels were fishing. The second largest category was planing. This is also consistent with skiing and tubing being second most popular activities and travel as the third most popular.

Table 13. Vessel speed summary data for all observations

	West Pool		Headquarters		East section of the East Pool		Total	
	#	%	#	%	#	%	#	%
Idle	439	49%	271	38%	268	59%	978	47%
Slow	118	13%	76	10%	16	4%	210	10%
Plowing	19	2%	11	1%	11	3%	41	2%
Cruising	31	3%	44	6%	22	5%	97	5%
Planing	296	33%	319	44%	128	28%	743	36%
Under sail			1	<1%			1	<1%
Paddling					6	<1%	6	<1%
Total observations	903		722		451		2076	

Summary of boater characteristics

The following description is based on the summary data in tables 5 through 13. The typical vessel on Lake Lowell is a motorboat between 16 to 25 feet in length and can be found in open water. The most common activities people in the vessels participate in are fishing or skiing and tubing. Most of the vessels are not moving (fishing or standing) and many are moving at a planing speed while skiing and tubing. Of the vessels that do enter the no wake zone in the east section of the east pool, most comply with the no wake regulation.

Parking Lot Traffic Counter Data

The traffic counter data are displayed in Tables 14 through 29. One table is provided for each 14-day sampling episode and one summary table for each parking lot sampled. Vehicle trailer ratios were created as described in the methods section and used to estimate the number of trailers entering the system based on the traffic counts. This provides an estimate of the vessels being launched on Lake Lowell on a given day. The vehicle to trailer ratio weights, that indicate what portion of the vehicles in the parking lot are apparently pulling trailers, are shown in Table 14 for each parking lot. Parking Lot 1, the Lower Dam Entrance, and the Upper Dam East entrance had the largest trailer traffic of the five lots. Parking Lot 7 had the lowest vehicle to trailer ratio.

Table 14. Vehicle to trailer weighting ratios[1] from parking lot counts from 4/15-9/30/11

Parking Lot	Ratio/weight
Upper Dam West Entrance	0.52
Upper Dam East Entrance	0.70
Parking Lot 1	0.78
Lower Dam Recreation Area Entrance	0.73
Parking Lot 7	0.14

1Weighting ratios indicate the proportion of vehicles in the parking lot pulling trailers.

The summary descriptive statistics for the traffic counter data collected during all of the days in each of the parking lots is shown in Tables 15 and 16. The range and standard deviation are indicators of the variability in use at each parking lot. Given the difference in parking lot size it is not appropriate to directly compare the variability between the lots. Within each lot a low range and standard deviation indicate that the amount of use at the parking lot is relatively consistent. A high range and standard deviation would suggest that use levels are variable.

Table 15. Summary descriptive statistics for vehicle traffic counts from magnetic counter

Parking Lot	Range	Minimum	Maximum	Average	Standard Deviation
Upper Dam West Entrance	105	32	137	70	28.9
Upper Dam East Entrance	180	62	242	110	38.2
Parking Lot 1	50	4	54	22	12.0
Lower Dam Recreation Area Entrance	601	99	700	240	147.9
Parking Lot 7	29	14	43	27	9.3

Table 16. Minimum, maximum and average number of trailers estimated using trailer weight ratios

Parking Lot	Minimum	Maximum	Average
Upper Dam West Entrance	17	71	36
Upper Dam East Entrance	43	169	77
Parking Lot 1	3	42	17
Lower Dam Recreation Area Entrance	72	511	175
Parking Lot 7	2	6	4

Parking lot traffic count results: Upper Dam West Entrance

The traffic counter data for the Upper Dam West Entrance are displayed in Tables 17, 18, and 19. The number of vehicles entering the Upper Dam West parking lot on low use weekdays ranged from 32 to 68 with 17 to 35 trailers respectively; and the average number of vehicles on low use days was 53 with 28 trailers. There was not much difference between the weekend high use and peak use day results. The number of vehicles on weekend high use days ranged from 69 to 124 (36 to 64 trailers). The number of vehicles on peak use days ranged from 62 to 137 (32 to 71 trailers). The average for high use days was 99 and peak use days was 100 (52 and 51 trailers, respectively).

Table 17. Parking lot traffic count results: Upper Dam West Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]

5/19/11	Thursday	Weekday low use	40	21
5/20/11	Friday	Weekday low use	70	36
5/23/11	Monday	Weekday low use	33	17
5/24/11	Tuesday	Weekday low use	57	30
5/25/11	Wednesday	Weekday low use	38	20
5/26/11	Thursday	Weekday low use	39	20
5/27/11	Friday	Weekday low use	32	17
5/31/11	Tuesday	Weekday low use	78	41
6/1/11	Wednesday	Weekday low use	54	28
5/21/11	Saturday	Weekend high use	114	59
5/22/11	Sunday	Weekend high use	69	36
5/28/11	Saturday	Holiday peak use	62	32
5/29/11	Sunday	Holiday peak use	72	37
5/30/11	Monday	Holiday peak use	109	57

[1]The vehicle to trailer weighting ratio is 0.52

Table 18. Parking lot traffic count results: Upper Dam West Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	68	35
9/2/11	Friday	Weekday low use	47	24
9/6/11	Tuesday	Weekday low use	74	38
9/7/11	Wednesday	Weekday low use	59	31
9/8/11	Thursday	Weekday low use	64	33
9/9/11	Friday	Weekday low use	55	29
9/12/11	Monday	Weekday low use	51	27
9/13/11	Tuesday	Weekday low use	57	30
9/14/11	Wednesday	Weekday low use	51	27
9/10/11	Saturday	Weekend high use	90	47
9/11/11	Sunday	Weekend high use	124	64

9/3/11	Saturday	Holiday peak use	110	57
9/4/11	Sunday	Holiday peak use	112	58
9/5/11	Monday	Holiday peak use	137	71

[1]The vehicle to trailer weighting ratio is 0.52

Table 19. Average number of vehicles per day Upper Dam West Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	100	52
Weekend high use	99	51
Weekday low use	53	28

[1]The vehicle to trailer weighting ratio is 0.52

Parking lot traffic count results: Upper Dam East Entrance

The traffic counter data for the Upper Dam East Entrance are displayed in Tables 20, 21, and 22. The number of vehicles entering the Upper Dam East parking lot on low use weekdays ranged from 62 to 123 with 43 to 86 trailers respectively; and the average on low use days was 90 vehicles with 63 trailers. There was overlap of the high use day and peak use day ranges. However, there appears to be the potential for extreme peak use levels at this parking area. The number of vehicles on weekend high use days ranged from 131 to 156 (92 to 109 trailers). The number of vehicles on peak use days ranged from 79 to 242 (55 to 169 trailers). The average for high use days was 142 and peak use days was 145 (99 and 102 trailers, respectively). The highest vehicle use count observed in this lot during the data collection was 242 on September 5, 2011.

Table 20. Parking lot traffic count results: Upper Dam East Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	85	60
5/20/11	Friday	Weekday low use	123	86

5/23/11	Monday	Weekday low use	65	46
5/24/11	Tuesday	Weekday low use	110	77
5/25/11	Wednesday	Weekday low use	88	62
5/26/11	Thursday	Weekday low use	63	44
5/27/11	Friday	Weekday low use	65	46
5/31/11	Tuesday	Weekday low use	97	68
6/1/11	Wednesday	Weekday low use	62	43
5/21/11	Saturday	Weekend high use	156	109
5/22/11	Sunday	Weekend high use	134	94
5/28/11	Saturday	Holiday peak use	79	55
5/29/11	Sunday	Holiday peak use	111	78
5/30/11	Monday	Holiday peak use	152	106

[1]The vehicle to trailer weighting ratio is 0.70

Table 21. Parking lot traffic count results: Upper Dam East Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	80	56
9/2/11	Friday	Weekday low use	107	75
9/6/11	Tuesday	Weekday low use	88	62
9/7/11	Wednesday	Weekday low use	92	64
9/8/11	Thursday	Weekday low use	102	71
9/9/11	Friday	Weekday low use	106	74
9/12/11	Monday	Weekday low use	102	71
9/13/11	Tuesday	Weekday low use	90	63
9/14/11	Wednesday	Weekday low use	106	74
9/10/11	Saturday	Weekend high use	148	104
9/11/11	Sunday	Weekend high use	131	92
9/3/11	Saturday	Holiday peak use	149	104
9/4/11	Sunday	Holiday peak use	140	98
9/5/11	Monday	Holiday peak use	242	169

[1]The vehicle to trailer weighting ratio is 0.70

Table 22. Average number of vehicles per day Upper Dam East Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	145	102
Weekend high use	142	99
Weekday low use	90	63

[1]The vehicle to trailer weighting ratio is 0.70

Parking lot traffic count results: Parking Lot 1

The traffic counter data for Parking Lot 1 are displayed in Tables 23, 24, and 25. The number of vehicles entering Parking Lot 1 on low use weekdays ranged from 4 to 34 with 3 to 27 trailers respectively; and the average on low use days was 19 vehicles with 15 trailers. There was not much difference between the high use day and peak use day ranges. The number of vehicles on weekend high use days ranged from 13 to 54 (10 to 42 trailers). The number of vehicles on peak use days ranged from 12 to 47 (9 to 37 trailers). The average for high use days (31 vehicles) was higher than the average for peak use days (24 vehicles) (24 and 19 trailers, respectively). The highest vehicle count for Parking Lot 1 was observed during a regular high use weekend and not during a holiday peak use weekend (54 vehicles on May 22, 2011).

Table 23. Parking lot traffic count results: Parking Lot 1, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	34	27
5/20/11	Friday	Weekday low use	30	23
5/23/11	Monday	Weekday low use	25	20
5/24/11	Tuesday	Weekday low use	20	16
5/25/11	Wednesday	Weekday low use	21	16
5/26/11	Thursday	Weekday low use	24	19

5/27/11	Friday	Weekday low use	29	23
5/31/11	Tuesday	Weekday low use	33	26
6/1/11	Wednesday	Weekday low use	22	17
5/21/11	Saturday	Weekend high use	43	34
5/22/11	Sunday	Weekend high use	54	42
5/28/11	Saturday	Holiday peak use	28	22
5/29/11	Sunday	Holiday peak use	16	12
5/30/11	Monday	Holiday peak use	47	37

[1]The vehicle to trailer weighting ratio is 0.78

Table 24. Parking lot traffic count results: Parking Lot 1, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	4	3
9/2/11	Friday	Weekday low use	18	14
9/6/11	Tuesday	Weekday low use	13	10
9/7/11	Wednesday	Weekday low use	6	5
9/8/11	Thursday	Weekday low use	18	14
9/9/11	Friday	Weekday low use	16	12
9/12/11	Monday	Weekday low use	15	12
9/13/11	Tuesday	Weekday low use	8	6
9/14/11	Wednesday	Weekday low use	12	9
9/10/11	Saturday	Weekend high use	13	10
9/11/11	Sunday	Weekend high use	13	10
9/3/11	Saturday	Holiday peak use	16	12
9/4/11	Sunday	Holiday peak use	12	9
9/5/11	Monday	Holiday peak use	23	18

[1]The vehicle to trailer weighting ratio is 0.78

Table 25. Average number of vehicles per day Parking Lot 1

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	24	19

Weekend high use	31	24
Weekday low use	19	15

[1]The vehicle to trailer weighting ratio is 0.78

Parking lot traffic count results: Lower Dam Recreation Area Entrance

The traffic counter data for the Lower Dam Recreation Area Entrance are displayed in Tables 26, 27, and 28. The number of vehicles entering the Lower Dam Recreation Area parking lot on low use weekdays ranged from 99 to 353 with 72 to 258 trailers respectively; and the average on low use days was 157 vehicles with 115 trailers. There was overlap between the high use day and peak use day ranges. There was also an extreme peak use value observed at this lot. The number of vehicles on weekend high use days ranged from 312 to 486 (228 to 355 trailers). The number of vehicles on peak use days ranged from 197 to 700 (144 to 511 trailers). The average for high use days was 387 and peak use days was 390 (283 and 285 trailers, respectively). The highest vehicle count observed during the data collection was 700 on September 5, 2011.

