



Revised Draft Comprehensive Conservation Plan and Environmental Assessment

The Jersey Coast Refuges (Edwin B. Forsythe and Cape May National Wildlife Refuges, including the new Two Mile Beach Unit)

Ocean, Atlantic, Burlington and Cape May Counties, New Jersey

U.S. Fish and Wildlife Service

July 2000

Abstract: The Service's Proposed Action and two other alternatives are described, along with the process used to develop them and the environmental consequences of implementing each one. The three alternatives are:

Alternative A. This is the No Action Alternative required by the Council of Environmental Quality's regulations on the implementation of the National Environmental Policy Act (NEPA). Selection of this Alternative would mean that there would be no change from our current management programs and emphasis at both Refuges. Seasonal travel and parking of motor vehicles would continue to be allowed in the Holgate Unit of the Brigantine Wilderness Area, on lands above mean high tide, in violation of the Wilderness s Act of 1964.

Alternative B. This Alternative would initiate new wildlife population and habitat management programs; provide new wildlife-dependent recreation opportunities; increase our land protection efforts; and provide new office and visitor facilities at both Refuges. All lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would initiate efforts to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.
Alternative B is our Proposed Action.

Alternative C. This Alternative would initiate new wildlife population and habitat management programs; provide new wildlife-dependent recreation opportunities Refuge-wide; increase our land protection efforts; and provide new or remodeled office and visitor facilities at both Refuges. All lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would also seek to further restrict motor vehicle access at the Holgate Unit by obtaining a license from the New Jersey Tidelands Council to close State-owned riparian lands below the mean high tide line. Efforts would be initiated to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.

Commenter Responsibility: Reviewers should provide the planning team with their comments by August 4, 2000. This will enable us to analyze and respond to their comments in a timely fashion and use any new information provided in the preparation of the final documents, helping avoid any undue delay in the decision making process. Reviewers have an obligation to structure their comments so that they are meaningful and alert us to their position and contentions. Comments should be specific and address the adequacy of the assessment and the merits of the alternatives discussed. All comments

received from the public will be placed in our planning record for this action. As part of the record, comments will be made available for inspection by the general public, and copies may also be provided to the public. Persons who do not wish to have their names and other identifying information made available may make such a request in writing along with their comments.

Public Hearing: A formal public hearing will be held at 7:00 PM on July 19, 2000. The hearing will provide an opportunity for all interested parties to present oral or written testimony on the revised draft document before a hearing officer and court reporter. Those wishing to do so will be able to sign up to speak when they enter the hearing room. This formal public hearing will be held at:

Absegami High School
201 South Wrangleboro Road
Galloway Township, Atlantic County, New Jersey

Comment Period: All other comments may be sent by either traditional or electronic mail, no later than August 4, 2000 to:

The Jersey Coast Refuges Planning Team
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
FW5RW_CCP@fws.gov

Reader's Guide

Where's the Comprehensive Conservation Plan?

The U.S. Fish and Wildlife Service's planning process for all National Wildlife Refuges involves two levels of planning:

- 1) the development of a broad Comprehensive Conservation Plan (CCP); and
- 2) the formulation of more detailed step-down management plans required to fully implement the CCP.

Public involvement and National Environmental Policy Act (NEPA) compliance have been incorporated into the process at all appropriate stages.

This Revised Draft Environmental Assessment provides NEPA compliance for the CCPs for both Forsythe and Cape May Refuges. Following the release of our final NEPA decision document [A Finding of No Significant Impact (FONSI) in the case of an environmental assessment] we will release final stand-alone CCPs for both Refuges. Each CCP will consist of materials currently found in the following sections of this document:

- Chapter I, Purpose of and Need for Action;
- the selected alternative from Chapter II, Alternatives;
- Chapter III, Affected Environment;
- Chapter V, Consultation and Coordination with Others and List of Preparers; and
- selected Appendices.

The final approved CCP for each Refuge will, when fully implemented, help achieve refuge purposes, fulfill the National Wildlife Refuge System mission, maintain, and where appropriate, restore the biological integrity, diversity, and environmental health of the refuge and the System, and meet other mandates. It will guide management decisions and set forth goals, objectives, and strategies to accomplish these ends. We may also require step-down management plans to provide additional details about meeting CCP goals and objectives and to describe strategies and implementation schedules. The CCP will be based on the principles of sound fish and wildlife management, available science, legal mandates and our other policies, guidelines, and planning documents. It will, above all else, ensure that wildlife comes first on the Refuge.

For further information on our planning process please refer to Part 602 of the Fish and Wildlife Service Manual, National Wildlife Refuge System Planning.

The Purpose of and Need for Action

This document evaluates a reasonable range of alternative management strategies for the Edwin B. Forsythe and Cape May National Wildlife Refuges (Jersey Coast Refuges). Each alternative was generated with the potential to be fully developed into a Comprehensive Conservation Plan (CCP). A Revised Draft Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA).

Development of a CCP is vital to the future management of the Jersey Coast Refuges. The *purpose* of the CCP for each Refuge is to provide strategic management direction over the next 15 years by:

1. Providing a clear statement of desired future conditions for habitat, wildlife, visitor services, and facilities;
2. Providing Refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
3. Ensuring Refuge management reflects the policies and goals of the National Wildlife Refuge System (Refuge System) and our other legal mandates;
4. Ensuring the compatibility of current and future public use;
5. Providing long-term continuity and direction for Refuge management;
6. Providing direction for staffing, operations, maintenance, and the development of budget requests.

The *need* to develop a CCP for each of the Jersey Coast Refuges is two-fold. First, the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) requires that all National Wildlife Refuges have a CCP in place within 15 years to help fulfill the new mission of the Refuge System.

Second, there is currently no master plan establishing priorities and ensuring consistent and integrated management for the Jersey Coast Refuges. A vision statement and goals, objectives, and management strategies are needed to effectively manage natural resources. Persistent issues related to non-wildlife dependent public use, beach access, wilderness management, and management for threatened and endangered species must be resolved with public and partner involvement.

Decision to Be Made

Based on the analysis documented in the EA, the Service will select an alternative to fully develop into a CCP for each Refuge. The selection will be made by the Regional Director based on an evaluation of the Service's mission, the purposes for which each of the Refuges was established, and our other legal mandates..

Forsythe Refuge

Forsythe Refuge is located in Atlantic, Burlington, and Ocean Counties, and consists of two divisions: the Brigantine Division and the Barnegat Division. (See **Map 1-1** on page 16.) The Refuge extends along more than 50 miles of the coast. This Refuge was renamed in 1984 in memory of the late conservationist Congressman from New Jersey, Edwin B. Forsythe, through a Congressional Joint Resolution (H.J. Res. 537). The resolution combined the Brigantine National Wildlife Refuge and the Barnegat National Wildlife Refuge. Those Refuges were established in 1939 and 1967, respectively, under provisions of the Migratory Bird Conservation Act. The Reedy Creek Unit was established in 1991, and is administered as part of Barnegat Division. The approved acquisition boundary of the Refuge encompasses more than 56,600 acres. As of September 30, 1999, the Service owned or leased 44,302 acres within the approved Refuge acquisition area.

Refuge wetlands are designated as Wetlands of International Importance under the Ramsar Convention. There are only 17 designated Wetlands of International Importance in the United States. Refuge lands and waters provide important resting and feeding habitat for tens of thousands of ducks and geese, wading birds, and shorebirds during their spring and fall migrations.

Congress designated 6,600 acres of the Refuge as the Brigantine Wilderness on January 3, 1975 (P.L. 93-632) to be managed under the Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136). **Map 1-2** on page 16 shows the Refuge Wilderness Areas.

Cape May Refuge

Cape May Refuge is located in Cape May County, and includes the Delaware Bay Division, the Great Cedar Swamp Division, and the Two Mile Beach Unit. (See

Map 1-1 on page 16.) The Refuge was established in 1989. The approved acquisition boundary for the Refuge encompasses more than 17,600 acres. As of In the past seven years, several studies or plans that involved the vicinity of the Refuge have been initiated or completed. These studies demonstrate the importance of this area. The Refuge acquisition area is within the New Jersey Coastal Area Facilities Review Act (CAFRA) zone and within the Service's Twin Capes Project area (Cape May, NJ and Cape Charles, VA). It is partially within the Pinelands National Reserve, the Great Egg Harbor National Scenic and Recreational River, and the Cape May Migratory Bird Stopover Project. Delaware Bay wetlands within the Refuge are designated as Wetlands of International Importance under the RAMSAR Convention. There are only 17 designated Wetlands of International Importance in the United States.

Two Mile Beach Unit

The United States Coast Guard declared a major portion of its Electronic Engineering Center (EECEN) in Lower Township, Cape May County, excess to its needs in 1997. (See **Map 1-3** on page 17.)

The northernmost 490 acres of the former EECEN were transferred from the Coast Guard to the Service on October 22, 1999 as the Two Mile Beach Unit of Cape May Refuge under the Transfer of Certain Real Property for Wildlife Conservation Purposes Act of May 19, 1948, as amended (16 U.S.C. §667b-667d; 62 Stat. 240). Of the 490 acres, 221 acres are above mean high tide. Of these 221 acres, 90 acres are upland habitat and 131 acres are wetland habitat.

The Coast Guard retained the remaining 530 acres of the former EECEN for its Long Range Aid to Navigation (LORAN) Support Unit (LSU) and the north dune antenna tower. The LSU will remain in operation indefinitely.

Purposes for the Jersey Coast Refuges

Lands within the Refuge System are acquired and managed under a variety of legislative acts and administrative orders and authorities. These orders and authorities usually have one or more purposes for which land can be transferred or acquired.

The purposes of **Forsythe Refuge** are:

- For lands acquired under the Migratory Bird

October 22, 1999, the Service owned 10,001 acres within the approved Refuge acquisition area.

Conservation Act (16 U.S.C. §715-715r), as amended, "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...." (16 U.S.C. §715d);

- "...the development, advancement, management, conservation, and protection of fish and wildlife resources...." Fish and Wildlife Act of 1956 (16 U.S.C. §742f(a)(4));
- "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory birds)... " Emergency Wetlands Resources Act of 1986 (16 U.S.C. §3901(b), 100 Stat. 3583);
- "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." The Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136).

The purposes of **Cape May Refuge** are:

- "...use as an inviolate sanctuary, or for any other management purpose, for migratory birds...." The Migratory Bird Conservation Act (16 U.S.C. §715d);
- "...the development, advancement, management, conservation, and protection of fish and wildlife resources...." The Fish and Wildlife Act of 1956 (16 U.S.C. §742f(a)(4));
- "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory birds)... " The Emergency Wetlands Resources Act of 1986 (16 U.S.C. §3901(b), 100 Stat. 3583).

The purpose of Cape May Refuge's **Two Mile Beach Unit** is:

- "...particular value in carrying out the national migratory bird management program" The Transfer of Certain Real Property for Wildlife Conservation Purposes Act, 1972, as amended (16 U.S.C. §667b-667d; 62 Stat. 240).

The U.S. Fish and Wildlife Service and

its Mission

National Wildlife Refuges are managed by the Service, part of the Department of the Interior. The mission of the Service is:

National resources entrusted to the Service for conservation and protection are: migratory birds, endangered species, interjurisdictional fish, wetlands, and certain marine mammals. The Service also manages the Refuge System and national fish hatcheries, enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection. Over 520 National Wildlife Refuges are part of the national network today. Refuges occur in every state and a number of U.S. Territories, encompassing over 92 million acres nationwide. Over 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretive activities on Refuges.

In 1997, the Refuge Improvement Act was passed. This legislation established a unifying mission for the Refuge System, a new process for determining compatible activities on Refuges, and the requirement to prepare CCPs for each Refuge. The Act states that above all else, wildlife comes first in the National Wildlife Refuge System. It does so by establishing that wildlife conservation is the principal mission of the Refuge System; by requiring that we maintain the biological integrity, diversity, and environmental health of each refuge and the Refuge System; and by mandating that we monitor the status and trends of fish, wildlife, and plants on each refuge. It further states that the national mission, coupled with the purpose(s) for which each Refuge was established, will provide the principal management direction for each Refuge.

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

...working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people."

generations of Americans."

The Refuge Improvement Act declares that all existing or proposed public uses must be "compatible" with the purposes for which each refuge was established. Six wildlife-dependent public uses were highlighted in the legislation as priorities to evaluate in CCPs. The six uses are: environmental education and interpretation, fishing, hunting, wildlife observation, and photography. "Compatibility" is determined by the Refuge Manager after evaluating the activities' potential impact on Refuge resources.

Refuge Vision

The following statement was developed by the planning team in order to describe the desired future status of the Jersey Coast Refuges.

"Edwin B. Forsythe and Cape May National Wildlife Refuges, the Jersey Coast Refuges, will continue to contain some of the most important migratory bird habitat in the National Wildlife Refuge System. They will continue to be focal points for the protection, management, restoration, and enjoyment of migratory birds and other Federal Trust Resources in coastal New Jersey. Forsythe Refuge will provide a true wilderness experience on pristine barrier islands and salt marshes, that are premiere examples of these ecological communities and untrammelled by man. Both Refuges will provide stop-over habitats of sufficient size and quality to assist in maintaining migrating and wintering birds on the Atlantic Flyway.

The Refuges will expand their roles in land protection efforts by acquiring additional habitat along the coast and inland watersheds, and working with all interested parties to promote conservation efforts on non-refuge lands. The Refuges will preserve important plant and animal populations, ecological communities, and the integrity of the landscape by protecting lands from development, restoring fire to the upland habitats, and repairing disruptions to wetlands. They will play a critical role in preserving biodiversity locally, regionally and within the Refuge System.

The Refuges will build alliances with State, county and local governments, other organizations and local communities to promote the ecological integrity of the landscape, ecotourism and the historical and cultural

attractions of the region. Wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation and photography, environmental education and interpretation will be provided on Refuge lands. The Refuges will help assure the sustainable economic viability of the area, and supplement and promote the values which attracted people and wildlife to the Jersey

We have developed the following goals for the Jersey Coast Refuges. These goals highlight specific elements of our vision statement which will be emphasized in future management. Our planning team has identified Goal 1 as the top priority; Goals 2-4 are not in priority order.

- Goal 1:** Protect and enhance federal trust resources and other species and habitats of special concern.
- Goal 2:** Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.
- Goal 3:** Establish a land protection program to support accomplishment of species, habitat, and ecosystem goals.
- Goal 4:** Provide opportunities for high-quality, compatible, wildlife-dependent public use.

The Comprehensive Conservation Planning Process and Issue Identification

This effort to prepare CCPs for the Jersey Coast Refuges began in the summer of 1996. The Service's action followed President Clinton's signing of Executive Order 12996, on the Management and General Public Use of the National Wildlife Refuge System. In recognition of the Order's four guiding principles, the Service focused its planning efforts on:

- Conserving and enhancing the quality and diversity of fish and wildlife habitat within the Refuges;
- Providing opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife-observation and photography, environmental education and interpretation;
- Establishing partnerships with other Federal agencies, State agencies, tribes, organizations, industry and the general public;

Shore in the first place."

Refuge Goals

- Increasing opportunities for public involvement in the planning of refuge land protection and management activities.

This effort continued and was enhanced following passage of the Refuge Improvement Act in 1997. The Act states that the Service shall:

- Propose a CCP for each refuge or related complex of refuges;
- Publish a notice of opportunity for public comment in the Federal Register on each proposed CCP;
- Issue a final CCP for each refuge consistent with the provisions of this Act and, to the extent practicable, consistent with fish and wildlife conservation plans of the State in which the refuge is located;
- Not less frequently than 15 years after the date of issuance of a CCP, and every 15 years thereafter, revise the CCP as may be necessary.

Initially, we focused on collecting information on natural resources and public use. In addition, we developed a vision statement and preliminary goals for the Jersey Coast Refuges, as well as the preliminary issues to be addressed in this planning effort. A mailing list of organizations and individuals was also compiled to insure that we were contacting a wide array of interested publics.

In November and December 1996 we held a series of 11 public meetings in:

- Ocean County, the Townships of Brick, Dover, Lacey, Stafford, and the Boroughs of Long Beach and Tuckerton;
- Atlantic County, the Township of Galloway;
- Cape May County, the Townships of Upper, Dennis, Middle, and Lower.

We announced the location, dates, and times for these meetings in local newspapers and through special mailings. We also briefed local members of Congress on

the upcoming meetings. More than 280 people attended the meetings, which were held to let people know what the Service was doing to manage the Jersey Coast Refuges, and to elicit their input on topics of interest to them.

We also distributed an "Issues Workbook" to help collect the public's ideas, concerns, and suggestions on important issues associated with managing the Jersey Coast Refuges. We distributed the workbook to everyone on our mailing list, those who attended the In February 1997 we distributed a "Planning Update" which summarized the responses received in the "Issues Workbook". Responses from the workbooks and meetings were influential in helping us formulate the issues related to resource protection and public use.

In April 1997 we also held an Alternatives Workshop. Twenty-five individuals, representing local and State conservation agencies and organizations, participated in the daylong workshop. The participants reviewed and discussed the issues and concerns identified in the "Issues Workbook" and were asked to answer three questions:

- 1) What should be done?
- 2) Where should it be done?
- 3) Who should help the Service do it?

Input obtained from the public meetings, workbooks and workshop was used to identify a reasonable range of alternatives and prepare a draft CCP/EA. This draft was released for 45 days of public review and comment in May 1999. Over 200 people attended the three public meetings held in July at the following locations: Middle Township Building in Cape May County; Galloway Township Library in Atlantic County; and Stafford Township Municipal Building in Ocean County.

We also received over 1,600 individual comment letters. There were a great many duplicate comments received, since many people sent copies to both the Forsythe Refuge headquarters in Oceanville, New Jersey and our Regional Office in Hadley, Massachusetts. A summary of the public comments received and the disposition of the concerns expressed in those comments can be found in **Appendix A** on page 52. This summary also notes where we have changed the draft CCP/EA or why we did not make such changes.

A Revised Draft CCP/EA is being released for 30 days of public review and comment. The Service is also holding a formal public hearing. The location, date, and time for this hearing are noted in the cover letter

public meetings, and anyone who subsequently requested one. Nearly 1,000 copies were distributed. Through the workbook, we asked for public input on the issues and possible action options, the things people valued most about the New Jersey coast, their vision for the future, and the Service's role in helping to conserve, protect, and enhance fish and wildlife and their habitats. More than 150 copies of the workbook were completed and returned.

accompanying the Revised Draft, have been announced in local newspapers, and a formal Notice of Availability printed in the Federal Register.

After the 30-day public review of the Revised Draft CCP/EA, we will compile and respond to the comments received. A Final CCP/EA will be prepared and, as required under NEPA, a decision will be made as to whether the Service's Proposed Action supports a Finding of No Significant Impact (FONSI). Assuming no significant impact is predicted, a FONSI will be prepared and released, along with stand-alone CCPs for both Forsythe and Cape May Refuges. Implementation of these plans will then begin and they will be monitored annually and revised when necessary.

Key Issues

Together with the Jersey Coast Refuge goals the following key issues, and the range of options on how to resolve them, formed the basis for the development and comparison of the different alternatives under consideration.

Managing habitats and wildlife populations

This issue was identified as being very important by the public at our meetings, in the workbook and at the workshop. A number of different management activities were suggested, including: habitat manipulation and restoration (e.g., burning, water level control, planting, mowing), wildlife population management, baseline surveys of wildlife species and ecological communities, population and habitat monitoring, and research. Other activities suggested include working with partners on cooperative efforts for habitat restoration and management on private lands.

Some members of the public requested increased opportunities for furbearer trapping at Forsythe Refuge and providing furbearer trapping opportunities at Cape May Refuge. They noted that trapping is a necessary and important wildlife management tool. Other people objected to trapping.

Trapping is often used on National Wildlife Refuges to protect endangered and threatened species from predators, to protect refuge infrastructure, and to maintain furbearer populations at levels consistent with refuge objectives.

The protection and management of wildlife populations and habitats is the fundamental mission of the Refuge System and the Jersey Coast Refuges. Special emphasis is placed on federal trust resources, including: endangered species, migratory birds, interjurisdictional fish, marine mammals, and wetlands.

Both Forsythe and Cape May Refuges have significant problems involving invasive species, which impact native species directly, displacing or killing individuals, destroying habitats, and disrupting ecological communities. Invasive species requiring control are mostly exotics not native to the New Jersey landscape (e.g., Japanese honeysuckle, European bittersweet, autumn olive).

Wildlife species may be deemed overabundant for various management objectives. Overabundant species may degrade habitat quality or the overall integrity of an ecological community (e.g., white-tailed deer), or may displace or prey upon other species that are actively being restored (e.g., raccoon). Other species, because of their numbers, may pose a human health risk (e.g., mosquitos). (See **Mosquito control** on page 8). Overabundant snow geese and resident Canada geese are a management concern for the Refuge and for some landowners. Current goose control activities are discussed under this issue, but more aggressive techniques for goose control will be covered in separate documents. (See **Control of resident Canada geese** and **Control of white geese** on page 9.) Deer and furbearer control activities are discussed under **Increased opportunities for hunting** on page 6 , and **Managing habitats and wildlife populations** on page 5.

The effects of pesticides on fish, wildlife and plants

The public identified the presence of pesticides and chemicals in the environment as an important issue. Chemicals and pesticides from activities taking place on the Refuges or from off-refuge sources may impact fish, wildlife and plants found on the Jersey Coast Refuges. Such chemicals may be transported to the Refuges by wind, water or other mechanisms, or picked up off-refuge by fish and wildlife during their migrations. Many people encouraged us to minimize our use of chemicals and pesticides on the Refuges.

The principle use of pesticides on the Refuge is to control mosquitos and invasive species. For example, at Forsythe Refuge during 1999, more than 1,000 pounds

Controlling invasive and overabundant species

Dealing with this issue is not only a national initiative for the Service, but was also deemed very important by the public at our meetings, in the workbook and at the workshop. The methods used to control these species are also of great concern.

of pesticide were used to control mosquitos. Integrated Pest Management (IPM) provides an overall strategy to reduce pesticide use and promote other techniques to control problem species. For mosquitos, this includes Open Marsh Water Management (OMWM) (modifying mosquito breeding habitat to favor mosquito-eating fish). Because of previous OMWM treatment no pesticides were applied at Cape May Refuge in 1999. Another technique for suppressing phragmites, an invasive species, would be tidal inundation, instead of using herbicides.

Increasing opportunities for hunting

Many people identified hunting on the Refuges as an important issue during the public meetings, in the workbook and at the workshop. Some voiced concern over the Service's policy of restricting access to lands at Forsythe Refuge that were historically available for hunting. Others felt that hunting should not be permitted on the Jersey Coast Refuges, often citing safety concerns and impacts on wildlife.

Hunting has long been a traditional activity in coastal New Jersey. Local residents have hunted much of the land within the current and proposed boundaries of the Jersey Coast Refuges in the past.

At Forsythe Refuge, deer hunting is allowed in designated areas by permit only. Upland game hunting is not allowed. Migratory game bird hunting is allowed in designated areas. Some people called for additional deer hunting opportunities during the six-day firearm season. Some people called for upland game hunting opportunities on the Refuge. Others called for additional opportunities to hunt migratory game birds on the Refuge, or did not agree with the Refuge's policy of restricting hunting to only 40% of its lands.

At Cape May Refuge, deer hunting is allowed Refuge-wide. Upland game hunting is not allowed. Migratory game bird hunting is allowed in designated areas. Some people called for upland game hunting opportunities on the Refuge. Others called for additional opportunities to hunt migratory game birds

on the Refuge.

Because hunting is one of the six priority general public uses of the Refuge System, it "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge hunt programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

Increasing opportunities for fishing

Many people identified fishing on the Refuges as an important issue during the public meetings, in the workbook and at the workshop.

Because fishing is one of the six priority general public uses of the Refuge System, it "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge fishing programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between user groups.

Increasing opportunities for wildlife observation and photography

There was a great deal of interest expressed in expanding wildlife observation and photography opportunities on the Refuges at the public meetings, in the workbook and at the workshop. This high interest is reflected in the fact that many visitors to the Jersey Coast Refuges come to observe the wildlife we manage.

The fact that Forsythe Refuge and the Cape May peninsula are world-renowned destinations for bird watchers is reflected in our high number of visitors and the diversity of their hometowns. As hundreds of thousands of migratory birds use the Refuges each year, so tens of thousands of visitors come each month to observe them.

Because wildlife observation and photography are two of the six priority general public uses of the Refuge System, they "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge wildlife observation and photography programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

Increasing opportunities for environmental education and interpretation

There was more interest in expanding environmental

While extensive fishing does occur within Refuge boundaries, the Service does not have management or law enforcement authority over fishing from boats in tidal waters within those boundaries. Fishing opportunities on lands managed by the Jersey Coast Refuges are limited. At Forsythe Refuge some opportunities are provided at several existing access sites, while Cape May Refuge is not open to fishing. Refuge beaches below mean high tide are under the jurisdiction of the New Jersey Tidelands Council, with the exception of Cape May Refuge's Two Mile Beach Unit.

education and interpretation opportunities at the Refuges than any of the other priority public uses. In fact, there was great interest in increasing our outreach efforts to local schools and communities as well. Quite often people expressed an interest in promoting more environmentally friendly recreational activities while expressing concern for minimizing impacts on the resources. Many encouraged us to place special emphasis in our education and interpretation efforts on: the impacts of public use on wildlife and how those impacts can be reduced; how the public can help wildlife both at the Refuge and in their own back yards; and the importance of refuges in conserving wildlife and their habitats.

Because environmental education and interpretation are two of the six priority general public uses of the Refuge System, they "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge environmental education and interpretation programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

Protecting and managing wilderness resources

In 1975 Congress designated 6,603 acres of the Forsythe Refuge as Wilderness. Undeveloped barrier beaches and dunes at Holgate and on Little Beach Island, and undisturbed salt marshes were included.

There are stringent requirements specified in the Wilderness Act and in Service policy for protecting and managing these areas. These include the highest requirements for clean air, using minimum tools for management, and letting natural processes prevail. The protection and management of Wilderness often includes such actions as monitoring the ecological communities, research, education and outreach,

enforcement of Refuge regulations, reviewing the potential impacts of both on- and off-site activities on wilderness values, and the restoration of native species or natural communities. The single most contentious issue associated with the review of the draft CCP/EA was the use of motorized vehicles for surf fishing at Holgate, in violation of the provisions of the Wilderness Act.

Increasing opportunities for land protection

During the public meeting, in the workbooks and at the workshop, people expressed a great deal of support for the protection of additional fish and wildlife habitat, and suggested that this occur not only through an expanded land acquisition program at the Jersey Coast New Jersey is the most densely populated state in the nation. In addition, Ocean County was the fastest developing county in the United States during the 1970's and 1980's. Development in both Atlantic and Cape May Counties has increased markedly since the birth of the Atlantic City casino industry in the 1980's. As a result, law enforcement incidents encountered on the Jersey Coast Refuges are no longer limited to wildlife related violations. Officers now respond to incidents involving vandalism, assault, breaking and entering, speeding, possession of illegal drugs, and the cultivation of marijuana. While these problems are currently more prevalent at Forsythe Refuge, they are expected to increase at Cape May Refuge in the future.

The two Refuges currently encompass 54,000 acres, along 90 miles of the New Jersey Shore. Marking the expanding Refuge boundaries remains a constant logistical problem. Total annual public use surpasses 300,000 visitors. It is expected to increase rapidly as more of Atlantic City's 35 million annual visitors and the millions of Jersey Shore summer visitors discover the Jersey Coast Refuges.

The current staffing level of three full-time Park Rangers is insufficient to adequately patrol and enforce Refuge and other federal regulations. These officers find it increasingly difficult to respond to public reports of potential violations.

Improving Refuge buildings and facilities

The existing buildings and facilities at both Forsythe and Cape May Refuges are woefully inadequate and need to be replaced. This is especially important if the Refuges are to adequately accommodate work space for not only their current staff, but also any future increases in staffing levels that would be required to implement the actions and strategies in the Refuge CCPs. Additional laboratory and equipment storage space is also needed.

Refuges, but also by working cooperatively with others to protect non-refuge lands as well. There is considerable interest in increasing land protection efforts at both Refuges, especially lands supporting federal trust species. The location of Cape May Refuge on the peninsula makes it particularly important to the successful migration of birds in the Atlantic flyway.

Increasing resource protection and visitor safety

People identified resource protection and visitor safety as a concern during the public meetings, in the workbook and at the workshop.

New facilities in readily accessible locations would also help increase the visibility of the Service in coastal New Jersey and improve our visitor services, including providing opportunities for environmental education and interpretation. The 150,000 people, who currently use the wildlife drive at Forsythe Refuge, are provided few opportunities to learn about the Service or its programs during their visit to the Refuge.

Use of the existing buildings at the Two Mile Beach Unit

A number of groups have expressed interest in using former Coast Guard buildings located at the site. Some of these buildings also have the potential for use as Refuge office, visitor or storage/maintenance facilities. There is also a lot of interest in seeing these buildings removed and restoring the habitat they currently displace.

These buildings lie in the center of possibly the best remaining piece of maritime forest found on the New Jersey coast and an area critical to migrating birds. They also lie within the 100-year flood plain.

Public access to the Two Mile Beach Unit

Some people expressed concern at the public meetings, in the workbook and at the workshop, about the possibility that the Service would close the beach during the piping plover breeding season.

Although the Coast Guard never officially sanctioned public access to the beach, they did allow people to walk along the beach surf line and by that route to access the jetty at Cold Spring Inlet, a popular fishing location. In the past, this beach has supported nesting piping plovers and the least tern, although those species do not

currently use the area.

Issues Outside the Scope of the Environmental Assessment

These issues do not fall within the scope of **The Purpose of and Need for Action** and the **Decision to be Made**. Issues within this category will not be further addressed in this document. The Service will, however, pursue other courses of action, often in cooperation with other interested parties, to resolve them.

Protecting sensitive areas from personal water craft use

Many people expressed concern over the use of personal water craft at the public meetings, in the workbook and at the workshop.

Several species of mosquitoes found in coastal New Jersey are important vectors of potentially lethal diseases, including Eastern Equine Encephalitis and West Nile Virus. The Service is striving to responsibly address risks to public health and safety and to protect trust resources from mosquito borne diseases and the impacts of pesticides on wildlife and the ecosystem. The Service and the mosquito control agencies in New Jersey and Delaware are working to develop new strategies for mosquito control, with appropriate NEPA compliance. The public will have the opportunity to review and comment on the proposed strategies before they are finalized.

Control of resident Canada geese

Resident Canada geese are having a growing impact on communities across the country. Increasing urban and suburban development in the United States has resulted in the creation of ideal goose habitat conditions including park-like areas with short grass adjacent to small bodies of water.

These habitat conditions have enticed rapidly growing numbers of locally breeding geese to live here year round. These resident goose populations are increasingly coming into conflict with human activities in many parts of the country. Large flocks of resident geese have serious impacts, on both wildlife and people: geese grazing in large numbers cause major habitat destruction, reducing the amount of critical forage available for migratory geese and other waterfowl during migration; high concentrations of goose droppings in lakes can cause excessive algae growth, leading to fish kills; high concentrations of goose droppings can also create health hazards to humans;

Personal water craft use in the State-managed waters surrounding or adjacent to lands of the Jersey Coast Refuges has risen dramatically. The Refuge does not have jurisdiction over these activities in these waters.

Personal water craft have made previously inaccessible Refuge areas susceptible to adverse habitat and wildlife impacts. Their use has increased wildlife-human interactions, involving disruption of roosting, foraging, and nesting birds over large areas of the Jersey Coast Refuges.

The Service will increase its education and outreach efforts regarding the responsible use of personal water craft, and will work closely with the State to seek solutions for resolving this perplexing problem.

Mosquito control

and resident geese can denude lawns of vegetation.

To help address this problem, the Service issued special Canada goose permits to states in the summer of 1999. The permits are designed to give states greater flexibility and opportunity to design management programs to control specific resident Canada goose populations. The permit program was designed as a short-term program until a comprehensive long-term management strategy can be developed and implemented.

The Service is preparing an Environmental Impact Statement (EIS) to lay out alternatives for dealing with all the resident Canada goose problems. The EIS will be completed in 2001.

Control of white geese

Populations of white geese – a term that encompasses greater and lesser snow geese and Ross' geese – have increased dramatically in the last 30 years. The species of primary concern in the Jersey Coast Refuge area is the greater snow goose.

Numbers of lesser snow geese and Ross' geese have grown from 300,000 birds in 1969 to more than 3 million birds today. Numbers of greater snow geese have grown from fewer than 50,000 in the late 1960's to about 800,000 today.

As a result, the geese have destroyed and damaged vast areas of their sensitive Arctic breeding grounds as well as local migration stopover areas. This negatively impacts not only the geese, but for all the plants and the other animals in these areas.

The Service is preparing an EIS to lay out alternatives for dealing with all the white goose population problems. The EIS will be completed in May 2001.

The Compatibility Determination

Federal law and policy provide the direction and planning framework to protect the National Wildlife Refuge System (Refuge System) from incompatible or harmful human activities and to insure that Americans can enjoy Refuge System lands and waters. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act), is the key legislation on managing public uses and compatibility.

Before activities or uses are allowed on a National Wildlife Refuge, the uses must be found to be a “compatible use.” A compatible use is a use, “...that will not materially interfere with or detract from the An interim compatibility determination is one which assesses the compatibility of an activity during the period from the time the Service first acquires a parcel of land to when a formal long-term management plan for the parcel is prepared and adopted. The Service has completed interim compatibility determinations for the six priority general public uses of the System listed in the Refuge Improvement Act, hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. (The interim compatibility determinations may be found in **Appendix B** on page 55.) The Act defines these six priority general public uses as “wildlife-dependent recreation” and “wildlife-dependent recreational use.”

These interim compatibility determinations cover both of the Jersey Coast Refuges. It covers the period between Service acquisition of a parcel and the formal adoption of a long-term management plan for the parcel. (See **Table 1.**)

Table 1. Interim Compatibility for Wildlife-dependent Recreational Activities at the Jersey Coast Refuges.

Wildlife-dependent Recreational Activities	Existing Activities ?	Compatible for Interim Use?	Interim Use Allowed?
Hunting	Yes	Yes	Yes
Fishing from bank	Yes	Yes	Yes
Fishing from boat	Yes	Yes	Yes

fulfillment of the mission of the Refuge System or the purposes of the refuge.” “Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety. Except for consideration of consistency with State laws and regulations as provided for in section (m), no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur.” (Refuge Improvement Act)

A number of compatibility determinations have been prepared over the years covering a variety of uses currently taking place on both Edwin B. Forsythe and Cape May National Wildlife Refuges (Jersey Coast Refuges). These compatibility determinations remain in effect and are being re-certified as part of this effort to prepare Comprehensive Conservation Plans (CCPs) for both Refuges.

Interim Compatibility Determination

Wildlife Observation	Yes	Yes	Yes
Wildlife Photography	Yes	Yes	Yes
Environmental Education	No	Yes	Yes
Interpretation	No	Yes	Yes

The interim compatibility determinations cover the existing priority general public uses taking place within the proposed Land Protection Focus Areas (Focus Areas) described in the Service’s Proposed Action in this Revised Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA). (See **Alternative B - The Service’s Proposed Action** on page 13, **Maps 2-8a, b, c, and d**, beginning on page , and **Maps 2-16a and b**, beginning on page .) These Focus Areas are lands outside the currently approved Refuge acquisition boundary. The interim compatibility determinations do not cover existing priority general public uses on lands within the currently approved Refuge acquisition boundary. The CCP/EA sets forth the management for all lands within the currently approved Refuge acquisition boundary – regardless of whether the Service already owns the properties or not.

Several of the six priority general public uses occur on lands within the proposed Focus Areas. The current levels of hunting, fishing, wildlife observation and photography, environmental education and interpretation taking place on these lands do not seem to be negatively impacting fish, wildlife, or plant

resources.

Current levels of the six priority general public uses in the proposed Focus Areas would be compatible with the mission of the Refuge System and the purposes for which the Jersey Coast Refuges were established. The proposed Focus Areas have little estuarine habitat important to the Atlantic Brant, black ducks or rails, or important estuarine feeding and resting habitat for ducks or brant. The Refuges would allow the current levels of hunting, fishing, wildlife observation and wildlife photography to continue in the interim. We would monitor impacts of these uses and adjust levels and locations as appropriate through the adoption of long-term management plans.

Walking, hiking and bicycling done for exercise and enjoyment of the outdoors occur on lands within the proposed Focus Areas. To eliminate conflicts between user groups, we would terminate bicycling on property within the proposed Focus Areas as soon as the Service acquired and posted a property within these areas. The Service intends to administratively separate Cape May Refuge from Forsythe Refuge. The two Refuges were joined in 1995 for funding and administrative purposes. Development of this document and identification of management actions in the CCPs for each Refuge provides the Service the opportunity to administratively separate them. Within the next five years, depending upon the availability of adequate resources, the Service will separate the two Refuges. After they have been separated, both Refuges will have their own Refuge Managers and appropriate staffs. We would, however, continue to coordinate biological management between Refuges to achieve wildlife population, habitat, and ecosystem management goals and objectives. The biological activities at both Refuges involve many of the same techniques, expertise, and species and community types. Continued coordination would benefit the resource, and provide greater efficiency in program management.

Potential Land Protection Methods

Land protection priority would be given to lands adjacent to Service-owned lands within existing Refuge boundaries, and also to larger contiguous tracts. Known hazardous waste sites or contaminated areas will be excluded from consideration. All land transactions are subject to contaminant surveys.

Funding for land acquisition will come from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund, under the Migratory Bird Conservation Act. Except in unusual cases, developed parcels within the current acquisition boundary or

Walking and hiking would be allowed to continue at their current levels in the interim. We would monitor impacts of these uses and adjust levels and locations as appropriate through the adoption of long-term management plans.

All terrain vehicle (ATV), dirt bike, and mountain bike riding occurs on some lands in the proposed Focus Areas. These activities negatively impact physical and biological resources, and are therefore not compatible with the purposes for which the Jersey Coast Refuges were established. To eliminate negative impacts, we would terminate these activities on property within the proposed Focus Areas as soon as the Service acquired and posted a property within these areas.

Administrative Separation of the Jersey Coast Refuges

proposed Focus Areas would not be acquired.

The Service's land acquisition policy is to obtain the minimum interest necessary to satisfy Refuge objectives. Conservation easements can sometimes be used in this context, when they can be shown to be a cost-effective method of protection. In general, any conservation easement must preclude destruction or degradation of habitat, and allow Refuge staff to adequately manage uses of the area for the benefit of wildlife. Because development rights must be included, the cost of purchasing conservation easements often approaches that of fee title purchase, thus rendering this method less practical. Nevertheless, donations of easements or voluntary deed restrictions prohibiting habitat destruction would be encouraged. In addition, the Service could negotiate management agreements with local and State agencies, and accept conservation easements on upland tracts.

Some parcels within the proposed Refuge Focus Area may already be owned by State, local governments, or private conservation organizations. The Service would work with interested agencies to identify additional areas needing protection and provide technical assistance if needed.

Property Taxes, Refuge Revenue Sharing, Relocation, and Landowner Rights

The Refuge Revenue Sharing Act of June 15, 1935, as amended, provides annual payments to taxing

authorities, based on acreage and value of Refuge lands located within their jurisdiction. In 1999, the Service paid, \$114,414 to Ocean County communities, \$10,006 to Burlington County communities, \$85,410 to Atlantic County communities, and \$80,646 to Cape May County communities.

Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, and the sale of other Refuge System resources and from Congressional appropriations. The Congressional appropriations are intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local taxing authorities. The actual Refuge Revenue Sharing Payment does vary from year to year, because Congress may or may not appropriate sufficient funds to make full payment. The actual payments made in 1999 were 62.25% of full payment.

The Refuge Revenue Sharing Payments are based on one of three different formulas, whichever results in the highest payment to the local taxing authority. In New Jersey, the payments are based on three-quarters of one percent of the appraised fair market value. The purchase price of a property is considered its fair market value until the property is reappraised. The Service reappraises the value of Refuge lands every five years.

The owner of land adjacent to Refuge land or within an approved Refuge acquisition boundary or a proposed Refuge Focus Area, retains any and all the rights, privileges, and responsibilities of private land ownership. This includes the right of access, hunting, vehicle use, control of trespass, right to sell to any party, and the obligation to pay real estate taxes. The Refuge controls uses only on the properties it owns.

Monitoring and Adaptive Management

The Final CCPs for each Refuge will cover a 15-year period. Periodic review of the CCP will be required to ensure that established goals and objectives are being met and that the Plan is being implemented as scheduled. To assist this review process, a monitoring and evaluation program would be implemented, focusing on issues involving public use activities, and wildlife habitat and population management.

Monitoring of public use programs would involve the continued collection and compilation of visitation figures and activity levels. In addition, research and monitoring programs would be established to assess the impacts of public use activities on wildlife and wildlife habitat, conflicts between Refuge users, and identify

On wetlands and formerly farmland-assessed properties in New Jersey, the full entitlement Refuge Revenue Sharing Payments sometimes exceed the real estate tax. However, Refuge Revenue Sharing payments are more often less than the real estate tax.

The fact that Refuges put little demand on the infrastructure of a municipality, must be considered in assessing the financial impact on the municipality. For example, there is no extra demand placed on the school system, roads, utilities, police and fire protection, etc. There is a substantial body of literature that shows that development, especially residential development, actually costs a community more in schools, roads, sewers and other services than the tax revenue generated by the development (Land Trust Alliance, 1994).

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, provides certain relocation benefits to home owners, businessmen, and farm operators who are displaced as a result of Federal land acquisition. The law provides benefits to eligible owners and tenants for reimbursement of reasonable moving expenses, replacement of housing payments under certain conditions, relocation assistance services, and reimbursement of certain expenses incurred in selling real property to the Government.

compatible levels of public use activities. We would reduce these activities if we determine that incompatible levels of public use were occurring.

Collection of baseline data on all wildlife populations and habitats would be implemented. This data would update existing records of wildlife species using the Refuges, their habitat requirements, and seasonal use patterns. This data would also be used to evaluate the effects of public use and habitat management programs on wildlife populations.

Refuge habitat management programs would be continually monitored for positive and negative impacts on wildlife habitat and populations and the ecological integrity of the ecosystem, and to determine if these management activities are helping to meet Refuge goals and objectives. Information resulting from monitoring would allow staff to set more specific and better management objectives, more rigorously evaluate management objectives, and ultimately, make better management decisions.

Alternative A – the No Action Alternative

Edwin B. Forsythe National Wildlife Refuge

Under the No Action Alternative, there would be no change in our current management programs at Forsythe Refuge. Seasonal travel and parking of motor vehicles would continue to be allowed in the Holgate Unit of the Brigantine Wilderness Area, on lands above mean high tide, in violation of the Wilderness s Act of 1964.

We would initiate few, if any, new wildlife population, habitat or ecosystem management activities, provide no new public recreation opportunities, and undertake no new major land acquisition efforts. The Refuge would continue to pursue land acquisition and Refuge operations and maintenance under it's current staffing and funding levels. (See also **Table 2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page , and **Maps 2-8a, b, c, and d**, beginning on page .)

Cape May National Wildlife Refuge

Under the No Action Alternative, there would be no change in our current management programs at Cape May Refuge. We would initiate few, if any, new wildlife population, habitat or ecosystem management activities, provide no new public recreation opportunities, and undertake no new major land acquisition efforts. The Refuge would continue to pursue land acquisition and Refuge operations and maintenance under it's current staffing and funding levels. (See also **Table 3. Actions and Strategies Matrix for Cape May Refuge**, beginning on page , and **Maps** Refuge staffing and funding levels would be increased and we would initiate new wildlife population, habitat, and ecosystem management activities; provide new compatible wildlife-dependent recreational opportunities; increase our land protection efforts; and construct new office and visitor facilities to support the goals and objectives of the Refuge.