Table 26. Parking lot traffic count results: Lower Dam Recreation Area Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	162	118
5/20/11	Friday	Weekday low use	353	258
5/23/11	Monday	Weekday low use	129	94
5/24/11	Tuesday	Weekday low use	174	127
5/25/11	Wednesday	Weekday low use	117	85
5/26/11	Thursday	Weekday low use	137	100
5/27/11	Friday	Weekday low use	112	82
5/31/11	Tuesday	Weekday low use	176	128
6/1/11	Wednesday	Weekday low use	200	146
5/21/11	Saturday	Weekend high use	405	296

5/22/11	Sunday	Weekend high use	486	355
5/28/11	Saturday	Holiday peak use	197	144
5/29/11	Sunday	Holiday peak use	216	158
5/30/11	Monday	Holiday peak use	357	261

[1]The vehicle to trailer weighting ratio is 0.73

Table 27. Parking lot traffic count results: Lower Dam Recreation Area Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	138	101
9/2/11	Friday	Weekday low use	192	140
9/6/11	Tuesday	Weekday low use	161	118
9/7/11	Wednesday	Weekday low use	143	104
9/8/11	Thursday	Weekday low use	170	124
9/9/11	Friday	Weekday low use	115	84
9/12/11	Monday	Weekday low use	144	105
9/13/11	Tuesday	Weekday low use	111	81
9/14/11	Wednesday	Weekday low use	99	72
9/10/11	Saturday	Weekend high use	344	251
9/11/11	Sunday	Weekend high use	312	228
9/3/11	Saturday	Holiday peak use	380	277
9/4/11	Sunday	Holiday peak use	489	357
9/5/11	Monday	Holiday peak use	700	511

[1]The vehicle to trailer weighting ratio is 0.73

Table 28. Average number of vehicles per day Lower Dam Recreation Area Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	390	285
Weekend high use	387	283
Weekday low use	157	115

[1]The vehicle to trailer weighting ratio is 0.73

Parking lot traffic count results: Parking Lot 7

The traffic counter data for Parking Lot 7 are displayed in Tables 29 and 30. Data were only collected for one two-week period in this lot. The number of vehicles entering Parking Lot 7 on low use weekdays ranged from 14 to 36 with 2 to 5 trailers respectively; and the average on low use days was 23 vehicles with 3 trailers. There was not much difference between the high use day and peak use day ranges. The number of vehicles on weekend high use days ranged from 23 to 42 (3 to 6 trailers). The number of vehicles on peak use days ranged from 26 to 43 (4 to 6 trailers). The average for high use days was 32 and peak use days was 35 (4 and 5 trailers, respectively).

Table 29. Parking lot traffic count results: Parking Lot 7, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	19	3
9/2/11	Friday	Weekday low use	31	4
9/6/11	Tuesday	Weekday low use	18	3
9/7/11	Wednesday	Weekday low use	22	3
9/8/11	Thursday	Weekday low use	29	4
9/9/11	Friday	Weekday low use	36	5
9/12/11	Monday	Weekday low use	21	3
9/13/11	Tuesday	Weekday low use	19	3
9/14/11	Wednesday	Weekday low use	14	2
9/10/11	Saturday	Weekend high use	42	6
9/11/11	Sunday	Weekend high use	23	3
9/3/11	Saturday	Holiday peak use	26	4
9/4/11	Sunday	Holiday peak use	43	6
9/5/11	Monday	Holiday peak use	37	5

[1]The vehicle to trailer weighting ratio is 0.14

Table 30. Average number of vehicles Parking Lot 7

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	35	5
Weekend high use	32	4
Weekday low use	23	3

[1]The vehicle to trailer weighting ratio is 0.14

Parking lot traffic count summary

The Lower Dam Recreation Area was the highest use lot and exhibited the largest variation in use levels with the highest individual count of vehicles (700 vehicles on September 5, 2011). Parking Lots 1 and 7 were similar in terms of use with averages of 22 and 27 respectively. However, Parking Lot 1 displayed greater variation in use with a range of 50 vehicles compared to 29 vehicles in Lot 7. Sampling occurred on both Memorial Day (5/28 to 5/30 2011) and Labor Day (9/3 to 9/5 2011) weekends. Parking lot counts were consistently higher on Labor Day weekend compared to Memorial Day weekend.

References Cited

Gorzelany, J.F., 2005 Recreational boater traffic surveys of Broward County, Florida: technical report submitted to Florida Fish and Wildlife Conservation Commission, 89 pp.

Appendix 1: Lake Use Observation Data Sheet

Lake Lowell Recreational Lake Use Study

Page #: of:

ZONE:	WEATHER:
DATE:	WIND SPEED / DIRECTION:
TIME WINDOW:	AVERAGE TEMPERATURE:
OBSERVER(S):	LAKE SURFACE CONDITION:

CODES

TYPE: motorboat (1), pontoon boat (2), human powered -kayak/canoe/float (3), sailboat (4), personal watercraft (5), kite boarder (6), wind surfer (7), other (8)

SIZE: less than 16 ft (1), 16 - 25 (2), 26 - 39 (3), 40 - 64 (4), 65 - 109 (5)

SPEED: Idle (0), Slow (1), Plowing (2), Cruising (3), Planing (4), Under sail (5) Paddling (6)

LOCATION: Open water (1), Emergent bed (2), edge of emergent bed (3), bank (4), Dock (5)

ACTIVITY: Travel (1), Milling (2), Skiing & tubing (3), Fishing (4), Recreation (5), Docked (6),

COMPLIANCE: Compliant (0), Non-compliance (1), Not Applicable (NA)

RECORD #	TIME	TYPE	SIZE	ACTIVITY	LOCATION	SPEED	COMPLIANCE	COMMENTS

Appendix 2: Boater Observation Sampling Schedule

date	use level	survey location	time block
Sunday, April 24, 2011	high	2=HQ Platform	2=10am to 1pm
Tuesday, April 26, 2011	low	1=lower dam	1=7am to 10am
Saturday, April 30, 2011	high	3=Gotts Point	3=1pm to 4pm
Thursday, May 05, 2011	low	2=HQ Platform	2=10am to 1pm
Saturday, May 07, 2011	high	1=lower dam	4=4pm to 7pm
Friday, May 13, 2011	low	3=Gotts Point	3=1pm to 4pm
Sunday, May 15, 2011	high	2=HQ Platform	1=10am to 1pm
Wednesday, May 18, 2011	low	1=lower dam	1=10am to 1pm
Monday, May 23, 2011	low	2=HQ Platform	4=4pm to 7pm
Sunday, May 29, 2011	peak	1=lower dam	2=10am to 1pm
Monday, May 30, 2011	peak	2=HQ Platform	3=1pm to 4pm
Saturday, June 04, 2011	high	3=Gotts Point	1=10am to 1pm
Tuesday, June 07, 2011	low	3=Gotts Point	5=7pm to 9pm
Sunday, June 12, 2011	high	1=lower dam	2=10am to 1pm
Thursday, June 16, 2011	low	1=lower dam	4=4pm to 7pm
Saturday, June 18, 2011	high	2=HQ Platform	3=1pm to 4pm
Friday, June 24, 2011	low	2=HQ Platform	2=10am to 1pm
Wednesday, June 29, 2011	low	3=Gotts Point	3=1pm to 4pm
Saturday, July 02, 2011	peak	3=Gotts Point	4=4pm to 7pm
Sunday, July 03, 2011	peak	1=lower dam	5=7pm to 9pm
Sunday, July 10, 2011	high	2=HQ Platform	4=4pm to 7pm
Monday, July 11, 2011	low	1=lower dam	2=10am to 1pm
Saturday, July 16, 2011	high	3=Gotts Point	5=7pm to 9pm
Tuesday, July 19, 2011	low	2=HQ Platform	5=7pm to 9pm
Sunday, July 24, 2011	high	1=lower dam	5=7pm to 9pm
Thursday, July 28, 2011	low	3=Gotts Point	1=10am to 1pm
Friday, August 05, 2011	low	1=lower dam	5=7pm to 9pm
Saturday, August 06, 2011	high	2=HQ Platform	1=10am to 1pm
Wednesday, August 10, 2011	low	2=HQ Platform	3=1pm to 4pm
Sunday, August 14, 2011	high	3=Gotts Point	2=10am to 1pm
Monday, August 15, 2011	low	3=Gotts Point	4=4pm to 7pm
Saturday, August 20, 2011	high	1=lower dam	3=1pm to 4pm
Tuesday, August 23, 2011	low	1=lower dam	5=7pm to 9pm
Sunday, August 28, 2011	high	2=HQ Platform	4=4pm to 7pm
Thursday, September 01, 2011	low	2=HQ Platform	1=10am to 1pm
Saturday, September 03, 2011	peak	2=HQ Platform	1=10am to 1pm
Monday, September 05, 2011	peak	3=Gotts Point	2=10am to 1pm
Friday, September 16, 2011	low	3=Gotts Point	2=10am to 1pm
Saturday, September 17, 2011	high	3=Gotts Point	5=7pm to 9pm
Wednesday, September 21, 2011	low	1=lower dam	3=1pm to 4pm
Monday, September 26, 2011	low	2=HQ Platform	4=4pm to 7pm

Appendix 3: Parking Lot Count Data Sheet

LAKE LOWELL PARKING LOT COUNTS

Date:_____ Weekend Weekday

Area: Lower Dam Upper Dam West Upper Dam East Parking Lot 1 or 7

Time Block: 7am to 9 am 1pm to 3pm 5pm to 7pm

Observer: _____

Time Start: _____ Time End:_____

Weather:_____

Time	Car	Truck/Van	Vehicle w/ Trailer			Motor-cycle	RV	Approx Length	Activity	Comment
			Motorized Boat	Nonmotorized Boat	Jet ski					

Activity: 1 = Fishing 2 = Water Skiing 3 = Jet skiing 4 = Sailing 5 = Other Recreation

Appendix M. Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge

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Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge

By Lynne Koontz, Catherine M. Cullinane Thomas, and Erik Larsen

Introduction

The National Wildlife Refuge System Improvement Act of 1997 requires all units of the National Wildlife Refuge System to be managed under a Comprehensive Conservation Plan (CCP). The CCP must describe the desired future conditions of a Refuge and provide long range guidance and management direction to achieve refuge purposes. The Deer Flat National Wildlife Refuge (Refuge) is in the process of developing a range of management goals, objectives, and strategies for the CCP. The CCP must contain an analysis of expected effects associated with current and proposed Refuge management strategies.

For CCP planning, a regional economic analysis provides a means of estimating how current management (No Action Alternative) and proposed management activities (Action Alternatives) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates the Refuge's contribution to the local community; and 2) it can help in determining whether economic effects are or are not a real concern in choosing among management alternatives.

It is important to note that the economic value of the Refuge encompasses more than just the impacts on the regional economy. The Refuge also provides substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill, 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.