Special emphasis would be placed on the six priority general public uses defined in the Refuge Improvement Act, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. Public use surveys, along with wildlife and habitat monitoring, would help us estimate the volume and impacts of public use, and adapt our management strategies for that use. (See also **Table 2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page , and **Maps** , beginning on page .)

Cape May National Wildlife Refuge

2-16a and b, beginning on page .)

Two Mile Beach Unit

The No Action Alternative for the Two Mile Beach Unit is one of custodial management. The beach would be closed to access by the public. No active wildlife or public use management would be undertaken, and no public use opportunities would be provided. The Service's major focus would be on posting and patrolling the property. We would abandon all buildings or improvements in place, except those required for the Coast Guard LORAN Support Unit. (See also **Table 4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page .)

Alternative B – The Service's Proposed Action

Edwin B. Forsythe National Wildlife Refuge

Under the Service's Proposed Action, all lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would initiate efforts to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.

Under the Service's Proposed Action staffing and funding levels would be increased and we would initiate new wildlife population, habitat, and ecosystem management activities; provide new compatible wildlife-dependent recreational opportunities; increase our land protection efforts; and construct new office and visitor facilities to support the goals and objectives of the Refuge.

Special emphasis would be placed on the six priority general public uses defined in the Refuge Improvement Act, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. Public use surveys, along with wildlife and habitat monitoring, would help us estimate the volume and impacts of public use, and adapt our management strategies for that use. (See also **Table 3. Actions and Strategies Matrix for Cape May Refuge**, beginning on page , and **Maps** , beginning on page .)

Two Mile Beach Unit

Under the Service's Proposed Action we would initiate a seasonal closure of the beach, above and below the mean high tide line, to benefit:

- beach nesting birds such as piping plover, least tern, and black skimmer;
- migratory shorebirds during spring and fall migration periods.

The closure would take place from April 1 to September 30, during which time, beach access would be allowed only during Refuge-scheduled bird/beach walks. This seasonal closure would be evaluated after two years to determine its effectiveness and to implement changes if necessary.

Motor vehicles, and non-wildlife dependent uses such as swimming, sunbathing, and surfing, would be prohibited at all times. The beach would be open for walking and surf fishing from October through March, accessible from the north boundary of the beach and at the location of the former Coast Guard Beach Hut. Sand dunes would be closed to public access except at designated crossing points.

A visitor center would be established in building A-14 and environmental education and interpretation programs would be provided on a regular basis. We would also use building B-6 for Refuge administration, and all other buildings or improvements on the property would be removed, except those required for the Coast Guard LORAN Support Unit. (See also **Table 4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page .) Under this Alternative staffing and funding levels would be increased and we would allow hunting, trapping, and fishing Refuge-wide. The existing Refuge office and visitor contact building would be enlarged and remodeled and new storage and maintenance facilities constructed. Wildlife and habitat management activities would be increased, while wildlife observation and photography, environmental education and interpretation opportunities would be reduced. (See also **Table 3. Actions and Strategies Matrix for Cape May Refuge**, beginning on page , and **Maps** , beginning on page .)

Two Mile Beach Unit

Under this Alternative we would provide year-round public access to the beach for walking and surf fishing. No motor vehicles would be permitted on the beach. Public trapping would be allowed, as would commercial bait fishing (both under Refuge special use permit). Public use improvements would be limited, and only a

Alternative C

Edwin B. Forsythe National Wildlife Refuge

Under this Alternative all lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would also seek to further restrict motor vehicle access at the Holgate Unit by obtaining a license from the New Jersey Tidelands Council to close State-owned riparian lands below the mean high tide line. Efforts would be initiated to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.

Refuge staffing and funding levels would be increased and we would provide increased public use and access opportunities, including Refuge-wide hunting, trapping, fishing, and wildlife observation and photography. New office and visitor facilities would be constructed to support the goals and objectives of the Refuge. In addition, this Alternative would also place more emphasis on our habitat and wildlife management, environmental education, interpretive, and outreach efforts. (See also **Table 2-2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page , and **Maps** , beginning on page .)

Cape May National Wildlife Refuge

visitor contact station would be provided.

We would use building B-6 for Refuge administration, provide selected building(s) to partners/cooperators for purposes compatible and complementary to the purpose of the Refuge, and remove all other excess buildings, except those required for the Coast Guard LORAN Support Unit. (See also **Table 4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page .)

Environmental Consequences of Implementing the Alternatives on the Physical Environment

Climate

None of the Alternatives would measurably impact the

climatic conditions within the New Jersey coastal weather station zone (Sandy Hook, Long Branch, Atlantic City, and Cape May weather stations). All of the Alternatives would impact the micro-climatic conditions within the Refuge acquisition areas and the immediate surroundings (e.g., vegetated undeveloped lands would moderate local temperatures compared to developed lands).

Air Quality

All of the Alternatives would positively impact the air quality in Ocean, Burlington, Atlantic, and Cape May Counties, because the Brigantine Wilderness Area is a Class I Air Quality area. The Clean Air Act provides for special emissions control regulations in areas surrounding Class I Air Quality areas. Furthermore, all the Alternatives would maintain or improve the air quality in the municipalities in which Refuge property is located, in direct relationship to the extent of the areas protected from development.

Not protecting the air quality of the Brigantine Wilderness Area, would likely threaten or destroy unique floral, faunal and scenic values.

Geology, Topography, and Soils

The Alternatives would not substantially impact these environmental features, except that the Alternatives would protect, in perpetuity, soil formation processes on lands the Refuge acquires. Some disturbances to surface soils and topography will occur at those locations selected for administrative, maintenance and visitor facilities, including visitor center, visitor contact stations, trails, platforms, and other structures.

Hydrology

Each Alternative would protect sites important to these species. Alternative A would provide the least protection, while Alternatives B and C both have the potential to provide the most protection.

Vegetation and Habitat

Each Alternative would prevent the conversion of agricultural and forest/shrub upland and wetlands to developed land. They would provide additional protection to wetlands beyond the protection afforded by existing wetlands regulations. They would also protect landscape characteristics such as habitat connectivity. Alternative A would provide the least protection, while Alternatives B and C both have the potential to provide the most protection, and contribute the greatest to habitat quality and the ecological integrity of the landscape.

Each Alternative would protect the natural hydrology of the affected areas. Alternative A would provide the least protection, while Alternatives B and C would provide the most protection. Each Alternative would prevent substantial upland acreage from being developed through land acquisition and through planning assistance to local governments and other conservation partners. They would maintain groundwater recharge areas, and prevent groundwater withdrawal, factors important for protecting wetlands and long-term water supply for those dependant on wells for their water supply. The upland and wetlands protected through the Alternatives would maintain natural catchments to hold and absorb surface waters, thereby minimizing flooding.

Water Quality

All the Alternatives would substantially impact the water quality in individual streams and possibly in the bodies of water into which these streams flow, for example, Barnegat Bay, Little Egg Harbor, Great Bay, Great Egg Harbor, and Delaware Bay. These positive impacts would result from the protection of ground water recharge areas, runoff prevention, sediment retention and by minimizing non-point source pollution. Positive impacts would also result from maintaining the ecosystem functions of disturbance regulation, water regulation, and waste treatment.

Environmental Consequences of Implementing the Alternatives on the Biological Environment

Threatened and Endangered Species

Wildlife Resources

Each Alternative would protect habitat types important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates. Alternative A would protect the least amount of habitat, while Alternatives B and C would protect the most.

Environmental Consequences of Implementing the Alternatives on the Archaeological and Historical Environment

All the Alternatives would protect archaeological and

historical resources that may occur on land the Refuge acquires. They would not only protect archeological and historical resources from vandalism, but also during the planning and construction of all administrative, maintenance and visitor facilities.

All the Alternatives would allow interpretation of human interaction with the Refuge environment over the last 12,000 years, and provide data on the nature and degree of change that have occurred to that environment.

Environmental Consequences of Implementing the Alternatives on the Socioeconomic Environment

All the Alternatives would reduce the amount of developable land in townships where the Service acquires developable property for the Refuges. This would increase the value of the remaining developable land.

The Alternatives would channel development to less environmentally sensitive areas, which would likely help townships reduce infrastructure costs related to any new development. They would also help assure the sustainable economic viability of the area, and promote the values which attract people to the Jersey Shore in the first place.

Alternatives B and C would increase compatible wildlife-dependent recreational opportunities (hunting, fishing, wildlife observation and photography, environmental education and interpretation) in the area. These Alternatives would also stimulate ecotourism, potentially increasing tourism expenditures.

Under some of the Alternatives certain newly acquired Refuge lands would be closed to all wildlife-dependent recreational uses, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. This does not necessarily mean, however, that this would result in a net loss of opportunities in the area. While some private land owners allow the public to use their lands, others may not allow public access or only allow certain individuals to use their property. Thus, most lands we acquire may never have been open to the public. If we open these lands to public access it may very well represent a net increase in wildlife-dependent recreational opportunities in the area.

All the Alternatives would decrease gross property tax revenues to townships in which the Service acquires developable property for the Refuges. However, the impact on net property tax revenues may be positive. Net property tax revenue equals the increase in gross property tax revenues from development, less the increase in costs to the municipality for services and infrastructure needed for the development.

All the Alternatives would increase Refuge Revenue Sharing Payments to townships in which the Service acquires lands for the Refuge.

For an analysis of the socioeconomic impacts of the proposed year-round closure of the Holgate Unit of the Brigantine Wilderness, above mean high tide, to motorized vehicles see **Appendix C** beginning on page 59.

Note for reviewers: For a more complete discussion of Alternatives A, B, and C, and the consequences of implementing each of these Alternatives, please see the full **Revised Draft Comprehensive Conservation Plan and Environmental Assessment**. Copies are available on request at the headquarters of Forsythe Refuge in Oceanville, New Jersey (609/652-1665), or the headquarters of Cape May Refuge in Cape May Courthouse, New Jersey (609/463-0994).

The following Actions and Strategies Matrix compares management Alternatives for the key issues identified in Chapter I. Actions and strategies identified under each of the three Alternatives are **not** additive, Alternatives B & C **do not** include the actions in Alternative A, unless otherwise indicated.

Table 2. *Actions and Strategies Matrix for Forsythe Refuge.*

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitats and wildlife populations?</i>	Continue to protect & monitor piping plover & swamp pink (federally-listed species) Complete a step-down habitat management plan for the Refuge Continue maintaining Barnegat & Brigantine impoundments Continue current population baseline surveys Establish monitoring program for water quality & contaminants Continue providing minimal on-site support for current research projects Continue using trapping to control furbearer populations in problem areas	Same as Alternative A, except: Survey areas for potential threatened & endangered species; actively restore good candidates (e.g. sea beach amaranth) Implement physiographic/species based habitat management prescription on all Refuge lands Conduct prescribed burns in upland forests, upland brush & grasslands Develop & implement cooperative private lands habitat restoration & management plan Conduct baseline surveys & monitoring on: plants, invertebrates, mammals, amphibians, raptors, fish, & waterbirds Implement species monitoring before & after major projects; expand use of GIS to document & model species & habitat Increase on-site support for current research & initiate new research on: impact of mosquito control techniques on wildlife; impact of public use on wildlife; beach/shoreline dynamics; impact of water quality & quantity on wetland resources; & pre-colonial ecology of area Develop computer archive of data& publications for staff, public, & partners Provide technical assistance to local communities on contaminant spill planning & response & other wildlife-related activities Restore colonial nesting birds on barrier & bay islands Identify spawning & nursery habitat for anadromous & interjurisdictional fish Expand trapping areas to better manage furbearer populations	In addition to Alternative B: Develop community-level habitat map Develop & implement community/species-based habitat management plan Develop & implement cooperative private lands habitat restoration plan Through partnerships, increase nesting structures for peregrine falcon, osprey, & barn owls Evaluate stream/river blockages impeding spawning runs for interjurisdictional fish Open all Refuge lands to public trapping

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage invasive and overabundant species?</i>	Continue program to control approximately 150 acres of Phragmites/year Continue special public hunting program to control populations of snow geese & resident Canada geese Conduct nest disruption of resident Canada geese	Survey invasive/exotic species Implement Integrated Pest Management (IPM) program for Phragmites & six other invasive plant species Provide technical assistance to adjacent land owners on invasive species control Research alternative methods of controlling invasive species Use more aggressive control techniques for overabundant goose population	Same as Alternative B
<i>How would we manage pesticide use?</i>	Continue current levels of pesticide use for phragmites & mosquito control	Expand Integrated Pest Management (IPM) program, minimizing pesticide use	Same as Alternative B
<i>What big game hunting opportunities would we provide?</i>	Continue current hunting programs in Deer Management Zones (DMZ) 56, 57 & 58	In addition to Alternative A: Initiate a universally accessible hunt in DMZ 56 during the permit shotgun or muzzle loader seasons Expand deer hunting opportunities in DMZ 58 to include: Forked River Game Farm; former AT&T property; selected properties east of Route 9; Middle Branch of Forked River; & Cedar Run Creek	In addition to Alternative B: Open DMZ 57 & 58 to six-day firearm, fall & winter bow seasons
<i>What upland game hunting opportunities would we provide?</i>	Continue to keep Refuge closed to upland game hunting	Establish an upland game hunting area at Oak Island	In addition to Alternative B: Open all Refuge lands to upland game hunting
<i>What migratory game bird hunting opportunities would we provide?</i>	Continue current waterfowl, rail, & moorhen hunting in designated units	In addition to Alternative A: At the Brigantine Division allow foot access to Unit 5 At the Barnegat Division allow jump shooting from Jeremy Point to Cedar Run Creek in Unit A; eliminate foot access & jump shooting from Cedar Run Creek to Beach Haven in Unit A; & allow jump shooting & eliminate site requirements in Unit C Designate new hunting areas at: Reedy Creek; Stouts Creek; Forked River Game Farm; AT&T tract; & Cedar Run Creek	In addition to Alternative B: Open all Refuge lands to migratory game bird hunting
<i>What fishing opportunities would</i>	Continue to operate boat launching ramp &	In addition to Alternative A:	In addition to Alternative B:

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>we provide?</i>	parking area at Scotts Landing Continue to provide fishing opportunities at: Lily Lake; Graveling Point; Holgate (seasonal); Scott's landing; Bridge to Nowhere; Dock Creek Road; Parkertown Road; Cedar Run Creek; Dock Road; & Stafford Avenue. Revise Refuge fishing plan	Develop a Refuge fishing guide By 2002, provide a universally accessible saltwater fishing & crabbing pier on the Mullica River By 2003, upgrade 3 saltwater fishing & crabbing sites: Parker Run, Cedar Run Creek, & Cedar Creek By 2004, provide a universally accessible freshwater fishing pier at Cedar Run Creek Fishing opportunities in the Brigantine Wilderness Area are discussed under <i>How would we manage the Brigantine Wilderness Area?</i>	Allow fishing from all shore locations outside of the Holgate Unit, Little Beach Island & the Wildlife Drive
<i>What wildlife observation and photography opportunities would we provide?</i>	Continue to provide opportunities at: Wildlife Drive, associated foot paths & observation tower; Reedy Creek Trail; Barnegat Impoundment observation deck; & Seasonal access at Holgate Beach. Monitor walking & bicycling activities on the Wildlife Drive Continue to maintain interpretive signs& provide brochures at existing Refuge public use sites	In addition to Alternative A: Create new foot trails, with appropriate parking areas, kiosks & interpretive signs at: Four Mile Branch Bogs by 2003; Stouts Creek by 2006; Cedar Run Bog by 2010; & Collinstown Rd by 2014 By 2004, complete Reedy Creek Trail & add observation platform Construct universally accessible observation platform at Bonnet Island by 2005 & off of Wildlife Drive, overlooking the experimental pool by 2007 Develop parking for canoers & kayakers, with appropriate kiosks, at Westecunk Creek by 2008 & Cedar Run Creek by 2012 Wildlife observation & photography opportunities in the Brigantine Wilderness Area are discussed under <i>How would we manage the Brigantine Wilderness Area?</i>	In addition to Alternative B: Open all Refuge lands to wildlife observation & photography, except those involving endangered species recovery efforts
<i>What environmental education and interpretation opportunities would we provide?</i>	Continue current programs & projects: New displays at the renovated auditorium; 5,000 students visit annually with teachers; Provide class visit planning & informational assistance	In addition to Alternative A: Conduct outreach related to environmental education opportunities at the newly renovated auditorium Reach out to local community groups, especially those that are not the Refuge's typical audience Increase interface with education community, including provision of	In addition to Alternative B: Participate in development of a watershed-wide, cooperative outreach group

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	as needed; Issue special use permits for class activities such as seining or collecting samples as requested; Upon request, show videos in auditorium for organized groups; Friends of Forsythe provide occasional interpretive tours of the Wildlife Drive; Distribute 3 Refuge brochures; & Continue to maintain interpretive signs& provide brochures at existing Refuge public use sites.	teacher training, & help develop wildlife classroom projects Increase interpretive signs & available information Increase interpretive outreach to hunters & anglers Develop environmental education partnerships, introductory Refuge video for all age groups, wildlife learning materials for children, 5 new Refuge brochures, & 2 outdoor classroom sites Work with partners to address personal watercraft impacts through outreach & education Expand interpretive focus to include human impacts on wildlife Add scheduled seasonal nature tours on the Wildlife Drive, at Holgate & Reedy Creek with the help of partners & Friends of Forsythe	
<i>How would we manage the Brigantine Wilderness Area?</i>	Continue to seasonally allow motor vehicles to illegally drive & park above the mean high tide line at Holgate Continue to offer seasonal surf fishing opportunities at Holgate Continue to close all of the Holgate Peninsula to public access from April thru August during the piping plover breeding season Continue to keep Little Beach Island closed to all public access year-round Continue to allow migratory game bird hunting on designated salt marshes Continue to allow motor vehicles to assist in rescuing stranded marine mammals	Prohibit motor vehicles use above the mean high tide line at Holgate year-round & post mean high tide line Continue offering seasonal surf fishing, wildlife observation & photography opportunities at Holgate from September thru March with access by foot only Initiate efforts to establish a boat concession to seasonally ferry anglers & other Refuge visitors to the southern tip of the Holgate Peninsula Continue to close all of the Holgate Peninsula & Little Beach Island to public access from April through August during the piping plover breeding season Open Little Beach Island to surf fishing, wildlife observation & photography seasonally by Refuge special use permit Encourage seasonal use of less sensitive areas of the Wilderness through guided tours or Refuge special use permit Continue to allow migratory game bird hunting on designated salt marshes	Same as Alternative B, except: Seek a license from the NJ Tidelands Council to close the State-owned intertidal zone at Holgate to motor vehicles, eliminating the need to post mean high tide line In cooperation with Town provide observation platform immediately north of Holgate Unit Perform most beach maintenance & management activities by boat

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	Continue to use motor vehicles for law enforcement at Holgate Beach Continue programs to monitor air quality & precipitation chemistry Conduct a Wilderness Review as part of the revision of the Refuge CCP in 2015	Apply "minimal tools" concept to management activities such as: invasive species control, boundary posting, assisting stranded marine mammals, etc. Continue current air quality monitoring programs & add mercury monitoring in partnership with NJ DEP Develop partnerships with NJ DEP, local chambers of commerce, & others emphasizing wilderness values Conduct outreach to increase awareness of the Wilderness Area, using TV, calendars, posters, presentations, etc. By 2005 develop a Wilderness Management Plan, & by 2010 conduct a Wilderness Review of all Refuge lands acquired since 1972 (Also see <i>How would we manage habitats and wildlife populations?</i> for other management activities)	
<i>What would be our land protection strategy?</i>	Continue efforts to acquire 12,300 acres of privately owned lands within approved Refuge acquisition boundaries from willing sellers Continue current level of land protection planning with government & private partners	In addition to Alternative A: Acquire 11,500 acres within designated Focus Areas outside existing approved Refuge acquisition boundaries Increase land protection planning efforts with partners Expand off Refuge habitat protection & restoration efforts with other public & private landowners	Same as Alternative B
<i>How would we ensure resource protection and visitor safety?</i>	Continue current law enforcement efforts with 1 seasonal & 2 full-time Park Rangers	In addition to Alternative A: Hire 3 new full-time Park Rangers	Same as Alternative B
<i>What buildings and facilities would be used or constructed for Refuge operations?</i>	Continue to use existing Refuge buildings	Conduct a Site Requirement Analysis Construct new headquarters & visitor center building(s) at the Brigantine Division to replace existing buildings Construct new Barnegat Division Office & visitor contact building(s) to replace existing field office Construct new Reedy Creek Unit office & visitor contact building(s)	Same as Alternative B
<i>What would be the</i>	Current staffing level:	In addition to Alternative A:	In addition to Alternative A:

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>future staffing needs at Forsythe Refuge?</i>	1 Project Leader 1 Deputy Project Leader 1 Supervisory Refuge Operations Specialist 1 Refuge Operations Specialist 2 Biologists 1 Outdoor Recreation Planner 2 Maintenance Workers 1 Lead Administrative Office Assistant 1 Office Automation Assistant 2 Park Rangers 1 Seasonal Park Ranger 1 Volunteer Coordinator 1 SCEP (Student Career Experience Program) 1 Crew Leader total FTEs = 17	2 Safety Officers/Refuge Operations Specialists 2 Biologists 1 Forester/Fire Management Officer 4 Biological Technicians 6 Maintenance Workers 1 Office Automation Assistants 1 Outreach Specialist 1 Computer Specialist 3 Park Rangers 1 Outdoor Recreation Planners 2 Recreational Assistants 1 Secretary total FTEs (A + B)= 42	3 Safety Officers/Refuge Operations Specialists 5 Biologists 4 Biological Technicians 6 Maintenance Workers 3 Office Automation Assistants 3 Park Rangers 3 Outdoor Recreation Planners total FTEs (A + C)= 44
<i>What would be the future funding needs at Forsythe Refuge for the next 15 years?</i>	Staffing & Projects: \$15.3 million Land Protection: \$19.7 million	Staffing & Projects: \$54.2 million Land Protection: \$57.7 million	Staffing & Projects: \$60 million Land Protection \$57.7 million