This report first presents a description of the local communities and economy near the Refuge. Next, the methods used to conduct a regional economic impact analysis are described. An analysis of the final CCP management strategies that could affect stakeholders and residents and the local economy is then presented. The management activities of economic concern in this analysis are:

- Purchases of goods and services within the local community;
- Personnel salary spending;
- Revenues generated from Refuge Revenue Sharing; and
- Spending in the local community by Refuge visitors

Regional Economic Setting

Located southwest of Boise, Idaho, the Refuge has two units, Lake Lowell and the Snake River Islands. The Lake Lowell Unit encompasses more than 10,500 acres, including the almost 9,000-acre Lake Lowell and surrounding lands. The Snake River Islands Unit contains about 1,200 acres on over 100 islands. These islands are distributed along 113 river miles from the Canyon-Ada County Line in Idaho to Farewell Bend in Oregon.

Refuge visitors can enjoy a variety of wildlife-dependent recreational activities, (i.e., wildlife-watching and photography, hunting, fishing, and environmental education and interpretation), as well as non-wildlife dependent recreational activities, including recreational boating, horseback riding, and dog walking. These recreational opportunities attract outside visitors and bring in dollars to the community. Associated visitor activities—such as spending on food, gasoline, and overnight lodging in the area—provides local businesses with supplemental income and increases the local tax base. Management decisions for the Refuge about public use, expansion of services, and habitat improvement may either increase or decrease visitation to the complex and, thus, affect the amount of visitor spending in the local economy.

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30-60 mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. After consultation with the Refuge staff, it was decided that only the Lake Lowell Unit would be considered for the economic analysis due to the relatively small amount of visitation to the Snake River Islands Unit. The Lake Lowell Unit lies within Canyon County, Idaho. The city of Boise, located in Ada County, is approximately 28 miles from the Refuge. Most of the economic activity related to the Lake Lowell Unit is located within Canyon and Ada counties. Therefore, this two-county area comprises the local economic region for this analysis. The next sections describe the socioeconomic characteristics and trends in the two-county region.

Population and Density

Table 1 summarizes the population characteristics of Idaho and the local two-county area. In 2010, the U.S. Census Bureau estimated the total population for the two counties to be 581,288, or 37% of Idaho's total population. Ada County was the most heavily populated county in both the study area and the state with 392,365 residents in 2010. Canyon County (188,923 residents) was the second most populous county of the state in this same year (United States Census Bureau, 2012; Idaho Department of Labor, 2011a; Idaho Department of Labor, 2011b). In the years leading up to the economic recession of the late 2000s, the two-county area experienced rapid population growth, with the respective populations of Ada and Canyon Counties increasing by 24% and 36% between the years of 2000 and 2008 (United States Census Bureau, 2012). The rapid population growth in the study area throughout the majority of the past decade has been motivated by several factors, including a healthy labor market, relatively low real estate prices, ample opportunity for outdoor recreation, and easy access to the Boise Metro Area (Idaho Department of Labor, 2011b; Cauchon, 2007).

Table 1. Population Estimates for the State and Counties Near the Refuge

Area	Population (2010)†	% Change (2000-2010)†	Persons per Square Mile (2010) †	Expected Population Growth (2010-2030) ‡
Idaho	1,567,582	21.1%	19	31%
Ada County	392,365	30.4%	373	42%
Canyon County	188,923	43.7%	322	34%

Source: † (United States Census Bureau, 2012) and ‡ (Church, 2003)

In the final two years of the decade, population growth in the study area slowed due to repercussions of the national economic recession, with the populations of Ada and Canyon Counties averaging only 2.0% and 3.0% growth, respectively, during these years (United States Census Bureau, 2012). Despite slowed growth from 2008 to 2010, the Treasure Valley and Boise Metro Area remain among some of the fastest growing regions of the state over the past decade; they are expected to continue to be so over the coming decades (Bureau of Economic Analysis, 2010; Church, 2003).

In 2010, the population densities of both counties in the region were between 300-400 persons per square mile, with Ada County being more densely populated (373 persons per square mile) than Canyon County (322 persons per square mile) (United States Census Bureau, 2012). Both counties had substantially higher population densities than the state of Idaho as a whole (nineteen persons per square mile in 2010). In the case of Ada County, the high population density is largely due to the city of Boise, which accounted for over half (52%) of the county's 2010 populace (United States Census Bureau, 2012). Similarly, the cities of Nampa (81,557 residents) and Caldwell (46,237 residents) collectively accounted for 68% of the population of Canyon County in 2010 (United States Census Bureau, 2012). Rural areas are more sparsely populated than the data shown in Table 1.

Population Projections

Future population projections for the two-county area as well as the state of Idaho are characterized by in-migration over the next twenty years. The population of Idaho is expected to increase by 31% over the course of the next two decades, and, by 2030, it is projected to reach nearly two million (Church, 2003). During these years, Idaho is anticipated to be one of the fastest growing states, with growth rate projections consistently among the top ten in the nation (United States Census Bureau, 1996). In 2010, the most populated regions in Idaho included parts of the Treasure Valley and Boise Metro Regions (i.e., Ada and Canyon Counties) (United States Census Bureau, 2012). These regions, which correspond to some of the state's largest population centers (e.g., the cities of Boise, Nampa, Caldwell), are expected to remain the most populated areas statewide over the next two decades. The Treasure Valley and Boise Metro Region is expected to be the fastest growing region in the state over the next twenty years, with Valley, Boise, Ada, and Canyon Counties averaging a growth rate of 42% over this time horizon. The two counties that make up the study area are expected to remain among the fastest growing counties in the state, with Ada and Canyon Counties projected to be the first and eighth fastest growing counties statewide over the next two decades (Church, 2003).

Gender, Age and Racial Composition

In 2010, the median age of residents in Canyon County (31.6 years) was lower than the state median of 34.6 years and the Ada County median of 34.8 years (United States Census Bureau, 2012) (United States Census Bureau, 2012). In 2010, the racial demographics of Ada County were very similar to those of the state (Table 2). In Canyon County the percentage of Hispanic or Latino residents was approximately 13% higher while the percentage of white residents was 6% lower than the state average (United States Census Bureau, 2012).

Table 2. Racial Demographics for the State and Counties Near the Refuge (2010)

Area	**Idaho**	**Ada County**	**Canyon County**
		% of Total Population	
White alone	89.0%	90.3%	83.0%
Hispanic or Latino	11.2%	7.1%	23.9%
Two or more races	2.5%	2.9%	3.0%
Asian alone	1.2%	2.4%	0.8%
Black or African American alone	0.6%	1.1%	0.6%
American Indian and Alaska Native alone	1.4%	0.7%	1.0%
Native Hawaiian and other Pacific Islander alone	0.2%	0.2%	0.2%

Source: (United States Census Bureau, 2012)

Economic Conditions and Trends

Unemployment and Poverty

Since the early 1990s, trends in the unemployment rate in the state of Idaho have generally paralleled the national average, with unemployment trending downward in the late 1990s to reach levels below the national average by the mid-2000s before increasing again in the latter half of the same decade (Bureau of Labor Statistics, 2011a). The period of expansion in the early 2000s may be attributed to several factors, including the growth of several service industries, the continued development of the state's technology sector, and increasing demand for local government and construction services as the state's population continued to grow (Idaho Division of Financial Management, 2004). In 2008, Idaho's unemployment rate trended sharply upward as the state began to feel the recessionary effects of a sluggish national economy, with the construction, manufacturing, financial services, administrative and support services, and retail trade industries suffering the greatest job losses in the state's economy (Idaho Department of Labor, 2011c; Idaho Department of Labor, 2009). Since 1990, unemployment in the study area exhibited similar trends as statewide unemployment, with Ada County and Canyon County averaging unemployment rates of 4.0% and 5.8%, respectively, over the past two decades (Bureau of Labor Statistics, 2011a). Between 2008 and 2010, unemployment in the two-county area saw a sharp increase, particularly in Canyon County where the combined effects of slowed population growth, a struggling housing market, and rising lumber, concrete, and fuel prices decreased the local demand for labor (Idaho Department of Labor, 2011a).

Table 3 summarizes measures of unemployment, poverty, and income in the two-county area. In 2010, the median household income in Idaho as a whole was $43,490, which was about $6,500 lower than the national median household income of $50,046 (United States Census Bureau, 2012). Median household income in the region averaged $46,672, with the median income in Ada County ($50,612) being substantially higher than that in Canyon County ($42,732).

Table 3. Unemployment, Poverty, and Household Income for the State and Counties Near the Refuge

Area	Median Household Income 2010	Unemployment Rate 2010	Net Change in Unemployment Rate 2007-2010	Percent of Persons Below Poverty 2010
Idaho	$43,490	9.5%	6.5%	25.0%
Ada County	$50,612	8.9%	6.4%	29.8%
Canyon County	$42,732	11.3%	7.8%	16.2%

Source: United States Census Bureau, 2012

As shown in Table 3, poverty levels in Canyon County (16.2%) were below the state average of 25% in 2010. In contrast, poverty levels in Ada County (29.8%) were greater than the state average in 2010. The two-county area averaged 23% of its population below the 2010 poverty line (United States Census Bureau, 2012).

Employment and Income by Industry

Table 4 summarizes employment by industry for the two-county area. In 2009, total employment in the local area represented 339,730 jobs with about 77% of these jobs located in Ada County. Sixty percent of the total employment in the study area came from five main sectors (Bureau of Economic Analysis, 2010): professional, scientific, management, administration, and waste services; educational, health, and social services; retail trade; finance, insurance, real estate, and rental and leasing; and public administration. In 2008, the two largest employers in Ada County were Micron Technology and Hewlett Packard; these companies remain some of the largest local employers in Ada County (Ada County Accounting Department, 2008; Idaho Department of Labor, 2011b). In Canyon County, the largest local employers in the past decade have been in the education, manufacturing, health care, food processing, and wood processing sectors. These employers currently include the Caldwell and Nampa School Districts, the St. Alphonsus Medical Center, Plexus, the Amalgamated Sugar Company, and Woodgrain Milwork Incorporated (Idaho Department of Labor, 2011a; City of Nampa Department of Planning and Zoning, 2003).

Professional, scientific, management, administration, and waste services accounted for the largest percentage of total employment in the region, with 15.6% of total local employment coming from this sector. In the two-county area, most jobs in education, health, and social services (77%) and public administration (87%) were located in Ada County, which is home to both the state capital and Boise State University. These sectors were the second and fifth largest sectors of the local economy, respectively, and accounted for 13.1% and 10.3% of total employment in the combined two-county area (Bureau of Economic Analysis, 2010).

On the whole, farm employment accounted for a relatively small share (1.5%) of total employment in the region. Employment from this sector, however, did account for a larger share of total employment located in Canyon County (4% of total in-county employment) than Ada County (less than one percent). On the whole, Ada County was much less dependent on farm earnings (less than one percent of total in-county farm earnings) than the state as a whole, which had about 4.0% of its total earnings coming from farming; the opposite is true of Canyon County, which had 4.7% of its total earnings from farming (Bureau of Economic Analysis, 2010).

Table 4. Employment by Industry for the Counties Near the Refuge

	Ada County	Canyon County	Two-County Area
Total Employment (jobs) in 2009	**262,868**	**78,862**	**339,730**
Percent of Employment by Sector			
Professional, scientific, management, admin., and waste services	17%	9%	16%
Educational, health, and social services	13%	13%	13%
Retail trade	11%	13%	11%

Finance, insurance, real estate, and rental & leasing	11%	8%	10%
Public administration	10%	11%	10%
Arts, entertainment, recreation, accommodation, and food services	9%	6%	8%
Manufacturing	6%	10%	7%
Construction	6%	8%	7%
Other Services (except public administration)	5%	6%	5%
Wholesale trade	4%	3%	4%
Transportation and Warehousing	2%	4%	3%
Agriculture, forestry, fishing and hunting, and mining	1%	6%	2%
Information Services	2%	1%	2%

Source: (Bureau of Economic Analysis, 2010)

Land Use and Ownership Changes Surrounding Refuge Lands

Current Land Use

Idaho's Treasure Valley lies within a flat lowland known as the Snake River Plain. The Treasure Valley stretches across the southwest corner of the state and is bounded by the Boise Front Range to the northeast and the Owyhee Mountains to the southwest (Petrich, Wilkins, Tondee, & Morse, 2002). This valley closely coincides with the two-county study area, and it houses some of Idaho's largest metropolitan areas, including the cities of Boise, Caldwell, and Nampa, which collectively accounted for about 21% of the state's 2010 population (United States Census Bureau, 2012). As of 2008, about 30% of the land in the two-county area near the Refuge was federally owned, with the majority of federal land ownership accounted for by Bureau of Land Management holdings (21% of all land in the two-county area). About 65% of the land in the study area was privately owned and the remaining 4% was State-owned (Conservation Biology Institute, 2006 [data complied using the Economic Profile System-Human Dimensions Toolkit (EPS-HDT) developed by Headwaters Economics]).

Ada County is largely covered by grassland and shrubland, which account for about 75% of all land cover in the County. Mixed cropland is also prevalent, accounting for 17% of the land cover (NASA, 2006 [data complied using EPS-HDT]). As of 2008, urban development accounted for 6% of all land cover in the County, with the greater Boise area (i.e., the cities of Boise, Eagle, Garden City, Kuna, Meridian, and Star) accounting for 332,646 residents, or about 85% of the county's total 2010 population (United States Census Bureau, 2012). Land ownership in Ada County in 2008 was 49% private, 43% Federal, 7% State, and 1% under other ownership (*i.e.* Tribal, City, County, or Other) (Conservation Biology Institute, 2006 [data complied using EPS-HDT]).

Canyon County is less urbanized with about 3% of the county's land cover being urban development in 2008. Mixed croplands accounted for about 75% of the county's land cover, grassland accounted for 14%, and shrubland accounted for 4% (NASA, 2006 [data complied using EPS-HDT]). Water

accounted for an additional 2% of land cover in Canyon County with the majority of this coming from Lake Lowell, which covers a total of 14.5 square miles of the county's land (NASA, 2006 [data complied using EPS-HDT]; United States Bureau of Reclamation, n.d.). In 2010, the largest municipalities in Canyon County included Nampa (81,557 residents), Caldwell (46,237 residents), and Middleton (5,524 residents), which collectively accounted for about 34% of the county's total population (United States Census Bureau, 2012). Land ownership in Canyon County in 2008 was 93% private, 6% Federal, 5% State owned, and 1% under other ownership (*i.e.* Tribal, City, County, or Other) (Conservation Biology Institute, 2006 [data complied using EPS-HDT]).

Changes in Land Use

As populations grow, the spread of American cities across the rural landscape has several potential environmental impacts including, for example, decreased watershed permeability, increased noise and air pollution, and the loss of arable land and open spaces (McMahan, Weber, & Sauder, 2002). In addition to these environmental impacts, urban sprawl may have significant economic impacts on local communities through increased costs of public community services such as emergency response, infrastructure, or public works and utilities (Chen, 2000; Speir & Stephenson, 2002). Population growth in Idaho over the past decades has been cause for the continued conversion of rural lands to urban purposes. Between 1982 and 1997, Idaho ranked 35th in the nation for the most rural acres converted for urban growth purposes, with 205,000 acres of rural land being converted (Goodwin, 2003). About half (45%) of this transformation took place between 1992 and 1997, with over 27,000 of these acres occurring in the two-county study area during this five year period. Land conversion in Ada and Canyon Counties between 1992 and 1997 occurred faster than in any other region in Idaho, with Ada County converting land at a rate of 4,480 acres per year and Canyon County averaging 2,600 acres per year (United States Department of Agriculture, 2000). Between 1997 and 2007, an additional 130,100 acres of land was developed statewide, resulting in 557,600 total acres of developed land in Idaho and representing a 61% increase from 1982 levels (United States Department of Agriculture, 2009). These trends of urbanization and sprawl are likely to continue in the future as statewide and local area populations are projected to continue growing over the next few decades.

Economic Impacts of Current and Proposed Management Activities

Methods for a Regional Economic Impact Analysis

Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for the Refuge were estimated using IMPLAN (Impact Analysis for

Planning), a regional input-output modeling system developed by the USDA Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than four hundred economic sectors (Olson and Lindall, 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group from multiple federal and state sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau (Olson and Lindall, 1999). For the Refuge analysis, the year 2009 IMPLAN 3.0 data profiles for Ada and Canyon counties were used for the local area analysis. The IMPLAN county level employment data estimates were found to be comparable to the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2009.

Because of the way industries interact in an economy, activity in one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the *direct* effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that doesn't stay in the local economy is termed a leakage (Carver and Caudill, 2007). In order to increase supplies to local businesses to meet increased demand, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. "Multipliers" (or "Response Coefficients") capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes, 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- **Employment** represents the change in the number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs.
- **Labor Income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.
- **Value Added** measures contribution to Gross Domestic Product. Value added is equal to the difference between the amount an industry sells a product for and the production cost of the product, and is thus net of intermediate sales.

This economic impact analysis provides the potential economic effects associated with the implementation of the management alternatives for the Deer Flat National Wildlife Refuge. The CCP provides long range guidance and management direction to achieve the Refuge purposes over a 15-year timeframe. The planning team developed and analyzed four alternatives including current management. The economic impacts reported in this report are on an annual basis in 2011 dollars. Large management changes often take several years to achieve. The estimates reported for all the alternatives represent the final average annual economic effects after all changes in management have been implemented.

Impacts from Refuge Revenue Sharing

Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75% of the fair market value of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In fiscal year 2010 (FY10), actual RRS payments were 21% of authorized levels. FY10 RRS payments (made in 2011) totaled $4,547 to communities in Canyon County. Table 5 shows the resulting economic impacts of RRS payments under all alternatives. Accounting for both the direct and secondary effects, RRS payments for Alternatives 1, 2, 3, and 4 would generate total annual economic impacts of $1.9 thousand in labor income and $2.8 thousand in value added in the local two-county area.

Table 5. Annual Impacts from Refuge Revenue Sharing Payments for all Alternatives.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternatives 1, 2, 3, and 4			
Direct effects	0	$1.4	$1.8
Secondary effects	0	$0.5	$1.0
Total economic impact	0	$1.9	$2.8

Impacts from Public Use and Access Management

Refuge Visitor Expenditures in Local Economy

Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The FWS report Banking on Nature: The Economic Benefits of National Wildlife Refuges

Visitation to Local Communities, estimated the impact of national wildlife refuges on their local economies (Carver and Caudill, 2007). According to the report, more than 34.8 million visits were made to national wildlife refuges in FY 2006 which generated $1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated nearly 27,000 jobs, and over $542.8 million in employment income (Carver and Caudill, 2007). Approximately eighty-two percent of total expenditures were from non-consumptive activities, twelve percent from fishing, and six percent from hunting (Carver and Caudill, 2007).

The priority "Big-Six" wildlife dependent uses are offered on the Lake Lowell Unit including: hunting, fishing, wildlife observation and photography, interpretation, and environmental education. Additionally, several other non-priority uses occur on the Refuge including non-wildlife dependent boating, swimming, jogging, and picnicking.

This section focuses on the regional economic impacts associated with Refuge visitation. Annual visitation estimates are based on several Refuge statistic sources including: visitors entering the Visitor Center/Office, counting vehicles at dispersed access sites, and general observation by Refuge personnel. Annual visitation estimates are on a per visit basis. Visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time visiting the Refuge, counting each visit as a full visitor day would overestimate the economic impact of Refuge visitation. In order to properly account for the amount of spending, the annual number of visits were converted to visitor days. Results from a recent visitor survey conducted during the summer of 2011(Sexton et. al., 2012) showed that Refuge visitors spend on average: five hours for fishing and non-wildlife dependent boating; four hours for swimming; and three hours for wildlife related non-consumptive activities (wildlife watching & photography, environmental education, and interpretation) and land-based non-wildlife dependent activities (walking, jogging, picnicking). Refuge personnel estimate that big game and waterfowl hunters spend six hours while upland game and other migratory bird hunters spend approximately 4 hours on the Refuge.

To determine the local economic impacts of visitor spending, only spending by persons living outside of the local two-county area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into Ada and Canyon counties from visitors living outside the local area (hereafter referred to as non-local visitors) is considered new money injected into the local economy. Second, if residents of the local two-county area visit the Refuge more or less due to the management changes, it is likely that they will correspondingly change the spending of their money elsewhere in that local area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic impact analyses at the local level. However, it is possible that potential Refuge management actions that would restrict boating and other non-priority recreation at the Refuge could result in visitors from the local area shifting their expenditures from Canyon County to Ada County or possibly going outside of Ada and Canyon counties to boat and recreate at reservoirs outside of the two-county area. To address the contribution of local Refuge

visitation, Appendix A provides a contribution analysis of local visitor expenditures in the two-county area. Refuge personnel determined the percentage of non-local Refuge visitors based on . Table 6 shows the estimated percent of current Refuge visits and visitor days by visitor activity.

Table 6. Estimated Current Annual Refuge Visitation.

Visitor Activity	Total annual number of visits	Number of hours spent at the Refuge	Total annual number of visitor days[a]	Percentage of non-local visits (%)	Number of non-local visitor days[a]
Priority Uses:					
Fishing	45,300	5	28,313	7%	1,982
Big game hunting	75	6	56	8%	5
Waterfowl hunting	5,000	6	3,750	8%	300
Other migratory bird hunting (mourning dove)	100	4	50	8%	4
Upland game hunting	1,100	4	550	8%	44
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	55,900	3	20,963	10%	2,096
Non-priority uses:					0
Non-wildlife dependent boating	49,400	5	30,875	13%	4,014
Swimming and other beach activities	38,700	4	19,350	13%	2,516
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking))	27,800	3	10,425	13%	1,355
Total Visitation	*223,375*		*114,331*		*12,315*

[a]One visitor day = 8 hours.

The Refuge staff used several sources to project changes in visitation by activity over the next 15 years for each alternative. The Refuge staff estimated visitor projections based on the following considerations: Idaho and national visitation trend data; changes in recreational programs, facilities, and resources under each alternative; and changes observed in visitation at Deer Flat NWR over the last 10 years (Refuge staff experience/judgment). Table 7 shows projected annual average number of visits and visitor days for each activity and alternative.