Table 3. *Actions and Strategies Matrix for Cape May Refuge.*

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitat and wildlife populations?</i>	Complete a step-down habitat management plan for the Refuge Maintain open land through cooperative mowing Continue current baseline population surveys Establish monitoring program for water quality & contaminants Continue providing minimal on-site support for current research projects The Refuge would remain closed to public trapping	Same as Alternative A, except: Survey all areas for potential threatened & endangered species & actively restore good candidates (e.g. sea beach amaranth) Implement physiographic/species based habitat management prescription on all Refuge lands Conduct prescribed burns in upland forests, upland brush & grasslands Develop & implement cooperative private lands habitat restoration plan Conduct comprehensive baseline flora & fauna surveys & long term monitoring Implement species monitoring before & after major projects; expand use of GIS to document & model species & habitat Initiate research on: impact of mosquito control techniques on wildlife; impact of public use on wildlife; beach/shoreline dynamics; impacts of water quality/quantity on wetland resources; & pre-colonial ecology of the area Develop computer archive of data & publications for staff, public, & partners Provide technical assistance to local communities on contaminant spill planning & response & other wildlife-related activities Open area north of Route 550 to trapping	In addition to Alternative B: Develop an ecological community-level habitat map Develop & implement community/species based habitat management plan Develop & implement cooperative private lands habitat restoration plan Through partnerships, increase nesting structures for osprey, barred & barn owls Open entire Refuge to trapping
<i>How would we manage invasive and overabundant species?</i>	No effort would be made to control invasive species	Survey invasive & exotic species on the Refuge Implement Integrated Pest Management (IPM) program, including long term monitoring, on phragmites & other exotic plant species Research alternative methods of controlling problematic species	Same as Alternative B
<i>How would we manage pesticide use?</i>	Continue current levels of pesticide use for mosquito control	Implement Integrated Pest Management (IPM) strategy minimizing pesticide use Provide technical assistance on IPM	Same as Alternative B

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		strategies to local communities to control common problem species	
<i>What big game hunting opportunities would we provide?</i>	Continue current Refuge-wide deer hunt program	Same as Alternative A.	Same as Alternative A
<i>What upland game hunting opportunities would we provide?</i>	Continue to keep Refuge closed to upland game hunting	In the Delaware Bay Unit open areas West of NJ Route 47 to upland game hunting In the Great Cedar Swamp Division open areas North of County Route 550 to upland game & turkey hunting	Open entire Refuge to upland game hunting
<i>What migratory game bird hunting opportunities would we provide?</i>	Continue current migratory game bird hunting program in the Delaware Bay Unit West of NJ Route 47	In addition to Alternative A: In the Great Cedar Swamp Division open areas North of County Route 550 to migratory game bird hunting	Open entire Refuge to migratory game bird hunting
<i>What fishing opportunities would we provide?</i>	The entire Refuge would remain closed to fishing	Open the entire Refuge to fishing & crabbing	Same as Alternative B
<i>What wildlife observation and photography opportunities would we provide?</i>	Continue to provide Refuge-wide opportunities for wildlife observation & photography Woodcock Trail would remain the only completed trail on the Refuge	In addition to Alternative A: Develop universally accessible trail at the Refuge Headquarters Provide a parking lot & kiosk in the area of Gracetown Road as part of the proposed 35 mile "Rails to Trails" project running from Cape May to Manumuskin in Cumberland County The "Rails to Trails" unimproved trail running through the Refuge would be open to hikers, bikers, & horses, with a side trail into the adjacent cedar swamp Develop parking lot, kiosk, & other trail improvements at Schellinger & Stocker tracts, & at Peach Orchard Road Establish a canoe landing & designated canoe route on Cedar Creek	Develop universally accessible trail at the Refuge headquarters Provide a parking lot & kiosk in the area of Gracetown Road as part of the proposed 35 mile "Rails to Trails" project running from Cape May to Manumuskin in Cumberland County The "Rails to Trails" unimproved trail running through the Refuge would be open to hikers, bikers, & horses, with a side trail into the adjacent cedar swamp
<i>What environmental education and interpretation opportunities would we provide?</i>	Occasional programs provided at the Refuge in cooperation with partners & at special events Continue distribution of Refuge brochure Continue to maintain interpretive signs & provide brochures at existing Refuge public use	In addition to Alternative A: Increase Refuge participation in local events, focusing on non-traditional groups Increase interpretive signage on Refuge trails & kiosks Schedule regular nature walks, assisted by partners Increase variety of Refuge brochures, maps,	Provide more self-guiding opportunities on the Refuge Place interpretive signage on Refuge trails & in kiosks Produce new Refuge brochures, maps & fact sheets for distribution at kiosks & remote

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	sites	& handouts Develop teacher workshops & an outdoor classroom established Develop a Friends of Cape May Refuge group Develop web site for environmental education at Cape May Refuge	locations
<i>When would we conduct a Wilderness Review of the Refuge?</i>	Conduct a Wilderness Review for all Refuge lands as part of the revision of the CCP in 2015	By 2010, conduct a Wilderness Review for all Refuge lands	Same as Alternative A
<i>What would be our land protection strategy?</i>	Continue efforts to acquire 7,600 acres of inholdings within approved Refuge acquisition boundaries from willing sellers Continue current level of land protection planning with government & private partners	In addition to Alternative A: Acquire 3,600 within the 4,900 acre Focus Areas that have been identified Expand landscape level land protection planning efforts with partners Expand off Refuge habitat protection & restoration efforts with other public & private landowners Acquire the Coast Guard's LORAN Support Unit (adjacent to the Two Mile Beach Unit), should it become excess property	Same as Alternative B
<i>How would we ensure resource protection and visitor safety?</i>	Continue current law enforcement efforts with 1 full-time & 1 seasonal Park Rangers	In addition to Alternative A: Hire 1 new full-time & 1 new seasonal Park Rangers	Same as Alternative B
<i>What buildings and facilities would be used or constructed for Refuge operations?</i>	Continue to use existing Refuge buildings at the Kimbles Beach Road headquarters site	Construct a new, larger office & visitor contact building at the Kimbles Beach Road headquarters site, along with new maintenance & storage buildings	Enlarge & remodel existing Refuge office at the Kimbles Beach Road headquarters site & build new maintenance & storage buildings
<i>What would be the future staffing needs at Cape May Refuge (including the Two Mile Beach Unit)?</i>	Current staffing level: 1 Supervisory Refuge Operations Specialist 1 Park Ranger 1 Seasonal Park Ranger	In addition to Alternative A:: 1 Project Leader 1 Deputy Project Leader 2 Biologists 2 Biological Technicians 2 Outdoor Recreation Planners 1 Outdoor Recreational Assistant	In addition to Alternative A: 1 Project Leader 1 Deputy Project Leader 3 Biologists 2 Biological Technicians 2 Outdoor Recreation

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		2 Maintenance Workers 1 Lead Administrative Support Assistant 1 Park Ranger 1 Forester/Fire Management Officer 1 Secretary/Receptionist 1 Seasonal Park Ranger 1 SCEP (Student Career Experience Program) 1 Tractor Operator	Planners 1 Outdoor Recreational Assistant 3 Maintenance Workers 1 Lead Administrative Support Assistant 1 Computer Specialist 1 Park Ranger 1 Forester/Fire Management Officer 1 Forestry Technician 1 Secretary - Receptionist 2 Seasonal Park Rangers 2 SCEPs (Student Career Experience Program) 1 Tractor Operator total FTEs (A+C) = 27
	total FTEs = 3	total FTEs (A + B) = 21	
<i>What would be the future funding needs at Cape May Refuge (including the Two Mile Beach Unit) for the next 15 years?</i>	Staffing & Projects: \$1.9 million Land protection: \$4.6 million	Staffing & Projects: \$6.5 million Land Protection: \$23.8 million	Staffing & Projects: \$6.9 million Land Protection: \$23.8 million

Table 4. *Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge.*

Actions and Strategies Matrix, Two Mile Beach Unit at Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitat and wildlife populations?</i>	There would be no active management or restoration of habitats or wildlife populations No wildlife surveys would be conducted No public trapping of furbearers would be allowed	Restore disturbed areas using native vegetation Develop & implement a habitat management plan Develop & implement management plan for beach nesting birds & migrant shorebirds Conduct wildlife surveys Initiate comprehensive surveys of flora & fauna Study & monitor beach & sand dune dynamics Restore threatened & endangered species Develop agreement with Coast Guard for resource management at Loran Support Unit & Training Center to extend wildlife management program No public trapping of furbearers would be allowed	Allow natural succession of disturbed areas Conduct baseline surveys of migratory birds & beach nesting birds Conduct baseline vegetation surveys Public trapping to manage furbearer populations
<i>How would we manage invasive and overabundant species?</i>	There would be no active management of invasive species	Survey invasive species & implement an Integrated Pest Management (IPM) plan to control undesirable species	Same as Alternative B
<i>How would we manage pesticide use?</i>	No pesticides would be used	Implement IPM strategy, minimizing pesticide use	Same as Alternative B
<i>What access opportunities would we provide to the beach?</i>	No public access allowed	Public access from October thru March	Public access allowed year-round
<i>What hunting opportunities would we provide?</i>	No hunting would be allowed	Same as Alternative A	Same as Alternative A
<i>What fishing opportunities would we provide?</i>	No fishing would be allowed	Allow seasonal surf fishing on the beach from October thru March, foot access only	Allow year-round surf fishing on the beach, & fishing & crabbing in back bay wetlands, foot access only Allow commercial bait fishing by Refuge special use permit

Actions and Strategies Matrix, Two Mile Beach Unit at Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>What wildlife observation and photography opportunities would we provide?</i>	Public access would be prohibited	Maintain selected trails & roads, with improvements such as signs, kiosks, platforms & universal accessibility Allow seasonal wildlife observation & photography on beach from October thru March Consider the possibility of utilizing the former radar platform for wildlife observation	Maintain selected trails & roads, with no improvements
<i>What environmental education and interpretation opportunities would we provide?</i>	Public access would be prohibited	Establish Refuge visitor center with displays, exhibits & regular programs in building A-14 Provide regular programs & guided nature walks, especially during peak bird migration periods Install signs & kiosks for self-guided interpretation	Install self-guiding interpretive signs & kiosks Occasional programs & guided nature walks provided by partners Establish visitor contact station, staffed by partners
<i>What buildings would we use?</i>	None of the existing buildings would be used or maintained Buildings & other improvements not needed by the Coast Guard would be removed as they become public safety hazards	Utilize buildings A-14, B-6, & any other improvements necessary for Refuge management Establish Refuge Visitor Center in building A-14 Remove all other buildings & improvements not needed by the Coast Guard	Utilize building B-6 & any other improvements necessary for Refuge management Provide selected buildings for use by mission-compatible partner(s) Establish Refuge visitor contact station, staffed by partners Remove all other buildings & improvements not needed by the Coast Guard

Appendix A

Summary of public comments received on the draft CCP/EA and their disposition

The draft CCP/EA was released for 45 days of public review and comment in June 1999. Over 170 people attended the three public meetings held in July at the following location: Middle Township Building in Cape May County; Galloway Township Library in Atlantic County; and Stafford Township Municipal Building in Ocean County. We also received over 1,600 individual comment letters. There were a great many duplicate comments received, since many people sent copies to both the Forsythe Refuge headquarters in Oceanville, New Jersey and our Regional Office in Hadley, Massachusetts. A summary of the public comments received and the disposition of the concerns expressed in those comments follows.

Comment: Most commenters thought that the proposed closure of Holgate beach to motorized vehicles was outside our authority. They questioned whether we had the authority to close the beach based upon the States ownership and jurisdiction of riparian lands below the mean high tide line.

Response: The Holgate Peninsula above mean high tide has been owned by the Service since June 30, 1960, and was designated part of the Brigantine Wilderness Area under Public Law 93-632 on January 3, 1975. We not only have the authority to close Holgate beach above mean high tide to motorized vehicles, but are specifically directed to do so by the Wilderness Act of 1964.

The land below mean high tide in New Jersey is owned by the State. In the Draft CCP/EA, we proposed coordinating the closure with the New Jersey Tidelands Council. During the three public meetings held on the Draft document, we specifically stated that it was our intent to request a license from the Tidelands Council to close Holgate beach below the mean high tide line as well. This request has been dropped from Alternative B, our Proposed Action in the Revised Draft CCP/EA.

Comment: Several commenters questioned whether we had the authority to close Holgate beach to motorized vehicles under the provisions of the Wilderness Act. Others stated that the original designation of Holgate as a Wilderness Area was inconsistent with the mandate and intent of the Act. They believed the high

volume of boat traffic and close proximity of Holgate to a major urban area like Atlantic City would make it difficult, if not impossible, for Refuge visitors to obtain a "wilderness experience," as defined by the Act.

Response: We not only have the authority to close the Wilderness Area at Holgate, including all the land above mean high tide, to motorized vehicles, but we are specifically directed to do so by the Wilderness Act of 1964. When Congress designated our lands on Holgate Peninsula as part of the Brigantine Wilderness Area, they determined that this designation was consistent with the mandate and intent of the Wilderness Act of 1964. While circumstances in the vicinity may make it difficult, if not impossible, for Refuge visitors to obtain a "wilderness experience," as defined by the Act, this does not give us the authority to disregard the Act's specific prohibition against motorized vehicle use within wilderness areas.

Comment: Many commenters also noted that closing Holgate beach to motorized vehicles would significantly reduce fishing opportunities on Forsythe Refuge. They felt this action would be inconsistent with our mandates under the National Wildlife Refuge System Improvement Act of 1997, which identifies fishing as one of six wildlife-dependent priority public uses of the Refuge System that should be given priority consideration over other uses of refuges.

Response: While closing the area above mean high tide to motorized vehicles will reduce the fishing opportunities currently available on the Holgate Peninsula, it will not close the area to fishing. Those interested in fishing the Peninsula would still be able to do so on foot or by driving and parking their motorized vehicles below the mean high tide line. In fact, the potential introduction of a water ferry to the tip of the Peninsula, as included in Alternative B, our Proposed Action in the Revised Draft CCP/EA, would provide new opportunities to fish the Holgate for those who do not own suitable motorized vehicles or boats.

Comment: Other commenters supported the closure of Holgate beach to motorized vehicles. They were primarily concerned that the current vehicular use of the beach caused water, air and noise pollution. Furthermore, they believed that motorized uses were not appropriate in designated Wilderness Areas.

Response: We agree, and have included the proposed year-round closure of the Holgate Peninsula above mean high tide to motorized vehicles in Alternative B, our Proposed Action in the revised Draft CCP/EA.

Comment: Many commenters requested that both Forsythe and Cape May Refuges provide more environmental education opportunities and improve public access by providing additional interpretive trails. They also requested that additional user-friendly maps and signs be placed throughout the Refuges.

Response: We agree. In Alternative B, our Proposed Action in the Revised Draft CCP/EA, we have substantially expanded our environmental education offerings and increased the amount of interpretation that we would provide, including additional interpretative trails and signage.

Comment: Several commenters were concerned that the proposed location of the new Barnegat Division office and visitor contact station would not provide the public with a suitable wildlife-oriented experience because of the commercial nature of the area.

Response: While we concur with those commenter's observations regarding the commercial nature of the area in question, we selected this site along U.S. Route 9 because we own the land and wished to keep our new structure within an area that was already developed and had good access to a major traffic corridor. This will allow us to protect the habitats within the Refuge from further fragmentation, while allowing us better access to a larger segment of the public. From this location we will be able to direct our visitors to the many trails and other facilities found in more remote parts of the Refuge.

Comment: Many commenters requested that at-large or Refuge-wide hunting be allowed at both Forsythe and Cape May Refuges in all areas deemed appropriate. They were concerned about the diminishing number of areas around the Refuges that provided hunting opportunities for the public. In particular, several people requested that upland game hunting opportunities be provided. They referenced the National Wildlife Refuge System Improvement Act of 1997, which includes hunting as one of six wildlife-dependent priority public uses of the Refuge System that should be given priority consideration over other uses of the refuges. A few people commented that hunting was not an appropriate use on a National Wildlife Refuge.

Response: In response to the concerns of these commenters, we added a third alternative, Alternative C, in the Revised Draft CCP/EA. This Alternative would provide opportunities for Refuge-wide hunting at both Refuges. At Forsythe we would expand deer

hunting opportunities by including the State fall and winter bow and regular six-day firearms seasons, and open most of the Refuge to both upland game and migratory game bird hunting. At Cape May we would provide opportunities for upland game and migratory game bird hunting Refuge-wide. The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

Alternative B, our Proposed Action in the revised Draft CCP/EA, while not providing Refuge-wide hunting, would significantly increase hunting opportunities at both Refuges. At Forsythe we would expand the area currently opened to permit deer hunting and initiate a universally accessible permit deer hunt, initiate upland game hunting in the Oak Island Unit of the Brigantine Division, and expand the area open to migratory game bird hunting. At Cape May we would open about 45% of the Refuge to upland game hunting and expand the current migratory game bird hunting area into that same 45% of the Refuge. The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

While hunting must be given priority consideration over other public uses, it does not take priority over the other five wildlife-dependent priority public uses (fishing, wildlife observation and photography, environmental education and interpretation) identified in the Improvement Act. We believe that Alternative B, our Proposed Action in the Revised Draft CCP/EA, would help us best achieve Refuge purposes, vision and goals; fulfill the Refuge System mission; maintain and, where appropriate, restore the biological integrity, diversity and environmental health of both Refuges and the System; address the key issues and mandates; and is consistent with the principles of sound fish and wildlife management.

Comment: The State of New Jersey, Division of Fish and Wildlife, requested that additional acreage within both Forsythe and Cape May Refuges be opened up to provide opportunities for hunting. They believed the Service's safety concerns could be addressed by requiring that all hunters be in compliance with State fish and game regulations.

Response: Alternative B, our Proposed Action in the Revised Draft CCP/EA, would significantly increase hunting opportunities at both Refuges. At Forsythe we would expand the area currently opened to permit deer hunting and initiate a universally accessible permit deer hunt, initiate upland game hunting in the Oak

Island Unit of the Brigantine Division, and expand the area open to migratory game bird hunting. At Cape May we would open about 45% of the Refuge to upland game hunting and expand the current migratory game bird hunting area into that same 45% of the Refuge.

Comment: Other commenters requested additional trapping opportunities at both Forsythe and Cape May Refuges. They identified trapping as a necessary and important wildlife management tool.

Response: We agree that trapping is an important wildlife management tool. It is often used on refuges to control predators and to manage populations of small mammals that impact refuge habitats and facilities such as dikes. Alternative B, our Proposed Action in the Revised Draft CCP/EA, includes additional opportunities for trapping at both Forsythe and Cape May Refuges. At Forsythe we would expand the areas open to trapping and at Cape May we would open about 25% of the Refuge to trapping of muskrat, raccoon and fox.

Comment: Many commenters supported our land protection proposals and wanted us to continue to acquire additional properties located near or around both Forsythe and Cape May Refuges. They supported our efforts to both increase habitat protection and provide additional public use opportunities.

Response: Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would acquire 12,300 acres of privately owned lands within our currently approved acquisition boundaries at Forsythe Refuge, and 7,600 acres of privately owned lands within our currently approved acquisition boundaries at Cape May Refuge. We also have identified 17,000 acres of focus areas at Forsythe Refuge, 11,500 acres of which we are proposing to acquire, and 4,900 acres of focus areas at Cape May Refuge, 3,600 acres of which we are proposing to acquire. These lands are located outside our current approved Refuge acquisition boundaries and represent lands with habitats that are important to a number of federal trust species. They also encompass watersheds that are important to protect from future development to ensure that we have adequate water quantity and quality for Refuge wetlands and provide habitat corridors for the movement of wildlife between various state, local and federal conservation lands.

Comment: Several commenters thought that the proposed two-year beach closure during the nesting season at the new Two Mile Beach Unit was unnecessary. They were concerned that the closure threatened their long-standing use of the beach, including being able to walk the beach to reach Cape

The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

May Inlet. Several suggested that fencing could be placed above the mean high tide line as a protective measure and that the proposed beach closure should only be enforced if birds actually began to nest at the site.

Response: In light of our mandates as a Federal Land Management Agency, we believe it is important that the beach be available for undisturbed breeding, nesting, feeding, preening, and loafing by an assortment of migratory birds. Under the provisions of the National Wildlife Refuge System Improvement Act of 1997, compatible wildlife-dependent recreational use and all other compatible uses are secondary to the "... conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitat..." We do not believe that placing fencing above the mean high tide line will adequately protect these birds, as the adults and young do much of their feeding at the wrack, or daily high tide line. Nor do we believe that closing the beach only if birds actually began to nest at the site is adequate.

The U.S. Coast Guard LORAN Support Unit is prepared to follow our lead on closing that portion of the beach still under their jurisdiction. They also are prepared to close public access to the jetty on the north side of the Cape May Inlet.

Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would allow pedestrian access to the beach from about October 1 through March 31 each year. No vehicles would be allowed on the beach at any time. We would also allow pedestrian access to other parts of the Two Mile Beach Unit all year.

Comment: Several commenters expressed a desire to see the existing buildings at the new Two Mile Beach Unit used for a variety of purposes such as housing for researchers or as a fishing clubhouse. Others commented that we should demolish all the existing buildings and then restore the land to native vegetation.

Response: Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would maintain two existing buildings for Refuge office, storage and maintenance purposes, and one for use as a visitor center with displays, exhibits, and regular programs. We would remove all other buildings on the site, all of

which are located within the one hundred year floodplain, in compliance with the directives of Executive Order 11988, Floodplain Management. This will allow us to restore the heart of the upland habitat at the Two Mile Beach Unit, in compliance with our mandate under the National Wildlife Refuge System Improvement Act of 1997, which calls for the "... conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitat..."