Table 7. Annual Average Number of Refuge Visits and Visitor Days by Activity and Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total Visits				
Priority Uses:				
Fishing	48,430	48,430	23,260	12,710

Big game hunting	125	125	125	125
Waterfowl hunting	5,350	5,350	3,090	4,280
Other migratory bird hunting (mourning dove)	110	110	50	40
Upland game hunting	1,180	1,180	550	410
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	93,410	125,560	123,080	103,850
Non-priority uses:				
Non-wildlife dependent boating	55,080	50,040	21,480	0
Swimming and other beach activities	60,290	54,260	40,700	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	32,280	30,970	27,140	11,500
Total Annual Visits	*296,255*	*316,025*	*239,475*	*132,915*
Total Visitor Days				
Priority Uses:				
Fishing	30,269	30,269	14,538	7,944
Big game hunting	94	94	94	94
Waterfowl hunting	4,013	4,013	2,318	3,210
Other migratory bird hunting (mourning dove)	55	55	25	20
Upland game hunting	590	590	275	205
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	35,029	47,085	46,155	38,944
Non-priority uses:				
Non-wildlife dependent boating	34,425	31,275	13,425	0
Swimming and other beach activities	30,145	27,130	20,350	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	12,105	11,614	10,178	4,313
Total Visitor Days	*146,724*	*152,124*	*107,356*	*54,729*
Non-local Visitor Days				
Priority Uses:				
Fishing	2,119	2,119	1,018	556
Big game hunting	8	8	8	8
Waterfowl hunting	321	321	185	257
Other migratory bird hunting (mourning dove)	4	4	2	2
Upland game hunting	47	47	22	16
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	3,503	4,709	4,616	3,894
Non-priority uses:				
Non-wildlife dependent boating	4,475	4,066	1,745	0
Swimming and other beach activities	3,919	3,527	2,646	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	1,574	1,510	1,323	561
Total Non-local Visitor Days	15,970	16,310	11,564	5,293

A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. In this analysis we use average daily visitor spending profiles from the Banking on Nature report (Carver and Caudill, 2007) that were derived from the 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (U.S. Fish and Wildlife Service, 2007). The National Survey reports trip related spending of state residents and non-residents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each FWS region. We used the spending profiles for nonresidents for FWS Region 1 (Region 1 includes Idaho), and updated the 2006 spending profiles to 2011 dollars using the Consumer Price Index Inflation Calculator. Average daily spending profiles for nonresident visitors to Region 1 for fishing ($65.98 per-day), big game hunting ($94.98 per-day), upland game hunting ($172.41 per-day) and waterfowl hunting ($192.73 per-day) were used to estimate non-local visitor spending for Refuge fishing and hunting related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) ($121.59 per-day) was used for all non-consumptive wildlife viewing activities including non-priority swimming and beach activities and land-based non-wildlife dependent activities.

Banking on Nature does not include a spending profile for boating. To account for expenditures by boaters, it was assumed that boaters have similar expenditures to other non-consumptive wildlife recreators, but have additional fuel expenses to power their motor boats. Based on this assumption, the boater spending profile for this analysis was constructed by adding average daily boating fuel expenditure costs to the average daily nonresident spending profile for non-consumptive wildlife recreation from the Banking on Nature report. Average daily boating fuel expenditures per party were estimated by multiplying the average outboard fuel consumption for 2- and 4-stroke boats (3.2 gallons/hour; Nissan Marine, 2012) by the U.S. average conventional retail gasoline prices for the summer of 2011 (May-August) ($3.68; U.S. Energy Information Administration, 2012). Average daily boating fuel expenditures per person were then calculated by dividing average daily boating fuel expenditures per party by the average number of persons in a boating party (4 persons/party; Sexton et. al., 2012). This resulted in an average daily boating fuel expenditure of $23.57 per-day and total nonresident daily boating expenditures of $145.16 per-day.

Total spending by non-local Refuge visitors was determined by multiplying the average non-local visitor daily spending by the number of non-local visitor days at the Refuge. The economic impacts of each alternative were estimated using IMPLAN. Table 8 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 1. Under Alternative 1, non-local Refuge visitors would spend approximately $1.95 million in the local economy annually. This

spending would directly account for 19 jobs, $538.2 thousand in labor income, and $877.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 9 jobs, $309.6 thousand in labor income, and $546.2 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 1 would generate total economic impacts of 28 jobs, $847.8 thousand in labor income, and $1.4 million in value added.

Table 8. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 1.

Alternative 1	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.1*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	1	$27.6	$45.8
Non-Consumptive (wildlife watching & photography, env. education, and interpretation)			
Direct effects	4	$111.4	$182.1
Secondary effects	2	$67.7	$118.9
Total effect	*6*	*$179.1*	*$301.0*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	7	$197.9	$322.6
Secondary effects	3	$105.3	$187.0
Total effect	*10*	*$303.1*	*$509.6*
Swimming and other beach activities			
Direct effects	4	$124.7	$203.8
Secondary effects	2	$75.7	$133.0
Total effect	*6*	*$200.4*	*$336.8*
Land-based non-wildlife dependent (walking, jogging, and other activities, e.g., picnicking)			
Direct effects	2	$50.1	$81.8
Secondary effects	1	$30.4	$53.4
Total effect	*3*	*$80.5*	*$135.2*
Aggregate Non-local visitation			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total effect	*28*	*$847.8*	*$1,423.8*

Table 9 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 2. Under Alternative 2, non-local Refuge visitors would spend approximately $1.99 million in the local economy annually. This spending would directly account for 19 jobs, $543.9 thousand in labor income, and $887.1 thousand in value added in the local economy. The secondary or

multiplier effects would generate an additional 10 jobs, $314.4 thousand in labor income, and $554.6 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 2 would generate total economic impacts of 29 jobs, $858.4 thousand in labor income, and $1.4 million in value added.

Table 9. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 2.

Alternative 2	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.1*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	*1*	*$27.6*	*$45.8*
Non-Consumptive (wildlife watching & photography, env.l education, and interpretation)			
Direct effects	5	$149.8	$244.8
Secondary effects	3	$91.0	$159.8
Total effect	*8*	*$240.7*	*$404.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	6	$179.8	$293.1
Secondary effects	3	$95.6	$169.9
Total effect	*9*	*$275.4*	*$463.0*
Swimming and other beach activities			
Direct effects	4	$112.2	$183.4
Secondary effects	2	$68.1	$119.7
Total effect	*6*	*$180.3*	*$303.1*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	2	$48.0	$78.5
Secondary effects	1	$29.2	$51.3
Total effect	*3*	*$77.2*	*$129.8*
Aggregate Non-local visitation			
Direct effects	19	$543.9	$887.1
Secondary effects	10	$314.4	$554.6
Total effect	*29*	*$858.4*	*$1,441.6*

Table 10 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 3. Under Alternative 3, non-local Refuge visitors would spend approximately $1.4 million in the local economy annually. This spending would directly account for 13 jobs, $377.8

thousand in labor income, and $616.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 6 jobs, $222.4 thousand in labor income, and $391.6 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 3 would generate total economic impacts of 19 jobs, $600.1 thousand in labor income, and $1 million in value added.

Table 10. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 3.

Alternative 3	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$17.5	$28.2
Secondary effects	0	$10.0	$17.6
Total effect	*1*	*$27.4*	*$45.8*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$10.1	$16.2
Secondary effects	0	$5.5	$9.8
Total effect	*0*	*$15.6*	*$26.0*
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)			
Direct effects	5	$146.8	$240.0
Secondary effects	3	$89.2	$156.7
Total effect	*8*	*$236.0*	*$396.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	3	$77.2	$125.8
Secondary effects	1	$41.1	$72.9
Total effect	*4*	*$118.2*	*$198.7*
Swimming and other beach activities			
Direct effects	3	$84.1	$137.6
Secondary effects	1	$51.1	$89.8
Total effect	*4*	*$135.3*	*$227.4*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$42.1	$68.8
Secondary effects	1	$25.6	$44.9
Total effect	*2*	*$67.6*	*$113.7*
Aggregate Non-local visitation			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.4	$391.6
Total effect	*19*	*$600.1*	*$1,008.2*

Table 11 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 4. Under Alternative 4, non-local Refuge visitors would spend approximately

$631 thousand in the local economy annually. This spending would directly account for 5 jobs, $164.5 thousand in labor income, and $268.3 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 2 jobs, $98.7 thousand in labor income, and $173.5 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 4 would generate total economic impacts of 7 jobs, $263.2 thousand in labor income, and $441.8 thousand in value added.

Table 11. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 4.

Alternative 4	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	0	$9.5	$15.4
Secondary effects	0	$5.5	$9.6
Total effect	*0*	*$15.0*	*$25.0*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$13.3	$21.2
Secondary effects	0	$7.1	$12.7
Total effect	*0*	*$20.4*	*$33.9*
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)			
Direct effects	4	$123.9	$202.5
Secondary effects	2	$75.2	$132.2
Total effect	*6*	*$199.1*	*$334.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Swimming and other beach activities			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$17.8	$29.2
Secondary effects	0	$10.8	$19.0
Total effect	*1*	*$28.7*	*$48.2*
Aggregate Non-local visitation			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.7	$173.5
Total effect	*7*	*$263.2*	*$441.8*

Table 12 summarizes the total economic impacts associated with current non-local Refuge visitation by alternative. As shown in Table 12, the total annual average economic impacts for Alternative 2 would be similar to Alternative 1. The impacts for Alternative 3 would be approximately 30% less than the impacts for Alternative 1. Alternative 4 would have the largest decrease in impacts (approximately 70-75%) compared to Alternative 1.

Table 12. Average Annual Impacts of Non-Local Visitor Spending by Alternative.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total economic impact	28	$847.8	$1,423.8
Alternative 2			
Direct effects	19	$543.9	$887.1
Secondary effects	10	$314.4	$554.6
Total economic impact	29	$858.4	$1,441.6
Alternative 3			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.4	$391.6
Total economic impact	19	$600.1	$1,008.2
Alternative 4			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.7	$173.5
Total economic impact	7	$263.2	$441.8

Impacts from Refuge Administration

Staff – Personal Purchases

Refuge employees reside and spend their salaries on daily living expenses in the local area, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals/households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles allow for leakage of household spending to outside the region. The IMPLAN household spending pattern for households

earning $35-50 thousand dollars per year was used to reflect the average salary of full-time permanent employees at the Refuge ($46,000 per year). Table 13 illustrates current Refuge staffing and additional positions needed under Alternatives 2, 3, and 4.

Table 13. Current Staffing and Additional Positions Needed to Implement the CCP.

Current Refuge Staff Positions (Alternative 1)
Refuge Manager
Assistant Refuge Manager
Visitor Services Manager
Wildlife Biologist
Maintenance Worker
Administrative Assistant
Office Aid
Youth Conservation Corps Leader (full-time seasonal)
Youth Conservation Corps (4 full-time seasonal positions)
Environmental Education Specialist (Intern)
Volunteer Coordinator (Intern)
Biological Science Technician (Intern)
Additional positions needed to implement the CCP (for Alt 2,3, 4)
*Biological Science Technician
*Environmental Education Specialist
*Volunteer Coordinator
Law Enforcement Officer

*If these positions were funded, the current interns would not be necessary.

Refuge personnel estimate that annual salaries total around $524.6 thousand for Alternative 1 and would increase to $711.1 thousand under Alternatives 2, 3, and 4. Table 14 shows the economic impacts associated with spending of salaries in the local two-county area by Refuge employees under all Alternatives. For Alternative 1, salary spending by Refuge personnel would generate additional secondary effects (i.e. additional non-refuge jobs in the local economy) of 4 jobs, $133.9 thousand in labor income, and $249.3 thousand in value added in the local economy. Alternatives 2,3, and 4 would generate additional secondary effects of 5 jobs, $181.5 thousand in labor income, and $338 thousand in value added in the local economy.

Table 14. Annual Local Impacts of Salary Spending by Deer Flat NWR Personnel for by Alternative.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			

Direct effects	0	$0.0	$0.0
Secondary effects	4	$141.1	$254.7
Total economic impact	*4*	*$141.1*	*$254.7*
Alternatives 2, 3, and 4			
Direct effects	0	$0.0	$0.0
Secondary effects	6	$191.2	$345.2
Total economic impact	*6*	*$191.2*	*$345.2*

Work-related Purchases

A wide variety of supplies and services are purchased for Refuge operations and maintenance activities. Refuge purchases made in the local two-county area contribute to the local economic impacts associated with the Refuge. Major local expenditures include: supplies and services related to annual maintenance costs for trails, buildings and signage, and small equipment; auto repairs, parts, and fuel; and utilities. Current Refuge non-salary recurring expenditures average approximately $204.7 thousand per year. Average annual costs (including recurring costs and the annual average of one-time project costs over the life of the plan) are anticipated to increase by $83.8 thousand for Alternative 1, $397 thousand for Alternative 2, $832.8 thousand for Alternative 3, and $362.6 thousand for Alternative 4. Total average annual non-salary costs would total $288.5 thousand for Alternative 1, $601.7 thousand for Alternative 2, $1.04 million for Alternative 3, and $567.3 thousand for Alternative 4. The large increase in costs under Alternative 3 are related to the construction of a boardwalk. According to Refuge records, approximately 80% of the annual non-salary budget expenditures are spent on goods and services purchased in the local two-county area. Table 15 shows the economic impacts associated with work-related expenditures in local communities near the Refuge. For Alternative 1, work-related purchases would generate a total economic impact of 3 jobs, $122.9 thousand in labor income, and $179.3 thousand in value added. Work-related purchases under Alternative 3 would generate the largest total economic impact of 15 jobs, $536.6 thousand in labor income, and $734.4 thousand in value added.

Table 15. Local Economic Impacts of Refuge Related Purchases by Alternative

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			
Direct effects	2	$76.5	$100.1
Secondary effects	1	$46.4	$79.2
Total economic impact	3	$122.9	$179.3
Alternative 2			
Direct effects	5	$177.4	$212.9
Secondary effects	3	$103.7	$176.3

Total economic impact	8	$281.1	$389.2
Alternative 3			
Direct effects	9	$326.9	$385.5
Secondary effects	6	$209.7	$348.9
Total economic impact	15	$536.6	$734.4
Alternative 4			
Direct effects	4	$165.4	$199.2
Secondary effects	3	$95.1	$162.3
Total economic impact	7	$260.5	$361.5

Summary of Economic Impacts for Alternative 1 (Status Quo)

Table 16 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 1. Under Alternative 1, management activities directly related to Refuge operations generate an estimated 21 jobs, $616.0 thousand in labor income, and $979.5 thousand in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities generate a total economic impact of 35 jobs, $1.1 million in labor income, and $1.8 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 1 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 16. Summary of all Refuge management activities for Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	2	$77.8	$101.9
Total Effects	7	$265.9	$436.8
Non-local Public Use Activities			
Direct effects	19	$538.2	$877.6
Total Effects	28	$847.8	$1,423.8
Aggregate Impacts			
Direct effects	21	$616.0	$979.5

Total effects	35	$1,113.6	$1,860.7

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 2 (Preferred Alternative)

Table 17 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 2. Under Alternative 2, management activities directly related to Refuge operations would generate an estimated 24 jobs, $722.7 thousand in labor income, and $1.1 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 43 jobs, $1.3 million in labor income, and $2.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 2 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 17. Summary of all Refuge management activities for Alternative 2

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	5	$178.8	$214.7
Total Effects	14	$474.2	$737.3
Non-local Public Use Activities			
Direct effects	19	$543.9	$887.1
Total Effects	29	$858.4	$1,441.6
Aggregate Impacts			
Direct effects	24	$722.7	$1,101.8
Total effects	43	$1,332.6	$2,178.9

[a.] Staff salary spending and work related purchases

Table 18 summarizes the change in economic effects associated with Refuge operations under Alternative 2 as compared to Alternative 1. Due to increases in visitation and administration, Alternative 2 would generate 8 more jobs, $219.0 thousand more in labor income, and $318.3 thousand more in value added as compared to Alternative 1.

Table 18. Change in economic impacts under Alternative 2 compared to Alternative 1

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 3	(+) $100.9	(+) $112.8
Total Effects	(+) 7	(+) $208.4	(+) $300.5
Non-local Public Use Activities			
Direct effects	no change	(+) $5.7	(+) $9.5
Total Effects	(+) 1	(+) $10.6	(+) $17.8
Aggregate Impacts			
Direct effects	(+) 3	(+) $106.7	(+) $122.3
Total effects	(+) 8	(+) $219.0	(+) $318.3

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 3

Table 19 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 3. Under Alternative 3, Refuge management activities directly related to Refuge operations would generate an estimated 22 jobs, $706.0 thousand in labor income, and $1.0 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 40 jobs, $1.3 million in labor income, and $2.1 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 3 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 19. Summary of all Refuge management activities for Alternative 3

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	9	$328.3	$387.4
Total Effects	21	$729.8	$1,082.5
Non-local Public Use Activities			

Direct effects	13	$377.8	$616.6
Total Effects	19	$600.1	$1,008.2
Aggregate Impacts			
Direct effects	22	$706.0	$1,003.9
Total effects	40	$1,329.9	$2,090.7

[a.] Staff salary spending and work related purchases

Table 20 summarizes the change in economic effects associated with Refuge operations under Alternative 3 as compared to Alternative 1. Due to substantial increases in Refuge administration (including the construction of a boardwalk), Alternative 3 would generate 5 more jobs, $216.3 thousand more in labor income, and $230.0 thousand more in value added as compared to Alternative 1.

Table 20. Change in economic impacts under Alternative 3 compared to Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 7	(+) $250.4	(+) $285.5
Total Effects	(+) 14	(+) $463.9	(+) $645.6
Non-local Public Use Activities			
Direct effects	(-) 6	(-) $160.4	(-) $261.1
Total Effects	(-) 9	(-) $247.6	(-) $415.6
Aggregate Impacts			
Direct effects	(+) 1	(+) $90.0	(+) $24.4
Total effects	(+)5	(+) $216.3	(+) $230.0

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 4

Table 21 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 4. Under Alternative 4, Refuge management activities directly related to Refuge operations would generate an estimated 9 jobs, $331.4 thousand in labor income, and $469.3 thousand in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 20 jobs, $716.8 thousand in labor income, and $1.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 4 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon

County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 21. Summary of all Refuge management activities for Alternative 4

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	4	$166.8	$201.0
Total Effects	13	$453.6	$709.5
Non-local Public Use Activities			
Direct effects	5	$164.5	$268.3
Total Effects	7	$263.2	$441.8
Aggregate Impacts			
Direct effects	9	$331.4	$469.3
Total effects	20	$716.8	$1,151.3

[a] Staff salary spending and work related purchases

Table 22 summarizes the change in economic effects associated with Refuge operations under Alternative 4 as compared to Alternative 1. Due to substantial decreases in visitation, Alternative 4 would generate 15 less jobs, $396.8 thousand less in labor income, and $709.4 thousand less in value added as compared to Alternative 1.

Table 22. Change in economic impacts under Alternative 4 compared to Alternative 1

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 2	(+) $89.0	(+) $99.1
Total Effects	(+) 6	(+) $187.8	(+) $272.7
Non-local Public Use Activities			
Direct effects	(-) 14	(-) $373.7	(-) $609.3
Total Effects	(-) 21	(-) $584.6	(-) $982.1
Aggregate Impacts			
Direct effects	(-) 12	(-) $284.7	(-) $510.2
Total effects	(-) 15	(-) $396.8	(-) $709.4

[a] Staff salary spending and work related purchases

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Appendix A

As mentioned in the Impacts from Public Use and Access Management section, when determining the economic impacts of visitor spending, only spending by non-locals are included in the analysis. This spending generates new income and employment, and has an economic impact on the region. Evaluating it shows the gain to the region from having the Refuge (Carver and Caudill, 2007). In this Appendix, total spending by both locals and non-locals is evaluated to show the significance of visitation to Deer Flat NWR to the local economy under Alternative 1 (Status Quo). As noted by

Carver and Caudill (2007), significance shows the economic activity in a region that is connected to Refuge activities, but does not reflect income and employment that would be lost if the Refuge were not a part of that economy.

Table A shows local and non-local visitation to Deer Flat NWR under Alternative 1. To capture spending by local visitors, we used the spending profiles in Carver and Caudill (2007) for residents for FWS Region 1 and update the 2006 spending profiles to 2011 dollars using the Consumer Price Index Inflation Calculator. Average daily spending profiles for resident visitors to Region 1 for fishing ($40.82 per-day), big game hunting ($41.15 per-day), upland game hunting ($40.54 per-day) and waterfowl hunting ($55.58 per-day) were used to estimate local visitor spending for Refuge fishing and hunting related activities. The average daily resident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) ($33.35 per-day) was used for all non-consumptive wildlife viewing activities including non-priority swimming and beach activities and land-based non-wildlife dependent activities. As described in the Impacts from Public Use and Access Management section, local boater expenditures were e by adding average daily boating fuel expenditure costs ($23.57 per-day) to the average daily resident spending profile for non-consumptive wildlife recreation ($33.35 per-day) from the Banking on Nature report. Total spending by local refuge visitors was determined by multiplying the average local visitor daily spending by the number of local visitor days at the Refuge.

Table A. Estimated Annual Deer Flat NWR Local and Non-local Visitation by Visitor Activity for Alternative 1

Alternative 1	Total number of visits	Number of local visits	Number of non-local visits	Number local visitor days[a]	Number of non-local visitor days[a]
Priority uses					
Fishing	48,430	45,040	3,390	28,150	2,119
Hunting (big game, waterfowl, and other migratory birds)	6,765	6,224	541	4,371	380
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)	93,410	84,069	9,341	31,526	3,503
Non-priority uses					
Non-wildlife dependent boating	55,080	47,920	7,160	29,950	4,475
Swimming and other beach activities	60,290	52,452	7,838	26,226	3,919
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	32,280	28,084	4,196	10,531	1,574
Total Visitation	296,255	263,788	32,467	130,754	15,970

[a] One visitor day = 8 hours

Table B summarizes the total economic significance associated with both local and non-local visitation under the status quo Alternative 1. Under Alternative 1, local and non-local Refuge visitors would spend a combined $7.3 million in the local economy annually. Accounting for both direct and secondary effects, spending by local and non-local visitors for Alternative 1 account for a total economic significance of 88 jobs, $3.3 million in labor income, and $5.5 million in value added in the local two-county area.