Appendix B

INTERIM COMPATIBILITY DETERMINATION

EXISTING WILDLIFE-DEPENDENT USES OF REFUGE LANDS WITHIN NEW REFUGE ACQUISITION AREAS

STATION NAME: Edwin B. Forsythe National Wildlife Refuge

DATE(S) ESTABLISHED: Brigantine NWR - Jan. 24, 1939;
Barnegat NWR - June 21, 1967;
Edwin B. Forsythe NWR - May 22, 1984 - by combining the former Brigantine and
Barnegat NWR's.

ESTABLISHING AND ACQUISITION AUTHORITIES:

Edwin B. Forsythe National Wildlife Refuge was created on May 22, 1984 by combining the former Brigantine and Barnegat National Wildlife Refuges (98 Stat. 207). The Brigantine National Wildlife Refuge was established on January 24, 1939 by the Migratory Bird Conservation Commission under the authority of the Migratory Bird Conservation Act, to preserve estuarine habitats important to Atlantic brant (*Branta berniclia*) and to provide nesting habitats for black ducks (*Anas rubripes*) and rails. The Barnegat National Wildlife Refuge was established on June 21, 1967, under the authority of the Migratory Bird Conservation Act, for preservation of estuarine feeding and resting habitat for ducks and brant. The State of New Jersey enabling legislation is New Jersey Statutes, Annotated, Title 23, Chapter 4, Section 23:4-56.

PURPOSE(S) FOR WHICH ESTABLISHED:

For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. 715-715r), as amended, the purpose of the acquisition is "...for uses as an inviolate sanctuary, or for any other management purpose, for migratory birds." Migratory Bird Conservation Act (16 U.S.C. 715d).

For lands acquired under the Fish and Wildlife Act of 1956 (16 U.S.C. 742(a) 754), as amended, the purpose of the acquisition is "... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742 (a)(4)) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1)).

For lands acquired under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b)) "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b), 100 Stat. 3583). For lands within the Brigantine Wilderness Area, "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136, Wilderness Act of 1964).

OTHER APPLICABLE LAWS, REGULATIONS, AND POLICIES:

3. Antiquities Act of 1906 (34 STAT 225).
4. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 STAT 1222).
5. Refuge Recreation Act of 1962 (16 U.S.C. 460k 1-4; 76 STAT 653).
6. National Wildlife Refuge Administrative Act of 1966 (16 U.S.C. 668dd - 668ee; 80 STAT 927), as amended.
7. National Environmental Policy Act of 1969 (42 U.S.C. 4321, *et seq*; 83 STAT 852).
8. National Wildlife Refuge System Regulations in the Code of Federal Regulation (CFR) 50 Subchapter C.
9. The Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 STAT 884), as amended.
10. Executive Order 11990, Protection of Wetlands.

11. Wilderness Act of 1964 (16 U.S.C. 1121(note), 1131-1136).
10. Clean Air Act (42 U.S.C. 7401 *et seq*), as amended.
11. National Wildlife Refuge System Improvement Act of 1997 (P. L. 105-57).

DESCRIPTION OF PROPOSED USE:

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are defined as wildlife-dependent recreational uses by The National Wildlife Refuge System Improvement Act of 1997. This interim compatibility statement addresses only these uses.

ANTICIPATED IMPACTS OF THE USE:

The current levels of the six wildlife-dependent recreational uses defined in The National Wildlife Refuge System Improvement Act of 1997 (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) in the proposed refuge expansion areas do not appear to be having any negative impacts on the habitat or wildlife within the areas.

DETERMINATION:

This use is compatible X .

This use is not compatible ____ .

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The parcel needs to be posted.

JUSTIFICATION:

See Anticipated Impacts of the Use:

NEPA COMPLIANCE:

CATEGORICAL EXCLUSION

ENVIRONMENTAL ASSESSMENT	X	1994
ENVIRONMENTAL IMPACT STATEMENT		
FONSI	X	1994

The 1994 Environmental Assessment and Finding of No Significant Impacts (FONSI) are the most recently approved documents for expanding the Edwin B. Forsythe National Wildlife Refuge. The Environmental Assessment and FONSI being prepared for the Jersey Coastal Refuges, scheduled to be completed in 2000, will supercede the 1994 documents.

REFUGE MANAGER: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

**INTERIM
COMPATIBILITY DETERMINATION**

**EXISTING WILDLIFE-DEPENDENT USES OF REFUGE LANDS
WITHIN NEW REFUGE ACQUISITION AREAS**

STATION NAME: Cape May National Wildlife Refuge

DATE(S) ESTABLISHED: January 20, 1989

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Cape May National Wildlife Refuge was created on January 20, 1989 administratively under authority of the Fish and Wildlife Act of 1956, (16 U.S.C. 742a-742j; 70 stat 1119), as amended.

PURPOSE(S) FOR WHICH ESTABLISHED:

For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. 715-715r), as amended, the purpose of the acquisition is "...for uses as an inviolate sanctuary, or for any other management purpose, for migratory birds." Migratory Bird Conservation Act (16 U.S.C. 715d).

For lands acquired under the Fish and Wildlife Act of 1956 (16 U.S.C. 742(a) 754), as amended, the purpose of the acquisition is "... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742 (a)(4)) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1)).

For lands acquired under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b)) "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b), 100 Stat. 3583).

OTHER APPLICABLE LAWS, REGULATIONS, AND POLICIES:

1. Antiquities Act of 1906 (34 STAT 225).
2. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 STAT 1222).
3. Refuge Recreation Act of 1962 (16 U.S.C. 460k 1-4; 76 STAT 653).
4. National Wildlife Refuge Administrative Act of 1966 (16 U.S.C. 668dd - 668ee; 80 STAT 927), as amended.
5. National Environmental Policy Act of 1969 (42 U.S.C. 4321, *et seq*; 83 STAT 852).
6. National Wildlife Refuge System Regulations in the Code of Federal Regulation (CFR)50 Subchapter C.
7. The Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 STAT 884), as amended.
8. Executive Order 11990, Protection of Wetlands.
9. Wilderness Act of 1964 (16 U.S.C. 1121(note), 1131-1136).
10. Clean Air Act (42 U.S.C. 7401 *et seq*), as amended.
11. National Wildlife Refuge System Improvement Act of 1997 (P. L. 105-57).

DESCRIPTION OF PROPOSED USE:

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are defined as wildlife-dependent recreational uses by The National Wildlife Refuge System Improvement Act of 1997. This interim compatibility statement addresses only these uses.

ANTICIPATED IMPACTS OF THE USE:

The current levels of the six wildlife-dependent recreational uses defined in The National Wildlife Refuge System Improvement Act of 1997 (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) in the proposed refuge expansion areas do not appear to be having any negative impacts on the

habitat or wildlife within the areas.

DETERMINATION:

This use is compatible X .

This use is not compatible ____ .

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The parcel needs to be posted.

JUSTIFICATION:

See Anticipated Impacts of the Use:

NEPA COMPLIANCE:

CATEGORICAL EXCLUSION

ENVIRONMENTAL ASSESSMENT	X	1988
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ENVIRONMENTAL IMPACT STATEMENT		
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FONSI	X	1989
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The above Environmental Assessment and Finding of No Significant Impacts (FONSI) are the most documents for establishing the Cape May National Wildlife Refuge. The Environmental Assessment and FONSI being prepared for the Jersey Coastal Refuges, scheduled to be completed in 2000, will supercede the above documents.

REFUGE MANAGER: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix C

Socioeconomic Analysis of ORV Use at Holgate

Background

The Holgate Unit of the Edwin B. Forsythe National Wildlife Refuge comprises 2.75 miles of Long Beach Island, including long expanses of undeveloped barrier beach. One of the most popular recreational activities occurring at Holgate beach is marine recreational surf fishing. Because there is no road access in the Holgate Unit, surf fishing along the beach has primarily been undertaken with the use of off-road vehicles (ORVs). Recreational surf fishing with ORVs is a popular pastime along the New Jersey coast and many ORV surf fishermen have formed private organizations to support their cause. ORV fishermen invest a substantial amount of resources in their recreational activity and frequently custom outfit their vehicles and purchase expensive fishing gear. For many participants, surf fishing with the use of an ORV is considered their most important recreational activity. Surf fishing at Holgate is particularly good at the southern point of the Unit where the waters of Great Bay and Egg Harbor meet the Atlantic. Stripe bass and bluefish are the most targeted species in the spring and fall, and in the summer flounders inhabit the shallow waters found around the bay. Surf fishing activity at Holgate beach typically peaks in the fall when large schools of bluefish and striped bass pass by the beach migrating south for the winter.

The total value placed on ORV beach access at Holgate can be divided into actual expenditures incurred by ORV anglers and non-monetary benefits associated with angler satisfaction. While ORV anglers will incur expenditures when fishing at Holgate beach, they do not pay for the actual fish they catch, nor do they incur a specific cost for the enjoyment of fishing itself, which may include experiences such as socializing with fellow fishermen and being able to enjoy solitude while fishing on a remote beach. The non-monetary benefits associated with ORV surf fishing make estimating the specific economic value of fishing at Holgate a difficult task. Furthermore, the willingness to pay for a surf fishing excursion with an ORV will vary between fisherman, based on each anglers gratification with the experience.

Many ORV anglers who surf fish along Holgate beach may consider the overall fishing experience to The seasonal closure particularly affected summer surf anglers as most of Long Beach Island's beaches were already closed to ORV traffic between May and

contribute to their general well being by affording them the opportunity for relaxation, experiencing nature, and gathering with friends. In a marine recreational fishing survey funded by the National Marine Fisheries Service (NMFS), anglers were asked to rate the primary reasons they spend time fishing. In the Mid-Atlantic region which includes the New Jersey coast, anglers in the survey rated the opportunity to enjoy nature and the outdoors as their principal reason for fishing, followed by the opportunity to relax and escape from their daily routine, to spend quality time with friends and family, and to experience the excitement or challenge of sport fishing. While catching fish to eat was rated somewhat important to anglers, findings from the survey generally concur with previous studies that found non-catch reasons are rated significantly higher by almost all respondents. Catch was rated very important to only about a third of the anglers surveyed. Putting a specific economic value on these non-monetary traits is extremely difficult, and will not be attempted in this analysis.

Typical angler expenditures associated with an ORV surf fishing trip to Holgate beach would include the purchases of bait, gear, ice, and meals. Furthermore, travel expenses incurred from the trip would include costs like fuel, tolls, travel fares and parking fees. A percentage of nonlocal ORV anglers fishing at Holgate beach may need overnight accommodations and would incur the additional costs associated with lodging. All of these expenditures can be assumed to have positive impacts on the local Long Beach Island community, in particular those businesses found along the route ORV users travel to reach Holgate beach.

Impacts from the 1988 Seasonal Closure

In 1988, the Holgate Unit was closed from early April to September to both pedestrian and ORV traffic to protect piping plovers, a listed species under the Endangered Species Act. An economic analysis completed in 1998, concluded that the seasonal beach closure had negligible impact on the overall economy of the island, which amounts to about \$500 million a year (Industrial Economics, 1998). However, the seasonal closure appears to have affected the beach usage patterns of some residents and visitors with consequent effects on the Islands economic welfare including potential losses in municipal revenues from beach buggy licenses, and lost revenues to some businesses, especially at the south end of the island near the entrance to the Holgate Unit.

September to accommodate seasonal beach use for swimming and sunbathing. In response to the seasonal closure it is assumed that some anglers sought

alternative fishing sites off-island which resulted in negative economic effects on businesses that catered to these ORV surf fishing anglers. Furthermore, the seasonal closure prevented recreational fishing opportunities at Holgate for popular species like summer flounder, which are primarily targeted in the months of July and August and thus the closure reduced fishing opportunities for some anglers. Bait and tackle shops throughout the island appeared to have suffered some loss in revenues from the seasonal closure, and one shop nearest to the entrance to the Holgate Unit reported losing 30 percent or more of its overall revenues in the first few years after the closure.

In addition, several other motels and restaurants which specifically catered to anglers also reported a loss in revenues. However, the report concluded that all these businesses survived the seasonal closure and remained viable.

Impacts from Alternative B, the Service's Proposed Action

The proposed year-round Holgate Unit closure (i.e., those lands above mean high tide) to ORVs, under the directives and principles of the Wilderness Act, can be expected to cause localized negative economic impacts to the Long Beach community. This Alternative would eliminate all motorized traffic year-round above mean high tide (the designated Wilderness Area known as the Holgate Unit) on the Holgate Peninsula. Although the closure is not expected to negatively impact the overall Long Beach Island economy, individual businesses such as bait and tackle shops will most likely suffer additional economic losses under a year-round ORV beach closure at Holgate. Along with bait and tackle shops it is anticipated that ORV surf fishing anglers will be the most directly impacted user group under the proposed closure. As stated above, many of the impacts ORV anglers incur will be non-monetary social impacts and putting a specific value on those losses or estimating the extent of the impact is a difficult task.

As with the 1988 seasonal closure, the direct negative economic impacts associated with the year-round ORV beach closure above mean high tide will most likely be localized to the communities in Long Beach Island, in particular those nearest the entrance to the Holgate Unit, such as Long Beach Township. To reach the Holgate Unit with an ORV, anglers must cross Long Beach Township lands. In order to do this, they must purchase a Township beach buggy permit. In 1999, permit data collected from the Township identified that a total of 734 beach buggy permits were issued that year. Permits were issued under two categories, either for the full season or for limited use during the fall fishing tournaments. Full season permits cost \$50.00, and a limited use permit sold for \$25.00. In 1999, the

Township issued 630 full season permits and 104 fall permits. Overall, beach buggy permit sales brought around \$34,000 in direct revenues to Long Beach Township in 1999.

Given that the majority of ORV beach buggy permits were issued to anglers specifically to access the Holgate Unit, it is likely that the Township's revenue from beach buggy sales would decrease under the Proposed Action. While Long Beach Township will see a reduction in overall ORV permit revenues, other Long Beach Island communities, such as Harvey Cedars and Surf City may see increases in their permit sales. It is also assumed that other New Jersey beachfront communities that offer ORV access for surf fishing may experience a slight increase in revenues from angler expenditures on beach buggy permits.

To identify the areas from which ORV anglers were traveling, the beach buggy permits were divided into local and non-local categories. Non-local was determined to be any ORV permittee that listed their primary residence as a location more than two hours from Long Beach Island using an average vehicle travel time. Using that criteria, it was determined that 466 of the 734 ORV permits issued by the Township in 1999 were for non-local anglers, while 268 of the permits were for local anglers. Although some local ORV anglers may have been identified as non-local by this criteria, it is difficult to determine whether an individual's fishing trip would originate from Long Beach Island, or their primary residence. Many anglers identified as non-local may own or rent seasonal housing on Long Beach Island changing their travel patterns and travel expenditures.

Impacts to Bait and Tackle Shops

As an industry directly dependent upon recreational fishing, bait and tackle shops located on Long Beach Island can be expected to incur economic losses from the proposed year-round beach closure to ORVs. Bait and Tackle shops located closest to the entrance to the Holgate Unit will most likely suffer the largest losses, with impacts being reduced as time and distance from the Unit increases. A typical surf fishing excursion requires a significant amount of gear and supplies such as rods, tackle, ice, and bait, and without the assistance of an ORV, it is anticipated many surf fishing anglers will seek alternative fishing sites and forgo a trip to Holgate beach.

Some bait and tackle shops reported an overall revenue decline of up to 30% under the seasonal beach closure of 1988. The economic impacts of the proposed year-round ORV beach closure are expected to be greater. This is especially true given that it restricts ORV fishing

access at the Holgate Unit to the area of the beach below mean high tide during the peak fall surf fishing period of September, October and November when anglers target large schools of migrating bluefish and striped bass. Most anglers acquire bait, ice and limited fishing tackle the day of the actual fishing. The full extent of the economic impact on bait and tackle shops from the Proposed Action will really depend on how many ORV anglers seek alternative fishing sites off the Island, and whether the closure impacts participation in the annual Fall Long Beach Island Fishing Tournament. While it is anticipated that fishing effort at Holgate beach will be reduced under this Alternative, the majority of ORV anglers currently using Holgate beach are expected to continue fishing at alternative fishing sites. Predicting what level of fishing effort will actually shift off the Island is not possible at this time. Because it will still be possible for ORV anglers to access nearly 16 miles of beachfront along the Island, many anglers may continue to fish other sites on the Island and continue to frequent local bait and tackle businesses.

Given that most anglers choose their fishing sites based upon criteria such as better catch rates and convenience, predicting which coastal communities may see a shift in fishing effort is difficult to predict. Also, many anglers and fishing tournament participants who use ORVs may change their fishing practices and continue to fish on the Island without accessing the beach with an ORV. Barnegat Light, found at the far north end of the Island, is a good example of a very popular fishing site where all ORV access above the mean high tide line is already prohibited. While some ORV anglers may decide to give up recreational surf fishing overall, that percentage is expected to be small and most anglers directly impacted by the ORV beach closure will continue to fish.

Overall, the reduction in income at a few Long Beach Island bait and tackle shops may be substantial under this Alternative. It is possible that businesses catering primarily to surf fishermen may suffer unsustainable economic losses to their operations.

Fall Fishing Tournament

On Long Beach Island, the Southern Ocean County Chamber of Commerce sponsors an annual six week fall surf fishing tournament, typically running from October 2-November 14. The tournament is promoted by both the Chamber of Commerce and local media and the event brings in anglers and spectators from within. One of the most difficult impacts to predict under the year-round ORV closure are non-monetary social impacts to ORV surf fishing anglers. As discussed above, recreational fishing provides anglers with social

excursion. It is expected that many anglers frequenting these businesses on Long Beach Island, particularly those near the entrance to the Holgate Unit, will use alternative bait and tackle shops once the closure is implemented.

and outside of the Long Beach Island area. The tournament encompasses all of Long Beach Island, including the Holgate Peninsula located at the southern end of the Island.

Holgate beach currently provides ORV anglers with access to some of the best fishing sites along the Island, and without ORV access to Holgate it is possible that participation in the fall tournament may decline. Local businesses, like bait and tackle shops, depend on revenues generated from the fall tournament, and any impact on the tournaments level of participation would impact these business's overall revenues. The fall tournament is structured to maintain fishing activity during the entire six week tournament, and a variety of cash prizes for the largest bluefish and striped bass landed are presented daily. Both local and nonlocal anglers participate in the event, with around 600 anglers annually entering the tournament and paying the \$25 registration fee, in addition to any ORV beach access permit fees.

Predicting what percentage of ORV anglers may choose not to enter the tournament or fish elsewhere is difficult because Long Beach Island does offer alternative fishing sites, almost all with ORV beach access. A slight decline in angler participation in the tournament will likely occur under the ORV beach closure at Holgate. A reduction in angler participation would also slightly reduce Chamber of Commerce revenues associated with the entrance fees. It is expected that the tournament will continue and anglers will shift their fishing effort elsewhere or access the Holgate Peninsula either on foot or by driving their ORVs down the beach below the mean high tide line. Many other coastal communities along the New Jersey coast also sponsor fall surf fishing tournaments offering anglers alternative tournament options. Because other communities offer tournament options, it is expected that a certain percentage of the revenues and expenditures brought into Long Beach Island by the fall fishing tournament will be shifted to other bait and tackle shops located in those communities.

Social Impacts to ORV Surf Fishing Anglers

benefits such as quality time with friends and relaxation opportunities. Putting a monetary value on these types of experiences is hard to calculate. Some anglers consider the best fishing on the island to be

located within the Holgate Unit, and prior to the 1988 summer closure for piping plovers, a large number of ORV fishermen fished the waters near the tip of the island during the summer months (Industrial Economics, 1998). When the 1988 seasonal closure was implemented, it was determined that a significant number of serious anglers abandoned the Island to fish at sites such as Brigantine Island and Island Beach State Park. The year-round ORV closure will further limit fishing opportunities on the Island for ORV anglers. In particular, the closure will impact ORV anglers who primarily focused their fishing activity at Holgate beach. Under the proposed ORV closure, anglers choosing to continue fishing on Long Beach Island with ORVs would still be able to access long stretches of the beach on the Island. Current Long Beach Island ORV regulations would allow fishermen to access 16 miles of beach from the entrance to the Holgate Unit north to Loveladies, if they secure the proper beach access permits. Although ORV anglers may still be able to access the Holgate beach during low tide under the proposed closure, most will likely choose not to use the Holgate Peninsula and forgo the opportunity to experience driving their ORVs along an undeveloped wilderness beachfront.

ORV fishermen who only occasionally fished at Holgate and who have easy access to alternative fishing sites will incur fewer impacts under this Alternative. Anglers who have primarily fished Holgate beach, will experience a more significant disruption and loss of quality fishing time. The unique physical nature of Holgate beach offers miles of undeveloped beachfront along the New Jersey coast and finding an alternative site which offers ORV anglers the same wilderness fishing experience will be extremely difficult, if not impossible. The heavy residential and commercial development along the New Jersey's coast has greatly reduced the opportunity for ORV fishermen to access areas lacking significant beachfront development. While areas such as Chicoteague National Wildlife Refuge in Virginia and the Outer Banks of North Carolina may still afford such remote fishing opportunities with ORVs, closing Holgate beach to ORVs will greatly reduce such fishing opportunities for ORV anglers in New Jersey. Overall, it is expected that ORV anglers will suffer some negative social impacts through reductions in fishing opportunities. The size and scope of such impacts will really be dependent on the availability of alternative ORV fishing sites and the willingness of ORV fishermen to travel to those sites.

Impacts to Restaurants and Lodging

Long Beach Island is a seasonal based economy totally dependent upon summer tourism. Long Beach Island has a permanent population of about 8,600 which swells

to over 50,000 on peak weekends in the summer months. The island supports 31 hotels and motels plus seven bed and breakfast inns and about 5,000 condominiums and other rental units. In addition, the guide for "Places to Eat" on the Island lists 39 restaurants and other eating establishments on the island (Southern Ocean County Chamber of Commerce, 1997).

According to a recent economic study, the summer season, which runs from late May to Labor Day weekend, accounts for nearly 80 percent or more of the annual revenues for most hotels and motels located on the Island (Industrial Economics, 1998). Because the Island community is a seasonal based economy, many businesses will have already closed for the season by the time fall surf fishing begins. Furthermore, many ORV anglers do not begin fishing at Holgate until later in the fall depending on when migrating schools of bluefish and striped bass arrive.

In 1988, the seasonal closure of Holgate beach for piping plovers appeared to have little effect on the overall lodging business. Assuming that most revenues are collected during the summer season, it is expected that closing the Holgate Unit year-round to ORVs will have only minor negative economic impacts on these businesses. Because a summer closure of Holgate beach was already in place, only those businesses which remained open after the summer season can be expected to incur any impacts from the year-round closure. Furthermore, the loss in revenues is expected to be minor as only a limited number of ORV anglers actually seek overnight lodging. The lighter traffic conditions during the fall fishing season and the willingness of ORV anglers to drive long distances also reduces the impact on lodging as many anglers will commute rather than seek overnight accommodations.

Long Beach Island restaurants also depend upon the summer season for their primary revenues. However, some restaurants on the Island do remain open longer during the fall season and a limited amount of restaurants remain open year-round. Under the proposed ORV closure these businesses can be expected to see some slight decrease in overall revenues if ORV fishermen choose alternative fishing sites off the Island. Because the Island still offers ORV access and fishing will continue during the fall, the impacts are expected to be minor. Furthermore, many ORV fishermen bring their meals with them on fishing trips and this tendency further reduces their dependence and impact on local businesses.

Although the overall economic impact of the year-round closure is expected to be minimal, localized impacts

may be more severe. The 1998 economic study did identify that some businesses which rented primarily to anglers suffered up to a 10% overall revenue reduction under the seasonal closure (Industrial Economics, 1998). Assuming these businesses also rented to ORV anglers in the fall, it is expected that they will see some further decline in their annual revenues under the Proposed Action. Furthermore, it is possible that some businesses which were kept open after the Labor Day weekend primarily to cater to ORV anglers will now close operations earlier. As with the bait and tackle Under the Service's Proposed Action, alternative access to the Holgate Unit may be allowed through a boat operated ferry system. Originating out of Long Beach Island, a boat ferry system would be expected to bring positive economic returns to the local economy. Ferry system concessionaires are currently in use at several National Wildlife Refuges nationwide to access Wilderness Areas, including Cape Romain Refuge in South Carolina and Monomoy Refuge in Massachusetts.

A boat ferry system would allow surf anglers to continue to access the best fishing sites on Holgate beach for a fixed cost. Many anglers may choose to use the ferry system to fish in a Wilderness Area without crowds and noise from motorized vehicles. The ferry system would also allow that segment of the public who do not have suitable motor vehicles the opportunity to access a remote beach environment.

A boat ferry operation may also help promote an ecotourism business on the Island as birders and naturalists seek remote areas to experience nature. The Holgate Unit is an ideal place to view fall migrations of shore birds and marine life, and the Service encourages wildlife viewing on the Refuge System. Interest in ecotourism is growing and access to Holgate beach would provide an excellent opportunity to create a Long Beach Island ecotourism business. It is difficult to predict the level of revenues that would be associated with establishing ecotourist based business, but with promotions from organizations like the local Chamber of Commerce the returns could be significant.

shops, the extent of the impact will be reduced as the motels and restaurants are located farther from the entrance to the Holgate Unit. Overall, while some businesses may experience minor reductions in revenues, only off season businesses focused primarily of capturing the surf fishing expenditures should see any noticeable declines.

Impacts from Boat Ferry Service

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Introduction and Background

The purpose of Chapter I is to:

- Describe the need for a Comprehensive Conservation Plan (CCP) for Edwin B. Forsythe and Cape May National Wildlife Refuges (Jersey Coast Refuges);
- Identify national, regional, and State plans, guidelines and mandates that influenced this project;
- Highlight the purposes for which each Refuge was established;
- Explain the planning process used for developing this CCP.

The information provided in this Chapter sets the stage for Chapters II through IV. Chapter II describes alternative strategies for meeting goals and objectives and compares them to current management. Chapter III describes the existing physical, biological, and human environment. Chapter IV evaluates the environmental consequences of implementing each of the proposed alternatives.

The Purpose of and Need for Action

This document evaluates a reasonable range of alternative management strategies for the Jersey Coast Refuges. Each alternative was generated with the potential to be fully developed into a CCP. Our intent in this document is to clearly and accurately display the predicted social, economic, physical, and biological impacts of implementing each alternative, as required by the National Environmental Policy Act of 1969 (NEPA). From this analysis, the Regional Director will select an alternative to be fully developed into a separate stand-alone CCP for each Refuge.

Development of a CCP is vital to the future management of the Jersey Coast Refuges. The **purpose** of the CCP for each Refuge is to provide strategic management direction over the next 15 years by:

1. Providing a clear statement of desired future conditions for

habitat, wildlife, visitor services, and facilities;

2. Providing Refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;

3. Ensuring Refuge management reflects the policies and goals of the National Wildlife Refuge System (Refuge System) and our other legal mandates;

4. Ensuring the compatibility of current and future public use;

5. Providing long-term continuity and direction for Refuge management;

6. Providing direction for staffing, operations, maintenance, and the development of budget requests.

The **need** to develop a CCP for each of the Jersey Coast Refuges is two-fold. First, the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) requires that all National Wildlife Refuges have a CCP in place within 15 years to help fulfill the new mission of the Refuge System.

Second, there is currently no master plan establishing priorities and ensuring consistent and integrated management for the Jersey Coast Refuges. A vision statement and goals, objectives, and management strategies are needed to effectively manage natural resources. Persistent issues related to non-wildlife dependent public use, beach access, wilderness management, and management for threatened and endangered species must be resolved with public and partner involvement.

Decision to Be Made

Based on the analysis documented in this Draft Environmental Assessment (EA), the Service will select an alternative to fully develop into a CCP for each Refuge.

The selection will be made by the Regional Director based on an evaluation of the Service's mission, the purposes for which each of the Refuges was established, and our other legal mandates. In accordance with NEPA, the Regional Director must also determine whether the selected management alternative will have a significant

impact on the quality of the human environment. If there is a significant impact, additional analysis would be required in an Environmental Impact Statement (EIS).

Analysis Area

Forsythe Refuge

Forsythe Refuge is located in Atlantic, Burlington, and Ocean Counties, and consists of two divisions: the Brigantine Division and the Barnegat Division. (See **Map 1-1.**) The Refuge extends along more than 50 miles of the coast. This Refuge was renamed in 1984 in memory of the late conservationist Congressman from New Jersey, Edwin B. Forsythe, through a Congressional Joint Resolution (H.J. Res. 537). The resolution combined the Brigantine National Wildlife Refuge and the Barnegat National Wildlife Refuge. Those Refuges were established in 1939 and 1967, respectively, under provisions of the Migratory Bird Conservation Act.

The Reedy Creek Unit was established in 1991, and is administered as part of Barnegat Division. The approved acquisition boundary of the Refuge encompasses more than 56,600 acres. As of September 30, 1999, the Service owned or leased 44,302 acres within the approved Refuge acquisition area.

Refuge wetlands are designated as Wetlands of International Importance under the Ramsar Convention. There are only 17 designated Wetlands of International Importance in the United States. Refuge lands and waters provide important resting and feeding habitat for tens of thousands of ducks and geese, wading birds, and shorebirds during their spring and fall migrations.

Congress designated 6,600 acres of the Refuge as the Brigantine Wilderness on January 3, 1975 (P.L. 93-632) to be managed under the Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136). **Map 1-2** shows the Refuge Wilderness Areas. This designation has far-ranging impacts on the management of these portions of the Refuge. See **Appendix A** for the 10 guiding principles of wilderness management based on Wilderness Act direction and the wilderness management policies of the Bureau of Land Management, Forest Service, National Park Service, and U.S. Fish and Wildlife Service.

This EA covers Forsythe Refuge and Cape May Refuge, including the Two Mile Beach Unit, collectively called the Jersey Coast Refuges. (See **Map 1-1.**)

Cape May Refuge

Cape May Refuge is located in Cape May County, and includes the Delaware Bay Division, the Great Cedar Swamp Division, and the Two Mile Beach Unit. (See **Map 1-1.**) The Refuge was established in 1989.

The approved acquisition boundary for the Refuge encompasses more than 17,600 acres. As of October 22, 1999, the Service owned 10,001 acres within the approved Refuge acquisition area.

In the past seven years, several studies or plans that involved the vicinity of the Refuge have been initiated or completed. These studies demonstrate the importance of this area. The Refuge acquisition area is within the New Jersey Coastal Area Facilities Review Act (CAFRA) zone and within the Service's Twin Capes Project area (Cape May, NJ and Cape Charles, VA). It is partially within the Pinelands National Reserve, the Great Egg Harbor National Scenic and Recreational River, and the Cape May Migratory Bird Stopover Project. Delaware Bay wetlands within the Refuge are designated as Wetlands of International Importance under the Ramsar Convention. There are only 17 designated Wetlands of International Importance in the United States.

Two Mile Beach Unit

The United States Coast Guard declared a major portion of its Electronic Engineering Center (EECEN) in Lower Township, Cape May County, excess to its needs in 1997. (See **Map 1-3.**)

The northernmost 490 acres of the former EECEN were transferred from the Coast Guard to the Service on October 22, 1999 as the Two Mile Beach Unit of Cape May Refuge under the Transfer of Certain Real Property for Wildlife Conservation Purposes Act of May 19, 1948, as amended (16 U.S.C. §667b-667d; 62 Stat. 240). Of the 490 acres, 221 acres are above mean high tide. Of these 221 acres, 90 acres are upland habitat and 131 acres are wetland habitat.

The Coast Guard retained the remaining

530 acres of the former EECEN for its Long Range Aid to Navigation (LORAN) Support Unit (LSU) and the north dune antenna tower. The LSU will remain in operation indefinitely.

Purposes for the Jersey Coast Refuges

Lands within the Refuge System are acquired and managed under a variety of legislative acts and administrative orders and authorities. These orders and authorities usually have one or more purposes for which land can be

- "...the development, advancement, management, conservation, and protection of fish and wildlife resources...." Fish and Wildlife Act of 1956 (16 U.S.C. §742f(a)(4));
- "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory birds)... " Emergency Wetlands Resources Act of 1986 (16 U.S.C. §3901(b), 100 Stat. 3583);
- "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." The Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136).

The purposes of **Cape May Refuge** are:

- "...use as an inviolate sanctuary, or for any other management purpose, for migratory birds...." The Migratory Bird Conservation Act (16 U.S.C. §715d);
- "...the development, advancement, management, conservation, and protection of fish and wildlife resources...." The Fish and Wildlife Act of 1956 (16 U.S.C. §742f(a)(4));
- "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory

transferred or acquired. **Appendix B** lists the authorities for acquisition and management of National Wildlife Refuges.

The purposes of **Forsythe Refuge** are:

- For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. §715-715r), as amended, "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...." (16 U.S.C. §715d);

birds)... " The Emergency Wetlands Resources Act of 1986 (16 U.S.C. §3901(b), 100 Stat. 3583).

The purpose of Cape May Refuge's **Two Mile Beach Unit** is:

- "...particular value in carrying out the national migratory bird management program" The Transfer of Certain Real Property for Wildlife Conservation Purposes Act, 1972, as amended (16 U.S.C. §667b-667d; 62 Stat. 240).

National and Regional Mandates

This section presents hierarchically, from the national-level to the local-level, highlights of legal mandates, Service policy, and existing resource plans which directly influenced development of CCPs for the Jersey Coast Refuges.

The U.S. Fish and Wildlife Service and its Mission

National Wildlife Refuges are managed by the Service, part of the Department of the Interior. 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."

National resources entrusted to the Service for conservation and protection are: migratory birds, endangered species, interjurisdictional fish, wetlands, and certain marine mammals. The Service also manages the Refuge System and national fish hatcheries, enforces federal

wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection. Over 520 National Wildlife Refuges are part of the national network today. Refuges occur in every state and a number of U.S. Territories, encompassing over 92 million acres nationwide. Over 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretive activities on Refuges.

In 1997, the Refuge Improvement Act was passed. This legislation established a unifying mission for the Refuge System, a new process for determining compatible activities on Refuges, and the requirement to prepare CCPs for each Refuge. The Act states that above all The Refuge Improvement Act declares that all existing or proposed public uses must be "compatible" with the purposes for which each refuge was established. Six wildlife-dependent public uses were highlighted in the legislation as priorities to evaluate in CCPs. The six uses are: environmental education and interpretation, fishing, hunting, wildlife observation, and photography. "Compatibility" is determined by the Refuge Manager after evaluating the activities' potential impact on Refuge resources.

The Wilderness Act

The Wilderness Act mandates that certain federal lands be maintained in a natural, undeveloped state in order to "preserve for the American people of present and future generations the benefits of an enduring resource of wilderness." The Act instructs federal agencies to manage Wilderness Areas in a manner which "preserves the wilderness character of the area," and provides "outstanding opportunities for solitude, primitive and unconfined recreation." In 1975, Congress designated 6,600 acres on Forsythe Refuge as the Brigantine

else, wildlife comes first in the National Wildlife Refuge System. It does so by establishing that wildlife conservation is the principal mission of the Refuge System; by requiring that we maintain the biological integrity, diversity, and environmental health of each refuge and the Refuge System; and by mandating that we monitor the status and trends of fish, wildlife, and plants on each refuge. It further states that the national mission, coupled with the purpose(s) for which each Refuge was established, will provide the principal management direction for each Refuge.

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 Improvement Act of 1997, Public Law 105-57)

National Wilderness Area. (See **Map 1-2** on page I-5.)

Other Legal and Policy Mandates

While the Refuge System Mission and the purposes for which each refuge was established provide the foundation for management, National Wildlife Refuges are also governed by other federal laws, Executive Orders, treaties, interstate compacts, and regulations pertaining to the conservation and protection of natural and cultural resources. **Appendix B** provides a summary of some of the most important federal laws related to management of National Wildlife Refuges.

Service policies providing guidance on planning and the day-to-day management of a Refuge are contained within the Refuge System Manual and the Service Manual.

Fulfilling the Promise, The National Wildlife Refuge System: Visions for Wildlife, Habitat, People, and Leadership

This report (USFWS, March 1999) resulted from the first-ever Refuge System

Conference held in Keystone, Colorado in October 1998, and attended by every Refuge manager in the country, other Service employees, and leading conservation organizations. The report contains 42 recommendations dealing with *Wildlife and Habitat, People, and Leadership*. This CCP/EA deals with all three of these major topics, and we have looked to the 42 recommendations for guidance throughout the project.

**North American Waterfowl Management Plan:
Atlantic Coast Joint Venture**

This Plan (USFWS, 1986) documents the strategy between the United States, Canada, and Mexico to restore waterfowl populations through habitat protection, restoration, and enhancement. The Plan includes ten regional habitat "Joint Ventures" that are partnerships involving federal, state and provincial governments, tribal nations, local businesses, conservation organizations, and individual citizens. The Jersey Coast Refuges lie within the Atlantic Coast Joint Venture. Seven focus areas, totaling more than 90,400 acres, have been identified for protection in New Jersey. Both wetlands and adjacent uplands are part of the focus areas. The 23,400 acre Brigantine-Barnegat Wetlands focus area is within the Forsythe Refuge.

The goal for the Atlantic Coast Joint Venture is:

"Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife

- seaside sparrow;
- American black duck;
- eastern wood-pewee;
- clapper rail;
- American oystercatcher.

The first-tier is "high overall (global) priority," which indicates high vulnerability of a species throughout its range.

Furthermore, more than 15 additional second-tier priority land birds breed on the Jersey Coast Refuges. The second-

in the joint venture area."

In addition to the ten regional habitat joint ventures, there are two species joint ventures: Arctic Goose and Black Duck. Since black ducks winter in New Jersey, the goals and objectives of the Black Duck Joint Venture apply to management of the Jersey Coast Refuges. The coastal salt marsh habitats along the mid-upper Atlantic coast have been identified by the Black Duck Joint Venture as the most important habitat for wintering black duck.

Partners In Flight Land Bird Conservation Plan: Mid-Atlantic Coastal Plain (Physiographic Area #44)

The Partners in Flight Program is developing a plan for the Mid-Atlantic Coastal Plain Physiographic Area (USFWS, April 1999). Habitat loss, land bird population trends, and vulnerability of species and habitats to threats are all factors used in the priority ranking of species. Further, the plan will identify focal species for each habitat type from which population and habitat objectives and conservation actions will be determined. This list of focal species, objectives and conservation actions will help direct land bird management on the Jersey Coast Refuges.

The draft plan ranks species and habitats on the basis of overall conservation priority. The following first tier priority land birds breed on the Jersey Coast Refuges:

- piping plover;
 - salt marsh sharp-tailed sparrow;
- tier is "high physiographic area priority."

Also, seven of the eight priority habitat types identified in the plan are found currently or historically on the Jersey Coast Refuges:

- pine savannah;
- barrier and bay islands;
- salt marsh;
- forested wetland;
- mixed upland forest;
- early succession old field and

shrub/scrub;

- fresh/brackish emergent wetland.

Regional Wetlands Concept Plan - Emergency Wetlands Resources Act, Northeast Region

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. The Act directed the Department of the Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority attention for acquisition by federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Service's Northeast Region completed a Regional Wetlands Concept Plan (USFWS, October 1990) to provide more specific information about wetlands resources in the Northeast. The Regional Plan identifies a total of 850 wetland sites that warrant consideration for acquisition, and also identifies wetland values, functions, and potential threats for each site. The Plan identifies four sites within the Jersey Coast Refuges: Brigantine/Barnegat Wetlands, Manahawkin Lake, and Reedy Creek (all within Forsythe Refuge), and Great Cedar Swamp (within Cape May Refuge).

Trust for Public Land Century Plan

The Trust for Public Land is a national nonprofit conservation organization dedicated to preserving land of recreational, ecological, and cultural value for public enjoyment. Its primary mission is to protect open space for public benefit. The Trust's Barnegat Bay Initiative is a long-term protection strategy involving land acquisition, public education and scientific research on the regions remaining outstanding natural resources. Its goal is to collaborate with other non-profit and civic groups and local, state and federal government agencies to establish a powerful and united coalition working The following resource priorities from this plan (USFWS, September 1994) are relevant to the Jersey Coast Refuges:

- Protect and restore migratory birds, threatened and endangered species, and species of special concern associated with native grasslands and forest habitats.

to preserve the Barnegat Bay watershed. Barnegat Bay is within the National Estuary Program

The Century Plan (Land Trust Alliance, April 1994) is a guide for future action to preserve the Barnegat Bay watershed in Ocean County, New Jersey and heighten public awareness about the Bay's landscape and ecological importance. It lists 100 unique conservation and public access sites that are of long-term importance to protecting the Bay as an ecosystem and treasured public resource.

Of the 100 sites, approximately 50 percent are currently partially or totally within the approved acquisition boundary for the Forsythe Refuge.

Relevant Ecosystem and Species Recovery Plans

Throughout the last decade, the Service has been putting more emphasis into defining and protecting entire ecosystems. To this end, the Service has initiated new partnerships with private landowners, state and federal agencies, corporations, conservation groups, and volunteers. Implementing an Ecosystem Team approach to management is a top national priority for the Service. Fifty-two Ecosystem teams were formed across the country, typically using large river watersheds to define ecosystems. Individual Ecosystem Teams are comprised of both Service professionals and partners, who work together to develop goals and priorities for research and management.

Forsythe Refuge lies within the Hudson River/New York Bight Ecosystem, while Cape May Refuge lies within both the Hudson River/New York Bight Ecosystem and the Delaware River/Delmarva Coastal Ecosystem.

Hudson River/New York Bight Ecosystem Plan

- Protect, restore and enhance populations of beach-dependent plants and animals, with emphasis on threatened and endangered species, and species of special concern.
- Increase populations of colonial nesting water birds, shorebirds, waterfowl, and inter-

jurisdictional fish requiring shallow water, salt marshes, adjacent uplands, and coastal lagoons and rivers.

Delaware River/Delmarva Coastal Ecosystem

The following resource priorities for the Delaware River/Delmarva Coastal Ecosystem are relevant to Cape May Refuge:

- Protect, restore and enhance migratory bird habitat and populations, with emphasis on the coastal migration corridor.
- Protect, restore, and enhance wetland habitats, with emphasis on Service-owned wetlands and other areas of exceptional value.
- Protect and enhance populations of threatened, endangered, and candidate species and their habitats.
- Protect and enhance populations of inter-jurisdictional fish and their habitats.
- Protect, restore, and manage Trust Resources on Service-owned lands.

Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan

The primary objective of the revised recovery plan (USFWS, May 1996) is to remove the Atlantic coast piping plover population from the List of Endangered and Threatened Wildlife and Plants by:

- Achieving well-distributed increases in numbers and productivity of breeding pairs;
- Providing for long-term protection of breeding and wintering plovers and their habitat.

The Revised Recovery Plan describes detailed "Recovery Tasks" needed to meet the recovery objective. Forsythe Refuge is specifically mentioned in the "Edwin B. Forsythe and Cape May National Wildlife Refuges, the Jersey Coast Refuges, will continue to contain some of the most important migratory bird habitat in the National Wildlife Refuge

following task:

- Monitoring to identify limiting factors;
- Control of feral animals and predators;
- Erect exclosures for protection from predators;
- Nourish or amend beaches.

Northeastern Beach Tiger Beetle (*Cincindela dorsalis dorsalis*), Recovery Plan

The recovery objective of this plan (USFWS, September 1994) is to remove the Northeastern Beach Tiger Beetle from the List of Endangered and Threatened Wildlife and Plants.