Table B. Total Annual Impacts of Local and Non-Local Visitor Spending for Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Local Spending			
Direct effects	55	$1,585.0	$2,566.4
Secondary effects	24	$825.8	$1,470.9
Total economic significance	79	$2,410.8	$4,037.2
Non-local Spending			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total economic impact	28	$847.8	$1,423.8
Total economic significance	*88*	*$3,258.5*	*$5,461.0*

Appendix N. Acronyms and Abbreviations

Act	National Wildlife Refuge System Improvement Act of 1997 (also Improvement Act or NWRSIA)
ADA	Americans with Disabilities Act
AFA	Acre Feet per Annum
AHM	Adaptive Harvest Management
AMA	Academy of Model Aeronautics
AQI	Air Quality Index
ARPA	Archaeological Resources Protection Act
Audubon	National Audubon Society
AUM	Animal Unit Month
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BIDEH	Biological Diversity, Integrity and Environmental Health
BLM	Bureau of Land Management
BMPs	Best Management Practices
Bti.	*Bacillus thuringiensis israelensis*
C.F.R.	Code of Federal Regulations
CCC	Civilian Conservation Corps
CCP	Comprehensive Conservation Plan
CCPRW	Canyon County Parks, Recreation, and Waterways
CD	Compatibility Determination
CEQ	White House Council on Environmental Quality
CFS	Cubic Feet per Second
CIG	Climate Impacts Group
CMP	Corridor Management Plan
CWA	Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
DDE	Dichlorodiphenyldichloroethylene
DO	Dissolved Oxygen
DPS	Distinct Population Segment
E.O.	Executive Order
EE	Environmental Education
EIS	Environmental Impact Statement
ENSO	El Niño/Southern Oscillation
EPA	U.S. Environmental Protection Agency
EPS–HDT	Economic Profile System-Human Dimensions Toolkit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHBC	Fort Hall Business Council
Friends	Friends of Deer Flat Wildlife Refuge
FWS	U.S. Fish and Wildlife Service (also Service, USFWS)
FY	Fiscal Year
GHGs	Green House Gases
GIS	Geographic Information System
GPS	Global Positioning System
GSA	General Services Administration

ha	Hectare
HAER	Historic American Engineering Record
IBA	Important Bird Area
ICT	CCP Interagency Coordinating Team
IDAPA	Idaho Administrative Procedure Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDPR	Idaho Department of Parks and Recreation
IDWR	Idaho Department of Water Resources
IMPLAN	Impact Analysis for Planning
Improvement Act	National Wildlife Refuge System Improvement Act of 1997 (also Act, NWRSIA)
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
ISHS	Idaho State Historical Society
LCC	Landscape Conservation Cooperative
LDRA	Lower Dam Recreation Area
LE	Law Enforcement
LEIS	Legislative Environmental Impact Statement
MBCC	Migratory Bird Conservation Commission
MMS	Maintenance Management System
MOU	Memorandum of Understanding
MRA	Minimum Requirements Analysis
MSL	Mean Sea Level
NAGPRA	Native American Graves Repatriation Act
NAWMPC	North American Waterfowl Management Plan Committee
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSRE	National Survey on Recreation and the Environment
NTU	Nephelometric Turbidity Unit
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PDO	Pacific Decadal Oscillation
PIF	Partners in Flight
PLO	Public Land Order
PM	Particulate Matter
PMU	Population Management Unit
ppm	Parts Per Million
PUP	Pesticide Use Proposal
Reclamation	Bureau of Reclamation
RM	River Mile
RMP	Resource Management Plan

RONS	Refuge Operating Needs System
RRS	Refuge Revenue Sharing Act
SCORTP	Statewide Comprehensive Outdoor Recreation and Tourism Plan
SDH	Southwest District Health
Service	U.S. Fish and Wildlife Service (also FWS, USFWS)
SGCN	Species of Greatest Conservation Need
SMU	Smoke Management Unit
SUP	Special Use Permit
SWID	Southwest Irrigation District
T and E	Threatened and Endangered
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service (also FWS, Service)
USG	Unhealthy for Sensitive Groups
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USHCN	U.S. Historical Climatology Network
VAOT	Vessels At One Time
VCS	Visitor Contact Station
VRM	Visual Resource Management
WPA	Works Progress Administration
WQS	Water Quality Standard
WRCC	Western Regional Climate Center
WSA	Wilderness Study Area

Document continues on next page.

Appendix O. Glossary

Adaptive Management. The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels. (Service Manual 602 FW 1.4)

Alternative. Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6). The "no action" alternative is current refuge management, while the "action" alternatives are all other alternatives.

Anadromous. Fish that hatch and rear in fresh water, migrate to the ocean (salt water) to grow and mature, and migrate back to fresh water to spawn and reproduce. (www.streamnet.org/glossary.html)

Appropriate Use. A proposed or existing use on a refuge that meets at least one of the following four conditions:

(1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
(2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
(3) The use involves the take of fish and wildlife under State regulations.
(4) The use has been found to be appropriate as specified in section 1.11 of the USFWS Appropriate Use Policy. (603 FW 1)

Approved Acquisition Boundary. National wildlife refuge boundary approved by the National Fish and Wildlife Service Director for potential acquisition of lands by the Service.

Approved Refuge Boundary. A national wildlife refuge boundary approved by the National or Regional Fish and Wildlife Service Director. Within this boundary, the Service may negotiate with landowners to acquire lands not already owned by the Service. (Modified from Region 1 Landowner Guide, USFWS Division of Refuge Planning)

Archaeology. The scientific study of material evidence remaining from past human life and culture. (www.merriam-webster.com)

Avifaunal. All the birds present in a region, environment, or period of time. (Encarta Dictionary)

Benefiting Resources. Those species, species groups, or resources expected to benefit from actions taken for a **Resource of Concern**.

Big Six. Wildlife-dependent recreational uses under Refuge System Improvement Act include hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Bioaccumulation. A process where chemicals are retained in fatty body tissue and increase in concentration over time. (U.S. EPA Pesticide Glossary, http://epa.gov/pesticides/glossary/)

Biological Diversity (also Biodiversity). The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which

they occur (Service Manual 601 FW 3). The Refuge System's focus is on indigenous species, biotic communities, and ecological processes.

Biological Integrity. Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities. (Service Manual 601 FW 3)

Biome. A division of the world's vegetation that corresponds to a defined climate and is characterized by specific types of plants and animals (e.g., tropical rain forest or desert). (Encarta Dictionary)

Birds of Conservation Concern. A category assembled by the U.S. Fish and Wildlife Service Division of Migratory Birds identifying the migratory and nonmigratory species (beyond those already designated as Federally threatened or endangered) that represent the Division's highest conservation priorities. (FWS, Division of Migratory Birds)

Board of Control; the Boise Project. Boise Project Board of Control and the Payette Division irrigation districts coordinate reservoir releases for irrigation, power generation, flood protection, municipal and industrial water use, recreation, water quality, and a healthy fishery. (Reclamation, www.usbr.gov/pn/project/boise_index.html)

Bureau of Reclamation. The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. (Reclamation, www.usbr.gov/library/glossary)

Candidate Species. Plant or animal species for which FWS or NOAA Fisheries has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Categorical Exclusion. A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act. (40 C.F.R. 1508.4)

Colonial (Nesting). A group of individuals that nest in the same area at the same time**.** Grebes, great blue herons, and gulls are examples of colonial nesting species at Deer Flat NWR. (www.fws.gov/birds/documents/whichbirdscolonial.pdf).

Compatibility Determination. A written determination signed and dated by the refuge manager and regional chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The Director makes this delegation through the Regional Director. (Service Manual 603 FW 2)

Compatible Use. A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (Service Manual 603 FW 2.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Composition (Plant). The inventory of plant species found in any particular area.

Comprehensive Conservation Plan. A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purpose(s) of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the biological integrity, diversity, and environmental health of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System, if appropriate; and meets other mandates. (Service Manual 602 FW 1.4)

Concern. See **Issue.**

Connectivity. The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of **Habitat Fragmentation**.

Conservation Targets (also see **Resources of Concern; Priority Species, Species Groups,** and **Communities).** Term used by land management agencies and conservation organizations to describe the resources (ecological systems, ecological communities, species, species groups, or other natural resources) selected as the focus of conservation actions. (**Consumptive Use.** Recreational activities, such as hunting and fishing that involve harvest or removal of wildlife or fish, generally to be used as food by humans.

Contaminants or **Environmental Contaminants.** Chemicals present at levels greater than those naturally occurring in the environment resulting from anthropogenic or natural processes that potentially result in changes to biota at any ecological level (USGS Open File Report 99-108, Assessing Environmental Contaminant Threats to Lands Managed by the U.S. Fish and Wildlife Service). Pollutants that degrade other resources upon contact or mixing. (Adapted from Webster's II)

Cooperative Agreement. An official agreement between two parties.

Cover. The estimated percentage of an area, projected onto a horizontal surface, occupied by a particular plant species.

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 C.F.R. 60.4. (Service Manual 614 FW 1.7)

Cultural Resources. The physical remains, objects, historic records, and traditional life ways that connect us to our nation's past. (FWS, Considering Cultural Resources, http://www.fws.gov/nativeamerican/graphics/Cultural_Resources_Overview.pdf)

Department of the Interior. The U.S. Department of the Interior serves as steward and guardian of the nation's natural resources and cultural heritage. It manages federal lands, such as national parks and refuges; honors the nation's trust responsibilities to tribal communities; and promotes conservation and wise use of natural resources. (U.S. Department of the Interior website)

Decadence. Marked by decay or decline. For plants, showing little or no new growth. (Adapted from Merriam-Webster online dictionary, www.merriam-webster.com)

Dichlorodiphenyldichloroethylene (DDE). A chemical compound formed by the loss of hydrogen chloride (dehydrohalogenation) from DDT, of which it is one of the more common breakdown products. DDT is an organochlorine pesticide that was once widely used to control insects on agricultural crops. Consuming large amounts of DDT over a short time would most likely affect the nervous system. (Public Health Statement of the Agency for Toxic Substances and Disease Registry, Centers for Disease Control)

Direct Loss. Loss of food or loss of habitat as nonnative species out-compete native species.

Distinct Population Segment (DPS). A subdivision of a vertebrate species that is treated as a species for purposes of listing under the Endangered Species Act. To be so recognized, a potential distinct population segment must satisfy standards specified in a FWS or NOAA Fisheries policy statement (See the February 7, 1996, Federal Register, pages 4722-4725). The standards require it to be separable from the remainder of and significant to the species to which it belongs. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Disturbance. Significant alteration of habitat structure or composition, or of the behavior or wildlife. May be natural (e.g., fire) or human-caused events. (e.g., aircraft overflight).

East Pool. That part of Lake Lowell that is east of the Narrows (see Map 3).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Elevation. The elevation above sea level of the surface water at Lake Lowell.

Endangered Species (Federal). An animal or plant species in danger of extinction throughout all or a significant portion of its range. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in a state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Enhance. To improve the condition of an area or habitat, usually for the benefit of certain native species.

Environmental Assessment (EA). A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact. (40 C.F.R. 1508.9)

Environmental Education Study Sites. Outdoor locations where groups of students engage in hands-on activities within an environmental education curriculum.

Environmental Health. Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment. (Service Manual 601 FW 3)

Environmental Impact Statement (EIS). A detailed written statement required by Section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impact of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short term uses of the environment versus the maintenance and enhancement of long-term productivity and any irreversible and irretrievable commitment of resources. (Adapted from 40 C.F.R. 1508.11 and 42 U.S.C. 4332)

Ethnography. The study and systematic recording of human cultures; also: a descriptive work produced from such research.

Executive Order. A President's or Governor's declaration which has the force of law, usually based on existing statutory powers, and requiring no action by the Congress or state legislature.

Experimental Population. A population (including its offspring) of a listed species designated by rule published in the Federal Register that is wholly separate geographically from other populations of the same species. An experimental population may be subject to less stringent prohibitions than are applied to the remainder of the species to which it belongs. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared. (40 C.F.R. 1508.13)

Fluviatile. Belonging to, existing in or about, or produced by the action of streams or rivers. (Webster's Third New International Dictionary Unabridged online)

Focal Conservation Target. A suite of conservation targets that for purposes of planning are sorted and condensed to represent threats to biological integrity diversity and environmental health at the refuge level.

Goal. Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units. (Service Manual 602 FW 1.6)

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Fragmentation. The division of continuous patches into smaller pieces which are partly or fully disconnected from one another by infrastructure, agricultural fields, or human settlements (www.biology-online.org). The opposite of **Connectivity.**

Habitat Management Plan. A plan that provides refuge managers a decision-making process; guidance for the management of refuge habitat; and long-term vision, continuity, and consistency for habitat management on refuge lands. (Service Manual 620 FW 1.4)

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes and/or to healthy ecosystems.