Recovery for the Northeastern beach tiger beetle will require reestablishing the species across its former range along the Atlantic Coast and protecting it within the Chesapeake Bay region. The Plan describes the Holgate Unit as part of the Northeastern beach tiger beetle historical range, and as having "medium restoration potential". According to the Plan, the Holgate Unit would be an excellent restoration site, if off-road vehicles were prohibited from the intertidal zone.

Recovery Plans for Other Federally Listed or Recovered Threatened or Endangered Species

Where the following federally listed threatened or endangered species occur on the Jersey Coast Refuges, we will follow the management goals and strategies laid out in their respective recovery plans: peregrine falcon, bald eagle, seabeach amaranth, and swamp pink. This list will change as new species are listed, delisted, or discovered on Refuge lands.

Refuge Vision

The following statement was developed by the planning team in order to describe the desired future status of the Jersey Coast Refuges.

System. They will continue to be focal points for the protection, management, restoration, and enjoyment of migratory birds and other Federal Trust Resources in coastal New Jersey. Forsythe Refuge

will provide a true wilderness experience on pristine barrier islands and salt marshes, that are premiere examples of these ecological communities and untrammelled by man. Both Refuges will provide stop-over habitats of sufficient size and quality to assist in maintaining migrating and wintering birds on the Atlantic Flyway.

The Refuges will expand their roles in land protection efforts by acquiring additional habitat along the coast and inland watersheds, and working with all interested parties to promote conservation efforts on non-refuge lands. The Refuges will preserve important plant and animal populations, ecological communities, and the integrity of the landscape by protecting lands from development, restoring fire to the upland habitats, and repairing disruptions to wetlands. They will play a critical role in preserving biodiversity locally, regionally and within the Refuge System.

The Refuges will build alliances with State, county and local governments, other organizations and local communities to promote the ecological integrity of the landscape, ecotourism and the historical and cultural attractions of the region. Wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation and photography, environmental education and interpretation will be provided on Refuge lands. The Refuges will help assure the sustainable economic viability of the area, and supplement and promote the values which attracted people and wildlife to the Jersey Shore in the first place.”

Refuge Goals

We have developed the following goals for the Jersey Coast Refuges. These goals highlight specific elements of our vision statement which will be emphasized in future management. Our planning team has identified Goal 1 as the top priority; Goals 2-4 are not in priority order.

Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern.

Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

Goal 3: Establish a land protection program to support accomplishment of species, habitat, and ecosystem goals.

Goal 4: Provide opportunities for high-quality, compatible, wildlife-dependent public use.

The Comprehensive Conservation Planning Process and Issue Identification

This effort to prepare CCPs for the Jersey Coast Refuges began in the summer of 1996. The Service's action followed President Clinton's signing of Executive Order 12996, on the Management and General Public Use of the National Wildlife Refuge System. In recognition of the Order's four guiding principles, the Service focused its planning efforts on:

- Conserving and enhancing the quality and diversity of fish and wildlife habitat within the Refuges;
- Providing opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife-observation and photography, environmental education and interpretation;
- Establishing partnerships with other Federal agencies, State agencies, tribes, organizations, industry and the general public;
- Increasing opportunities for public involvement in the planning of refuge land protection and management activities.

This effort continued and was enhanced following passage of the Refuge Improvement Act in 1997. The Act states that the Service shall:

- Propose a CCP for each refuge or related complex of refuges;
- Publish a notice of opportunity for public comment in the Federal

Register on each proposed CCP;

- Issue a final CCP for each refuge consistent with the provisions of this Act and, to the extent practicable, consistent with fish and wildlife conservation plans of the State in which the refuge

Initially, we focused on collecting information on natural resources and public use. In addition, we developed a vision statement and preliminary goals for the Jersey Coast Refuges, as well as the preliminary issues to be addressed in this planning effort. A mailing list of organizations and individuals was also compiled to insure that we were contacting a wide array of interested publics.

In November and December 1996 we held a series of 11 public meetings in:

- Ocean County, the Townships of Brick, Dover, Lacey, Stafford, and the Boroughs of Long Beach and Tuckerton;
- Atlantic County, the Township of Galloway;
- Cape May County, the Townships of Upper, Dennis, Middle, and Lower.

We announced the location, dates, and times for these meetings in local newspapers and through special mailings.

We also briefed local members of Congress on the upcoming meetings. More than 280 people attended the meetings, which were held to let people know what the Service was doing to manage the Jersey Coast Refuges, and to elicit their input on topics of interest to them.

We also distributed an "Issues Workbook" (**Appendix C**) to help collect the public's ideas, concerns, and suggestions on important issues associated with managing the Jersey Coast Refuges. We distributed the workbook to everyone on our mailing list, those who attended the public meetings, and anyone who subsequently requested one. Nearly 1,000 copies were distributed. Through the workbook, we asked for public input on the issues and possible action options, the things people valued most about the New Jersey coast, their vision for the future, and the Service's role in helping to

is located;

- Not less frequently than 15 years after the date of issuance of a CCP, and every 15 years thereafter, revise the CCP as may be necessary.

conserve, protect, and enhance fish and wildlife and their habitats. More than 150 copies of the workbook were completed and returned.

In February 1997 we distributed a "Planning Update" (**Appendix D**) which summarized the responses received in the "Issues Workbook". Responses from the workbooks and meetings were influential in helping us formulate the issues related to resource protection and public use.

In April 1997 we also held an Alternatives Workshop. Twenty-five individuals, representing local and State conservation agencies and organizations, participated in the daylong workshop. The participants reviewed and discussed the issues and concerns identified in the "Issues Workbook" and were asked to answer three questions:

- 1) What should be done?
- 2) Where should it be done?
- 3) Who should help the Service do it?

Input obtained from the public meetings, workbooks and workshop was used to identify a reasonable range of alternatives and prepare a draft CCP/EA.

This draft was released for 45 days of public review and comment in May 1999. Over 200 people attended the three public meetings held in July at the following locations: Middle Township Building in Cape May County; Galloway Township Library in Atlantic County; and Stafford Township Municipal Building in Ocean County.

We also received over 1,600 individual comment letters. There were a great many duplicate comments received, since many people sent copies to both the Forsythe Refuge headquarters in Oceanville, New Jersey and our Regional Office in Hadley, Massachusetts. A summary of the public comments received and the disposition of the concerns expressed in those comments can be found in **Appendix E**. This summary

also notes where we have changed the draft CCP/EA or why we did not make such changes.

This Revised Draft CCP/EA is being released for 30 days of public review and comment. The Service is also holding a formal public hearing. The location, date, and time for this hearing are noted in the cover letter accompanying this Revised Draft, have been announced in local newspapers, and a formal Notice of Availability printed in the Federal Register.

After the 30-day public review of this Revised Draft CCP/EA, we will compile and respond to the comments received. A Final CCP/EA will be prepared and, as required under NEPA, a decision will be made. Together with the Jersey Coast Refuge goals (see page I-11), the following key issues, and the range of options on how to resolve them, formed the basis for the development and comparison of the different alternatives proposed in Chapter II.

Managing habitats and wildlife populations

This issue was identified as being very important by the public at our meetings, in the workbook and at the workshop. A number of different management activities were suggested, including: habitat manipulation and restoration (e.g., burning, water level control, planting, mowing), wildlife population management, baseline surveys of wildlife species and ecological communities, population and habitat monitoring, and research. Other activities suggested include working with partners on cooperative efforts for habitat restoration and management on private lands. Some members of the public requested increased opportunities for furbearer trapping at Forsythe Refuge and providing furbearer trapping opportunities at Cape May Refuge. They noted that trapping is a necessary and important wildlife management tool. Other people objected to trapping.

Trapping is often used on National Wildlife Refuges to protect endangered and threatened species from predators, to protect refuge infrastructure, and to maintain furbearer populations at levels consistent with refuge objectives.

The protection and management of

made as to whether the Service's Proposed Action supports a Finding of No Significant Impact (FONSI). Assuming no significant impact is predicted, a FONSI will be prepared and released, along with stand-alone CCPs for both Forsythe and Cape May Refuges. Implementation of these plans will then begin and they will be monitored annually and revised when necessary.

Figure 1-1 describes the steps of the Service's CCP process and how it is integrated with the NEPA process.

Key Issues

wildlife populations and habitats is the fundamental mission of the Refuge System and the Jersey Coast Refuges. Special emphasis is placed on federal trust resources, including: endangered species, migratory birds, interjurisdictional fish, marine mammals, and wetlands.

Controlling invasive and overabundant species

Dealing with this issue is not only a national initiative for the Service, but was also deemed very important by the public at our meetings, in the workbook and at the workshop. The methods used to control these species are also of great concern.

Both Forsythe and Cape May Refuges have significant problems involving invasive species, which impact native species directly, displacing or killing individuals, destroying habitats, and disrupting ecological communities. Invasive species requiring control are mostly exotics not native to the New Jersey landscape (e.g., Japanese honeysuckle, European bittersweet, autumn olive).

Wildlife species may be deemed overabundant for various management objectives. Overabundant species may degrade habitat quality or the overall integrity of an ecological community (e.g., white-tailed deer), or may displace or prey upon other species that are actively being restored (e.g., raccoon). Other species, because of their numbers, may pose a human health risk (e.g., mosquitos), (**Mosquito control**, page I-17). Overabundant snow geese and resident Canada geese are a management

concern for the Refuge and for some landowners. Current goose control activities are discussed under this issue, but more aggressive techniques for goose control will be covered in separate documents (**Control of resident Canada geese** and **Control of white geese**, page I-17). Deer and furbearer control activities are discussed under **Increased opportunities for hunting**, and **Managing habitats and wildlife populations**, page I-14.

The effects of pesticides on fish, wildlife and plants

The public identified the presence of pesticides and chemicals in the environment as an important issue. Chemicals and pesticides from activities taking place on the Refuges or from off-refuge sources may impact fish, wildlife and plants found on the Jersey Coast Refuges. Such chemicals may be transported to the Refuges by wind, water or other mechanisms, or picked up off-refuge by fish and wildlife during their migrations. Many people encouraged us to minimize our use of chemicals and pesticides on the Refuges.

The principle use of pesticides on the Refuge is to control mosquitos and Hunting has long been a traditional activity in coastal New Jersey. Local residents have hunted much of the land within the current and proposed boundaries of the Jersey Coast Refuges in the past.

At Forsythe Refuge, deer hunting is allowed in designated areas by permit only. Upland game hunting is not allowed. Migratory game bird hunting is allowed in designated areas. Some people called for additional deer hunting opportunities during the six-day firearm season. Some people called for upland game hunting opportunities on the Refuge. Others called for additional opportunities to hunt migratory game birds on the Refuge, or did not agree with the Refuge's policy of restricting hunting to only 40% of its lands.

At Cape May Refuge, deer hunting is allowed Refuge-wide. Upland game hunting is not allowed. Migratory game bird hunting is allowed in designated areas.

Some people called for upland game hunting opportunities on the Refuge. Others called for additional

invasive species. For example, at Forsythe Refuge during 1999, more than 1,000 pounds of pesticide were used to control mosquitos. Integrated Pest Management (IPM) provides an overall strategy to reduce pesticide use and promote other techniques to control problem species. For mosquitos, this includes Open Marsh Water Management (OMWM) (modifying mosquito breeding habitat to favor mosquito-eating fish). Because of previous OMWM treatment no pesticides were applied at Cape May Refuge in 1999. Another technique for suppressing phragmites, an invasive species, would be tidal inundation, instead of using herbicides.

Increasing opportunities for hunting

Many people identified hunting on the Refuges as an important issue during the public meetings, in the workbook and at the workshop. Some voiced concern over the Service's policy of restricting access to lands at Forsythe Refuge that were historically available for hunting.

Others felt that hunting should not be permitted on the Jersey Coast Refuges, often citing safety concerns and impacts on wildlife.

opportunities to hunt migratory game birds on the Refuge.

Because hunting is one of the six priority general public uses of the Refuge System, it "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge hunt programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

Increasing opportunities for fishing

Many people identified fishing on the Refuges as an important issue during the public meetings, in the workbook and at the workshop.

While extensive fishing does occur within Refuge boundaries, the Service does not have management or law enforcement authority over fishing from boats in tidal waters within those boundaries. Fishing opportunities on lands managed by the Jersey Coast Refuges are limited. At Forsythe Refuge some opportunities are

provided at several existing access sites, while Cape May Refuge is not open to fishing. Refuge beaches below mean high tide are under the jurisdiction of the New Jersey Tidelands Council, with the exception of Cape May Refuge's Two Mile Beach Unit.

Because fishing is one of the six priority general public uses of the Refuge System, it "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act).

Refuge fishing programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between user groups.

Increasing opportunities for wildlife observation and photography

There was a great deal of interest expressed in expanding wildlife observation and photography opportunities on the Refuges at the public meetings, in the workbook and at the workshop. This high interest is reflected in the fact that many visitors to the Jersey Coast Refuges come to observe the wildlife we manage.

The fact that Forsythe Refuge and the Cape May peninsula are world-renowned destinations for bird watchers is reflected in our high number of visitors and the diversity of their hometowns. As hundreds of thousands of migratory birds use the Refuges each year, so tens of thousands of visitors come each month to observe them.

Because wildlife observation and photography are two of the six priority general public uses of the Refuge System, they "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge

Protecting and managing wilderness resources

In 1975 Congress designated 6,603 acres of the Forsythe Refuge as Wilderness. Undeveloped barrier beaches and dunes at Holgate and on Little Beach Island, and undisturbed salt marshes were included.

There are stringent requirements specified in the Wilderness Act and in Service policy for protecting and managing these areas. These include the highest requirements for clean air,

wildlife observation and photography programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

Increasing opportunities for environmental education and interpretation

There was more interest in expanding environmental education and interpretation opportunities at the Refuges than any of the other priority public uses. In fact, there was great interest in increasing our outreach efforts to local schools and communities as well. Quite often people expressed an interest in promoting more environmentally friendly recreational activities while expressing concern for minimizing impacts on the resources. Many encouraged us to place special emphasis in our education and interpretation efforts on: the impacts of public use on wildlife and how those impacts can be reduced; how the public can help wildlife both at the Refuge and in their own back yards; and the importance of refuges in conserving wildlife and their habitats.

Because environmental education and interpretation are two of the six priority general public uses of the Refuge System, they "...shall receive priority consideration in refuge planning and management." (National Wildlife Refuge System Improvement Act). Refuge environmental education and interpretation programs must consider public safety, disturbance and other harm to wildlife, harm to habitat, and conflicts between different user groups.

using minimum tools for management, and letting natural processes prevail. The protection and management of Wilderness often includes such actions as monitoring the ecological communities, research, education and outreach, enforcement of Refuge regulations, reviewing the potential impacts of both on- and off-site activities on wilderness values, and the restoration of native species or natural communities. The single most contentious issue associated with the review of the draft CCP/EA was the use of motorized vehicles for surf fishing at

Holgate, in violation of the provisions of the Wilderness Act.

Increasing opportunities for land protection

During the public meeting, in the workbooks and at the workshop, people expressed a great deal of support for the protection of additional fish and wildlife habitat, and suggested that this occur not only through an expanded land acquisition program at the Jersey Coast Refuges, but also by working cooperatively with others to protect non-refuge lands as well. There is considerable interest in increasing land protection efforts at both Refuges, especially lands supporting federal trust species. The location of Cape May Refuge on the peninsula makes it particularly important to the successful migration of birds in the Atlantic flyway.

Increasing resource protection and visitor safety

People identified resource protection and visitor safety as a concern during the public meetings, in the workbook and at the workshop.

New Jersey is the most densely populated state in the nation. In addition, Ocean County was the fastest developing county in the United States during the 1970's and 1980's. Development in both Atlantic and Cape May Counties has increased markedly since the birth of the Atlantic City casino industry in the 1980's. As a result, law enforcement incidents encountered on the Jersey Coast Refuges are no longer limited to wildlife related violations. Officers now respond to incidents involving vandalism, assault, breaking and entering, speeding, possession of illegal drugs, and the cultivation of marijuana. While these problems are currently more prevalent at Forsythe Refuge, they are expected to increase at Cape May Refuge in the future.

The two Refuges currently encompass 54,000 acres, along 90 miles of the New Jersey Shore. Marking the expanding Refuge boundaries remains a constant logistical problem. Total annual public use surpasses 300,000 visitors. It is expected to increase rapidly as more of Atlantic City's 35 million annual visitors and the millions of Jersey Shore summer visitors discover the

Jersey Coast Refuges.

The current staffing level of three full-time Park Rangers is insufficient to adequately patrol and enforce Refuge and other federal regulations. These officers find it increasingly difficult to respond to public reports of potential violations.

Improving Refuge buildings and facilities

The existing buildings and facilities at both Forsythe and Cape May Refuges are woefully inadequate and need to be replaced. This is especially important if the Refuges are to adequately accommodate work space for not only their current staff, but also any future increases in staffing levels that would be required to implement the actions and strategies in the Refuge CCPs. Additional laboratory and equipment storage space is also needed.

New facilities in readily accessible locations would also help increase the visibility of the Service in coastal New Jersey and improve our visitor services, including providing opportunities for environmental education and interpretation. The 150,000 people, who currently use the wildlife drive at Forsythe Refuge, are provided few opportunities to learn about the Service or its programs during their visit to the Refuge.

Use of the existing buildings at the Two Mile Beach Unit

A number of groups have expressed interest in using former Coast Guard buildings located at the site. Some of these buildings also have the potential for use as Refuge office, visitor or storage/maintenance facilities. There is also a lot of interest in seeing these buildings removed and restoring the habitat they currently displace.

These buildings lie in the center of possibly the best remaining piece of maritime forest found on the New Jersey coast and an area critical to migrating birds. They also lie within the 100-year flood plain.

Public access to the Two Mile Beach Unit

Some people expressed concern at the public meetings, in the workbook and at the workshop, about the possibility that the Service would close the beach during the piping plover breeding season.

Although the Coast Guard never officially sanctioned public access to the beach, they did allow people to walk along the beach surf line and by that route to access the jetty at Cold Spring Inlet, a popular fishing location. In the past, this beach has supported nesting piping plovers and the least tern, although those species do not currently use the area.

Issues Outside the Scope of this Environmental Assessment

These issues do not fall within the scope of **The Purpose of and Need for Action** and the **Decision to be Made**. Issues within this category will not be further addressed in this document. The Service will, however, pursue other courses of action, often in cooperation with other interested parties, to resolve them.

Protecting sensitive areas from personal water craft use

Many people expressed concern over the use of personal water craft at the public meetings, in the workbook and at the workshop.

Personal water craft use in the State-managed waters surrounding or adjacent to lands of the Jersey Coast Refuges has risen dramatically. The Refuge does not have jurisdiction over these activities in these waters.

Personal water craft have made previously inaccessible Refuge areas susceptible to adverse habitat and wildlife impacts. Their use has increased wildlife-human interactions, involving disruption of roosting, foraging, and nesting birds over large areas of the Jersey Coast Refuges.

The Service will increase its education and outreach efforts regarding the responsible use of personal water craft, and will work closely with the State to seek solutions for resolving this

perplexing problem.

Mosquito control

Several species of mosquitoes found in coastal New Jersey are important vectors of potentially lethal diseases, including Eastern Equine Encephalitis and West Nile Virus. The Service is striving to responsibly address risks to public health and safety and to protect trust resources from mosquito borne diseases and the impacts of pesticides on wildlife and the ecosystem. The Service and the mosquito control agencies in New Jersey and Delaware are working to develop new strategies for mosquito control, with appropriate NEPA compliance. The public will have the opportunity to review and comment on the proposed strategies before they are finalized.

Control of resident Canada geese

Resident Canada geese are having a growing impact on communities across the country. Increasing urban and suburban development in the United States has resulted in the creation of ideal goose habitat conditions including park-like areas with short grass adjacent to small bodies of water.

These habitat conditions have enticed rapidly growing numbers of locally breeding geese to live here year round. These resident goose populations are increasingly coming into conflict with human activities in many parts of the country. Large flocks of resident geese have serious impacts, on both wildlife and people: geese grazing in large numbers cause major habitat destruction, reducing the amount of critical forage available for migratory geese and other waterfowl during migration; high concentrations of goose droppings in lakes can cause excessive algae growth, leading to fish kills; high concentrations of goose droppings can also create health hazards to humans; and resident geese can denude lawns of vegetation.

To help address this problem, the Service issued special Canada goose permits to states in the summer of 1999. The permits are designed to give states greater flexibility and opportunity to design management programs to control specific resident Canada goose populations. The permit program was

designed as a short-term program until a comprehensive long-term management strategy can be developed and implemented.

The Service is preparing an EIS to lay out alternatives for dealing with all the resident Canada goose problems. The EIS will be completed in 2001.

Numbers of lesser snow geese and Ross' geese have grown from 300,000 birds in 1969 to more than 3 million birds today. Numbers of greater snow geese have grown from fewer than 50,000 in the late 1960's to about 800,000 today.

As a result, the geese have destroyed and damaged vast areas of their sensitive Arctic breeding grounds as well as local migration stopover areas. This negatively impacts not only the geese, but for all the plants and the other animals in these areas.

The Service is preparing an EIS to lay out alternatives for dealing with all the white goose population problems. The EIS will be completed in May 2001.

Step-down Management Plans

Step-down management planning is the formulation of detailed plans for meeting goals and objectives identified in the CCP. These plans describe the specific strategies and implementation schedules we are to follow, "stepping down" from general goals and objectives.

They may be addressed in detail during preparation of the CCP, or prepared following completion of the CCP. The preparation of new step-down management plans or substantial changes to existing plans typically require further NEPA compliance and an opportunity for public review.

The Refuge System Manual, Part 4, Chapter 3, lists over 25 specific management plans that are generally required on every Refuge. Some plans require annual revisions, others are on a 5 to 10 year revision schedule. There are separate step-down management plans for each of the two Jersey Coast Refuges.