Herptiles. A general term for amphibians and reptiles.

Historic Conditions. Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape. (Service Manual 601 FW 3)

Hydrology. study of the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment within each phase of the water cycle (USGS website http://ga.water.usgs.gov/edu/hydrology.html).

Hydrophytic. Hydrophytic vegetation is the community of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (U.S. Army Corps of Engineers Wetland Delineation Manual).

Hypolimnion. The lower zone of a thermally stratified lake, below the thermocline, and usually depleted in oxygen during summer stagnation. (www.streamnet.org/glossary.html)

Important Bird Area. A site that provides essential habitat for one or more species of bird and that is recognized as being important on a global, continental, or state level.

Indicator. A measurable characteristic of a key ecological attribute that strongly correlates with the status of the key ecological attribute, something that serves as a sign or symptom.

Inholding. Refers to lands within an **Approved Refuge Boundary** that are not owned by the U.S. Fish and Wildlife Service. These can be private lands or lands owned by City, County, State, or other Federal agencies.

Integrated Pest Management (IPM). The use of pest and environmental information in conjunction with available pest control technologies to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to persons, property, and the environment. (U.S. EPA Pesticide Glossary, http://epa.gov/pesticides/glossary/f-l.html#i)

Interpretation. A teaching technique that combines factual information with stimulating explanation, frequently used to help people understand natural and cultural resources. (www.yourdictionary.com)

Invasive. Nonnative species disrupting and replacing native species. (www.thebiotechdictionary.com)

Inventory. A survey of the plants or animals inhabiting an area.

Inviolate Sanctuary. Management purpose for migratory birds under the Migratory Bird Conservation Act (16 U.S.C. 715d).

Issue. Any unsettled matter that requires a management decision (e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition). (Service Manual 602 FW 1.6)

Key Ecological Attributes. Those aspects of the environment, such as ecological processes or patterns of biological structure and composition that are critical to sustain the long-term viability of the target. These key ecological attributes are further divided into measurable indicators.

Lacustrine. Pertaining to, produced by, or inhabiting a lake. (U.S. EPA, Terms of Environment)

Macrophyte. A macroscopic plant, commonly used to describe aquatic plants that are large enough to be visible to the naked eye. (www.biology-online.org)

Maintenance. The upkeep of constructed facilities, structures, and capitalized equipment necessary to realize the originally anticipated useful life of a fixed asset. Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment, periodic condition assessment; periodic inspections, adjustment, lubrication and cleaning (non-janitorial) of equipment; painting, resurfacing, rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown.

Maintenance Management System (MMS). A national database of refuge maintenance needs and deficiencies. It serves as a management tool for prioritizing, planning, and budgeting purposes. (RMIS descriptions)

Methylmercury. CH_3Hg+, organic form of mercury and the form of mercury that is most easily bioaccumulated in organisms; a neurotoxin. Methylmercury can accumulate up the food chain in aquatic systems and lead to high concentrations in fish, which, when consumed by humans, can result in an increased risk of adverse effects in highly exposed or sensitive populations. (USGS, Toxic Substances Hydrology Program)

Migration. The seasonal movement from one area to another and back.

Migratory Birds. Those species of birds listed under 50 C.F.R. 10.13. (Service Manual 720 FW 1)

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA). Requires all Federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making. (40 C.F.R. 1500)

National Register of Historic Places (NRHP). The nation's master inventory of known historic properties administered by the National Park Service. Includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archeological, or cultural significance at the national, state, and local levels. (USFWS, Considering Cultural Resources, http://www.fws.gov/nativeamerican/graphics/Cultural_Resources_Overview.pdf)

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the Refuge System, excluding coordination areas. (Service Manual 601 FW 1.3)

National Wildlife Refuge System. Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). A Federal law that amended and updated the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee, et seq.).

Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. (Service Manual 601 FW 3)

NephelometricTurbidity Unit (NTU). A unit measuring the lack of clarity of water, used by water and sewage treatment plants, in marine studies, and so on. Water containing 1 milligram of finely divided silica per liter has a turbidity of 1 NTU.

Nonconsumptive Recreation. Recreational activities that do not involve harvest, removal, or consumption of fish, wildlife, or other natural resources.

Noxious Weed. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (Public Law 93-629), a noxious weed is one that causes disease or had adverse effects on humans or their environment and therefore is detrimental to the agriculture and commerce of the United States and to public health.

Objective. A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Objectives should be attainable, time-specific, and measurable. (Service Manual 620 FW 1)

Obligate Species. A plant or animal that occurs only in a narrowly defined habitat such as a tree cavity, rock cave, or wet meadow. (www.streamnet.org/glossary.html)

Operations. Activities related to the normal performance of the functions for which a facility or item of equipment is intended to be used. Costs such as utilities (electricity, water, sewage) fuel, janitorial services, window cleaning, rodent and pest control, upkeep of grounds, vehicle rentals, waste management, and personnel costs for operating staff are generally included within the scope of operations.

Organochlorines. Compounds that contain carbon, chlorine, and hydrogen. Their chlorine-carbon bonds are very strong, which means that they do not break down easily. They are highly insoluble in water, but are attracted to fats. Since they resist metabolism and are readily stored in fatty tissue of any animal ingesting them, they accumulate in animals in higher trophic levels. (USFWS, Pacific

Region Ecological Services, http://www.fws.gov/Pacific/ecoservices/envicon/pim/reports/contaminantinfo/contaminants.html)

Otoliths. A structure of the inner ear of vertibrates. In fish, this structure is used for balance, orientation and sound detection. The otoliths of fish provide useful information on age, growth rate, life history, recruitment, and taxonomy of individuals (Alaska Department of Fish and Game http://tagotoweb.adfg.state.ak.us/oto/).

Outreach. The process of providing information to the public on a specific issue through the use of the media, printed materials, and presentations.

Pacific Flyway. One of several major north-south travel corridors for migratory birds. The Pacific Flyway is west of the Rocky Mountains.

Palustrine. Pertaining to a marsh or wetlands; wet or marsh habitats. (U.S. EPA, Terms of Environment)

Passerine. Of or relating to the largest order (Passeriformes) of birds, which includes over half of all living birds; birds having feet that are adapted for perching, including all songbirds. (www.OxfordDictionaries.com)

Permanent Wetland. Characterized by saturated soil and shallow ponding of water (6 inches deep) throughout winter and early spring.

Piscivorous. Habitually feeding on fish; fish-eating.

Planning Team. The primary U.S. Fish and Wildlife staff and others who played a key role in developing and writing a CCP. Planning teams are interdisciplinary in membership and function. Teams generally consist of a Planning Team Leader, Refuge Manager, staff biologists, a state natural resource agency representative, and other appropriate program specialists (e.g., social scientist, ecologist, recreation specialist). Other Federal and Tribal natural resource agencies are asked to provide team members, as appropriate. The planning team prepares the CCP and appropriate NEPA documentation. (Service Manual 602 FW 1.6)

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community **Plant Community.** An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.

Preferred Alternative. This is the alternative determined (by the decision maker) to best achieve a refuge's purpose, vision, and goals; to best contribute to the Refuge System mission; to best address the significant issues; and to be consistent with principles of sound fish and wildlife management.

Preplanning. The first phase of comprehensive conservation planning process. It includes identifying the planning area and data needs; establishing the planning team and planning schedule; reviewing available information; preparing a public involvement plans and conducting internal scoping.

Priority Public Uses. Hunting, fishing, wildlife observation and photography, environmental education and interpretation, where compatible, are identified under the National Wildlife Refuge System Improvement Act of 1997 as the six priority public uses of the National Wildlife Refuge System.

Propagule. A structure (such as a cutting, a seed, or a spore) that propagates a plant.

Public. Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the **Planning Team**. It includes those who may or may not have indicated an interest in Service issues and those who may be affected by Service decisions.

Public Land Order. Public lands consist of that class of land remaining from the original public domain that was acquired by the United States by treaty, purchase, or cession from a foreign power.

Quality Hunt. Each refuge includes input during development of a CCP that helps define and evaluate wildlife dependent recreation programs such as hunting and contains the following attributes:

(1) Minimizes conflicts with neighboring landowners;
(2) Promotes accessibility and availability to a broad spectrum of the American people;
(3) Promotes resource stewardship and conservation;
(4) Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
(5) Provides reliable/reasonable opportunities to experience wildlife;
(6) Uses facilities that are accessible to people and blend into the natural setting; and
(7) Uses visitor satisfaction to help define and evaluate programs.

Refuge Operating Needs System (RONS). A national database of unfunded refuge operating needs required to meet and/or implement station goals, objectives, management plans, and legal mandates. It is used as a planning, budgeting, and communication tool describing funding and staffing needs of the Refuge System.

Refuge Purpose(s). The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge. (Service Manual 602 FW 1.6)

Resource of Concern (ROC). All plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, state, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect "migrating waterfowl and shorebirds." Federal or state threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts. (Service Manual 620 FW 1.4)

Restore. To bring back to a former or original condition. (Webster's II)

Salmonid. A bony soft-finned fish of the family Salmonidae, Order Salmoniformes, that includes salmon, trout, whitefish, and char. (Encarta Dictionary)

Scoping. A stage in the development of a CCP in which a refuge uses news releases, and other appropriate media to notify the public of the opportunity to participate in the planning process and to help identify issues, concerns, and opportunities related to the project.

Species of Concern (Federal). An informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Step-down Management Plan. A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives. (Service Manual 602 FW 1.6)

Strategy. A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives. (Service Manual 602 FW 1.6)

Stress. The impairment or degradation of a key ecological attribute for a conservation target. (TNC 2000)

Threatened Species (Federal). An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Threatened Species (State). A plant or animal species likely to become endangered in a state within the near future if factors contributing to population decline or habitat degradation or loss continue.

Traditional Cultural Property. A historic property that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. (National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties)

Transmissivity. The rate which groundwater flows horizontally through an aquifer.

Trophic. A position in a food chain occupied by a group of organisms with similar feeding mode. (www.biology-online.org)

Trust Species. A resource such as endangered species or migratory birds and fish that the government holds in trust for the people through law or administrative act. Federal trust species include threatened and endangered species, as well as migratory birds (e.g., waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Upland. Any area that does not meet the definition of a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic

characteristics associated with wetlands. (U.S. Army Corps of Engineers Wetland Delineation Manual)

Vegetation Type (Also **Habitat Type**, **Forest Cover Type**)**.** A land classification system based upon the concept of distinct plant associations.

Vision Statement. A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. The vision statement for the refuge is tied to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates. (Service Manual 602 FW 1.6)

Waterfowl. Resident and migratory ducks, geese, and swans.

Water Quality. A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Watershed. The land area that drains water to a particular stream, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large watersheds, like the Mississippi River Basin, contain thousands of smaller watersheds.

West Pool. That part of Lake Lowell that is west of the Narrows (see Map 3).

Wetlands. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season of each year. (Service Manual 660 FW 2; Cowardin et al. 1979)

Wildlife-dependent Recreational Use. A use of a refuge involving hunting, fishing, wildlife observation, photography, environmental education, or interpretation. These are the six priority public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. The Service will also consider these other uses in the preparation of refuge CCPs; however, the six priority public uses always will take precedence. (Service Manual 602 FW 1.6)

Appendix P. References Cited

This appendix contains all references cited in Chapters 1 through 6. References for citations located within the appendices (A-O) are located within each individual appendix, and are not duplicated in the following list.

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National Wildlife Refuge System Information
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Cover Photo:
Mule deer overlooking refuge
Addison Mohler, USFWS