The following step-down management plans are currently being revised:

Control of white geese

Populations of white geese – a term that encompasses greater and lesser snow geese and Ross' geese – have increased dramatically in the last 30 years. The species of primary concern in the Jersey Coast Refuge area is the greater snow goose.

- Fire Management Plan;
- Habitat Management Plan.

The following step-down management plans are considered "dated" and in need of revision or do not exist:

- Wildlife Population Management Plan, including trapping;
- Wilderness Management Plan (Forsythe Refuge only);
- Integrated Pest Management Plan, including chapters for each problem species;
- Priority Wildlife-Dependent Recreation Plan, including hunting, fishing, wildlife observation and photography, environmental education and interpretation.

Management Directions Common to all Alternatives

The Compatibility Determination

Federal law and policy provide the direction and planning framework to protect the National Wildlife Refuge System (Refuge System) from incompatible or harmful human activities and to insure that Americans can enjoy Refuge System lands and waters. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act), is the key legislation on managing public uses and compatibility.

Before activities or uses are allowed on a National Wildlife Refuge, the uses must be found to be a “compatible use.” A compatible use is a use, “...that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.” “Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety. Except for consideration of consistency with State laws and regulations as provided for in section (m), no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur.” (Refuge Improvement Act)

A number of compatibility determinations have been prepared over the years covering a variety of uses currently taking place on both Edwin B. Forsythe and Cape May National Wildlife Refuges (Jersey Coast Refuges). These compatibility determinations remain in effect and are being re-certified as part of this effort to prepare Comprehensive Conservation Plans (CCPs) for both Refuges.

Interim Compatibility Determination

An interim compatibility determination is one which assesses the compatibility of an activity during the period from the time the Service first acquires a parcel of land to when a formal long-term management plan for the parcel is prepared and adopted. The Service has completed interim compatibility determinations for the six priority general public uses of the System listed in the Refuge Improvement Act, hunting, fishing, wildlife

observation, wildlife photography, environmental education, and interpretation. (The interim compatibility determinations may be found in **Appendix N**.) The Act defines these six priority general public uses as “wildlife-dependent recreation” and “wildlife-dependent recreational use.”

These interim compatibility determinations cover both of the Jersey Coast Refuges. It covers the period between Service acquisition of a parcel and the formal adoption of a long-term management plan for the parcel. (See **Table 2.1**.)

Table 2.1 *Interim Compatibility for Wildlife-dependent Recreational Activities at the Jersey Coast Refuges.*

Wildlife-dependent Recreational Activities	Existing Activities ?	Compatible for Interim Use?	Interim Use Allowed?
Hunting	Yes	Yes	Yes
Fishing from bank	Yes	Yes	Yes
Fishing from boat	Yes	Yes	Yes
Wildlife Observation	Yes	Yes	Yes
Wildlife Photography	Yes	Yes	Yes
Environmental Education	No	Yes	Yes
Interpretation	No	Yes	Yes

The interim compatibility determinations cover the existing priority general public uses taking place within the proposed Land Protection Focus Areas (Focus Areas) described in the Service’s Proposed Action in this Revised Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA). (See **Alternative B - The Service’s Proposed Action** beginning on page II-55, **Maps 2-8a, b, c, and d**, beginning on page II-35, and **Maps 2-16a and b**, beginning on page II-53.) These Focus Areas are lands outside the currently approved Refuge acquisition boundary. The interim compatibility determinations do not cover existing priority general public uses on lands within the currently approved Refuge acquisition boundary. The CCP/EA sets forth the management for all lands within the currently approved Refuge acquisition boundary – regardless of whether the Service already owns the properties or not.

Several of the six priority general public uses occur on lands within the proposed Focus Areas. The current levels of hunting, fishing, wildlife observation and photography, environmental Current levels of the six priority general public uses in the proposed Focus Areas would be compatible with the mission of the Refuge System and the purposes for which the Jersey Coast Refuges were established. The proposed Focus Areas have little estuarine habitat important to the Atlantic Brant, black ducks or rails, or important estuarine feeding and resting habitat for ducks or brant. The Refuges would allow the current levels of hunting, fishing, wildlife observation and wildlife photography to continue in the interim. We would monitor impacts of these uses and adjust levels and locations as appropriate through the adoption of long-term management plans.

Walking, hiking and bicycling done for exercise and enjoyment of the outdoors occur on lands within the proposed Focus Areas. To eliminate conflicts between user groups, we would terminate bicycling on property within the proposed Focus Areas as soon as the Service acquired and posted a property within these areas. Walking and hiking would be allowed to continue at their current levels in the interim. We would monitor impacts of these uses and adjust levels and locations as appropriate through the adoption of long-term management plans.

All terrain vehicle (ATV), dirt bike, and mountain bike riding occurs on some lands in the proposed Focus Areas. These activities negatively impact physical and biological resources, and are therefore not compatible with the purposes for which the Jersey Coast Refuges were established. To eliminate negative impacts, we would terminate these activities on property within the proposed Focus Areas as soon as the Service acquired and posted a property within these areas.

Administrative Separation of the Jersey Coast Refuges

The Service intends to administratively separate Cape May Refuge from Forsythe Refuge. The two Refuges were joined in 1995 for funding and administrative purposes. Development of this document and identification of management actions in the CCPs for each Refuge provides the Service the opportunity to administratively separate them. Within the next five years, depending upon the availability of adequate resources, the Service will separate the two Refuges. After they have been separated, both Refuges will have their own Refuge Managers and appropriate staffs. We would, however, continue to coordinate biological

education and interpretation taking place on these lands do not seem to be negatively impacting fish, wildlife, or plant resources.

management between Refuges to achieve wildlife population, habitat, and ecosystem management goals and objectives. The biological activities at both Refuges involve many of the same techniques, expertise, and species and community types. Continued coordination would benefit the resource, and provide greater efficiency in program management.

Potential Land Protection Methods

Land protection priority would be given to lands adjacent to Service-owned lands within existing Refuge boundaries, and also to larger contiguous tracts. Known hazardous waste sites or contaminated areas will be excluded from consideration. All land transactions are subject to contaminant surveys.

Funding for land acquisition will come from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund, under the Migratory Bird Conservation Act. Except in unusual cases, developed parcels within the current acquisition boundary or proposed Focus Areas would not be acquired.

The Service's land acquisition policy is to obtain the minimum interest necessary to satisfy Refuge objectives. Conservation easements can sometimes be used in this context, when they can be shown to be a cost-effective method of protection. In general, any conservation easement must preclude destruction or degradation of habitat, and allow Refuge staff to adequately manage uses of the area for the benefit of wildlife. Because development rights must be included, the cost of purchasing conservation easements often approaches that of fee title purchase, thus rendering this method less practical. Nevertheless, donations of easements or voluntary deed restrictions prohibiting habitat destruction would be encouraged. In addition, the Service could negotiate management agreements with local and State agencies, and accept conservation easements on upland tracts.

Some parcels within the proposed Refuge Focus Area may already be owned by State, local governments, or private conservation organizations. The Service would work with interested agencies to identify additional areas needing protection and provide technical assistance if needed.

Property Taxes, Refuge Revenue Sharing, Relocation, and Landowner Rights

The Refuge Revenue Sharing Act of June 15, 1935, as amended, provides annual payments to taxing authorities, based on acreage and value of Refuge Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, and the sale of other Refuge System resources and from Congressional appropriations. The Congressional appropriations are intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local taxing authorities. The actual Refuge Revenue Sharing Payment does vary from year to year, because Congress may or may not appropriate sufficient funds to make full payment. The actual payments made in 1999 were 62.25% of full payment.

The Refuge Revenue Sharing Payments are based on one of three different formulas, whichever results in the highest payment to the local taxing authority.

In New Jersey, the payments are based on three-quarters of one percent of the appraised fair market value. The purchase price of a property is considered its fair market value until the property is reappraised. The Service reappraises the value of Refuge lands every five years.

On wetlands and formerly farmland-assessed properties in New Jersey, the full entitlement Refuge Revenue Sharing Payments sometimes exceed the real estate tax. However, Refuge Revenue Sharing payments are more often less than the real estate tax.

The fact that Refuges put little demand on the infrastructure of a municipality, must be considered in assessing the financial impact on the municipality. For example, there is no extra demand placed on the school system, roads, utilities, police and fire protection, etc. There is a substantial body of literature that shows that development, especially residential development, actually costs a community more in schools, roads, sewers and other services than the tax revenue generated by the development (Land Trust Alliance, 1994).

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, provides certain relocation benefits to home owners, businessmen, and farm operators who are displaced as a result of Federal land acquisition.

The law provides benefits to eligible owners and tenants for reimbursement of reasonable moving expenses, replacement of housing payments under

lands located within their jurisdiction. In 1999, the Service paid, \$114,414 to Ocean County communities, \$10,006 to Burlington County communities, \$85,410 to Atlantic County communities, and \$80,646 to Cape May County communities.

certain conditions, relocation assistance services, and reimbursement of certain expenses incurred in selling real property to the Government.

The owner of land adjacent to Refuge land or within an approved Refuge acquisition boundary or a proposed Refuge Focus Area, retains any and all the rights, privileges, and responsibilities of private land ownership. This includes the right of access, hunting, vehicle use, control of trespass, right to sell to any party, and the obligation to pay real estate taxes. The Refuge controls uses only on the properties it owns.

Monitoring and Adaptive Management

The Final CCPs for each Refuge will cover a 15-year period. Periodic review of the CCP will be required to ensure that established goals and objectives are being met and that the Plan is being implemented as scheduled. To assist this review process, a monitoring and evaluation program would be implemented, focusing on issues involving public use activities, and wildlife habitat and population management.

Monitoring of public use programs would involve the continued collection and compilation of visitation figures and activity levels. In addition, research and monitoring programs would be established to assess the impacts of public use activities on wildlife and wildlife habitat, conflicts between Refuge users, and identify compatible levels of public use activities. We would reduce these activities if we determine that incompatible levels of public use were occurring.

Collection of baseline data on all wildlife populations and habitats would be implemented. This data would update existing records of wildlife species using the Refuges, their habitat requirements, and seasonal use patterns. This data would also be used to evaluate the effects of public use and habitat management programs on wildlife populations.

Refuge habitat management programs would be continually monitored for positive and negative impacts on wildlife habitat and populations and the ecological integrity of the ecosystem, and to

determine if these management activities are helping to meet Refuge goals and objectives. Information resulting from monitoring would allow staff to set more specific and better management objectives, more rigorously evaluate management objectives, and ultimately, make better management. Refuge lands provide substantial value to society through ecosystem services. These services (i.e., nutrient cycling, erosion control and sediment retention, water supply) represent benefits human populations derive, directly or indirectly, from ecosystem functions. Ecosystem services consist of the flow of material and energy from natural capital stocks (i.e., vegetation, minerals, the atmosphere) which combine with manufactured and human capital services to produce human welfare. Ecosystem services and the natural capital stocks that produce them are critical to the functioning of the earth's life support system. **Appendix F** lists 17 ecosystem services, the related ecosystem functions, and examples of how society benefits from them.

Accessibility

Each Refuge will operate its programs or activities so that when viewed in its entirety, it is readily accessible to and useable by disabled persons. The Rehabilitation Act of 1973, as amended, requires that programs and facilities be, to the highest degree feasible, readily accessible to and useable by all persons who have a disability.

Protection and Management of Cultural Resources

The Service has a legal responsibility to consider the effects its actions have on archeological and historic resources. Under all alternatives, the Service will comply with Section 106 of the National Historic Preservation Act before conducting any ground disturbing activities. Compliance may require any or all of the following: State Historic Preservation Records survey, literature survey, or field survey.

Volunteer Opportunities and Educational Programs

As the Jersey Coast Refuges continue to contribute to the quality of life on the New Jersey coast, strong support in the community and the region will continue to contribute to their success. Helping hands are needed for program development, data gathering, and other opportunities discussed in the

decisions.

Ecosystem Services

Alternatives. Only with this type of assistance can the Refuge achieve its goals and objectives, support the mission of the Service, and help meet the needs of the community.

The volunteer program at Forsythe Refuge has been growing steadily. In 1990, volunteers provided more than 2,300 hours of assistance to the Refuge. In 1999, volunteers provided about 3,900 hours of volunteer service.

Much of this volunteer work was done by 60 core volunteers, five active Friends Group members, three schools who brought groups to work on specific problems and two Eagle scouts working on their projects.

In addition, 65 one-time volunteers provided 756 hours of service for a "Community Tree Planting project" and another 90 onetime volunteers gave 360 hours of service on "Make a Difference Day".

Volunteers are essential to the ongoing and planned operation and maintenance of the Jersey Coast Refuges. We are deeply indebted to all of our volunteers for their dedication and services rendered for the betterment of our nation's natural resources.

Volunteers participate in a wide variety of activities. These include wildlife and wildlands photography, interpretation, providing information, observation and surveys of endangered species, such as, peregrine falcons and piping plovers, botanical surveys, fabrication of wood duck and bluebird boxes, waterfowl surveys and research assistance, litter pickup, trail clearing and maintenance, sign rehabilitation, and other maintenance projects.

Other Partnership Opportunities

Nineteen Americorps members contributed a total of 17,710 hours of work to Forsythe Refuge performing such tasks as construction of an observation platform, clearing trails, painting facilities, and creating the "At the Refuge" program. Americorps members performed the "At the Refuge" puppet show at a local hospital, a senior citizen home, and the Children's Seashore House. Others participated in special events such as the International Migratory Bird Day, National Wildlife Refuge Day

II Alternatives

and the 60th anniversary of Forsythe Refuge.

The CCP/EA's proposed Alternatives discuss ways to increase educational and interpretive programs through a Refuge Support Group.

Alternative A – the No Action Alternative

Edwin B. Forsythe National Wildlife Refuge

Under the No Action Alternative, there would be no change in our current management programs at Forsythe Refuge. Seasonal travel and parking of motor vehicles would continue to be allowed in the Holgate Unit of the Brigantine Wilderness Area, on lands above mean high tide, in violation of the Wilderness s Act of 1964.

We would initiate few, if any, new wildlife population, habitat or ecosystem management activities, provide no new public recreation opportunities, and undertake no new major land acquisition efforts. The Refuge would continue to pursue land acquisition and Refuge operations and maintenance under it's current staffing and funding levels. (See also **Table 2-2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page II-74.)

Habitat and Wildlife Populations

We would continue to protect and monitor the piping plover and the swamp pink (Federally listed threatened species). Piping plover management activities would include identifying nests, establishing exclosures to protect nests, controlling mammal predators (red fox and feral cats), and monitoring plover numbers on a regular basis. The Refuge management objectives for piping plovers are 25 nesting pairs at Holgate and 25 nesting pairs at Little Beach Island (total of 50 nesting pairs). Swamp pink management activities would include annual visits to known populations, and periodic trimming of surrounding woody vegetation to prevent overgrowth of the sites.

A step-down habitat management plan, detailing habitat objectives and implementation strategies would be completed. We have already developed a preliminary habitat prescription for all currently owned Refuge lands. However, the only habitats that we would actively manage are the Barnegat and Brigantine Impoundments (water level management, phragmites control, dike and water structure maintenance) which occupy only 4% of the Forsythe Refuge. Do to the lack of adequate funding and staff, we would not actively pursue the other habitat management objectives contained in the We would continue current levels of pesticide use for

step-down habitat management plan, except for those habitat types that are targeted for natural regeneration (e.g., conversion of old field to upland forest). (See **Maps 2-1a, b, c and d** beginning on page II-13.)

We would continue current population baseline surveys (song bird point counts, Monitoring Avian Production and Survivorship banding program, frog call surveys) as long as non-base funding for these activities is available. We would continue current monitoring programs (weekly bird count at the Brigantine Impoundment, shorebird survey). We would seek to establish partners-based monitoring programs for contaminants (USFWS Ecological Services, EPA, NJDEP) and water quality (USGS, NJDEP, Barnegat Bay Estuary Program).

We would continue to provide minimal on-site support for research projects. Current research at the Refuge includes: assessing the impact of sea-level rise on marsh dynamics and bird use, and energetics of black ducks. We would continue to identify research needs to the Regional Research Coordinator and to potential research partners (e.g., USGS, Biological Resources Division).

The current Refuge trapping activities to protect endangered and threatened species from predators (e.g., foxes and raccoons in piping plover areas), to protect Refuge infrastructure (e.g., muskrats that burrow in Refuge dikes), and to maintain furbearer populations at levels consistent with objectives for Refuge and surrounding habitat would be continued. Trapping currently occurs under contract and Refuge special use permits. **Maps 2-2a, b, c and d**, beginning on page II-17, show the current Refuge special use permit trapping areas.

Invasive and Overabundant Species

We would continue use a combination of herbicide use, prescribed burning, mowing and water level management to control approximately 150 acres of phragmites per year in the Refuge impoundments.

Public hunting to control populations of snow geese and resident Canada geese would also continue, as would nest disruption on the Refuge to limit production of resident Canada geese. These activities would continue until further planning prescribes other actions.

Pesticide Use

phragmites and mosquito control, which largely

follow an Integrated Pest Management (IPM) approach. Mosquito control activities include surveillance, pesticide application, and Open Marsh Water Management (OMWM). We would continue to allow OMWM in previously ditched Refuge salt marshes to aid in biological control of mosquitos. We would not allow OMWM in the pristine, unditched Refuge salt marshes in the Brigantine Wilderness Area. Information on the location of these activities is available from the respective county mosquito control agency or the Refuge.

All mosquito control activities on the Refuge are funded and implemented by county mosquito control agencies and the State, under an ongoing Cooperative Agreement which is being renegotiated. Current mosquito control efforts on the Refuge would continue until further planning prescribes other actions.

Big Game Hunting

The current Refuge deer hunting program would continue. Deer hunting is allowed, by permit, in the following Deer Management Zones (DMZ):

- DMZ 56 in Atlantic Co., south of Stoney Hill Road;
- DMZ 57 in Atlantic Co., north of Stoney Hill Road;
- DMZ 58 in Burlington and Ocean Counties. (See **Maps 2-3a, b, and c** beginning on page II-21.)

All three zones are open for the permit shotgun season; 20 permits are available for DMZ 56, 35 for DMZ 57, and 50 for DMZ 58. DMZs 57 and 58 are also open for the permit bow and muzzle loader seasons; 35 permits are available for each zone for the permit bow season; 35 permits are available for DMZ 57 and 40 for DMZ 58 for muzzle loader season.

Upland Game Hunting

The entire Refuge would continue to be closed to upland game hunting.

Migratory Game Bird Hunting

We would continue waterfowl, rail, and moorhen hunting in designated hunt units. (See **Maps 2-4a, b, c and d** beginning on page II-25.) Currently, about 40% of Refuge lands are open to migratory game bird hunting. The hunt units have regulations

designed to provide a variety of opportunities for quality hunting experiences.

Fishing

We would continue to offer a boat launching ramp and car parking area at Scotts Landing (Atlantic Co., Galloway Township).

Freshwater fishing opportunities would continue to be provided at Lily Lake (Atlantic Co., Galloway Township), including bank fishing from the south shore and boat fishing. Boats at Lily Lake may not have internal combustion engines. (See **Maps 2-5a and b** beginning on page II-29.)

We would continue to offer saltwater fishing opportunities at:

- Cedar Creek (Ocean Co., Stafford Township) off Stafford Avenue;
- Cedar Run Creek (Ocean Co., Eagleswood Township) off Cedar Run Dock Road;
- Parker Run (Ocean Co., Little Egg Harbor Township) off Dock Road;
- Gravelling Point (Ocean Co., Little Egg Harbor Township) near the end of Radio Road.

Motorized vehicles are not permitted beyond designated parking areas at any of these locations.

We would also continue to offer seasonal saltwater fishing opportunities at Holgate (Ocean Co., Long Beach Township) within the Brigantine Wilderness Area. (See **Wilderness Management** beginning on page II-8.)

Wildlife Observation and Photography

Existing wildlife observation and photography opportunities would continue to be provided. (See **Maps 2-6a, b, c and d** beginning on page II-31.) Visitors would continue to be able to observe and photograph wildlife:

- along the Wildlife Drive and from its two observation towers and associated foot trails;
- on the newly developed trail at Reedy Creek in Brick Township;
- from the observation deck at the Barnegat

impoundments;

- seasonally at Holgate.

Refuge visitors would continue to be allowed to bicycle and walk on the Wildlife Drive. These We would also continue to maintain the interpretive signs and provide Refuge brochures at all of our existing Refuge public use sites.

Environmental Education and Interpretation

Present levels of environmental education and interpretation would be continued. An average of 3,000 to 5,000 students visit the Refuge each year, brought in by teachers from near and far. The Refuge auditorium, currently undergoing extensive renovation and the installation of new displays, would be reopened to the general public and organized groups, such as schools, on weekdays.

We would continue to provide planning for class visits and informational assistance as needed. Many class visits are supplemented by orientations and videos upon arrival at the Refuge Headquarters auditorium. Trails, interpretive signs, and brochures for the Wildlife Drive and the Holgate Unit assist in interpretation. Environmental education classes may request special use permits for such activities as seining or collecting soil, water, or vegetation samples. The newly developed Friends of Forsythe would give occasional group tours of the wildlife drive, when requested in advance.

We would also continue to maintain the interpretive signs and provide Refuge brochures at all of our existing Refuge public use sites.

Wilderness Management

We would continue to offer seasonal saltwater surf fishing opportunities at the Holgate Unit (Ocean Co., Long Beach Township) within the Brigantine National Wilderness Area (Wilderness Area). (See **Map 1-2** on page I-5.) Seasonal travel and parking of motor vehicles would continue to be allowed in the Holgate Unit on lands above mean high tide, in violation of the Wilderness s Act of 1964. Seasonal motor vehicle use in adjacent lands below the mean high tide line (State-owned riparian lands) would continue to be allowed under State law. These State-owned riparian lands are not part of the Refuge or the Wilderness Area. We would not survey or post the mean high tide line at the Holgate Unit.

activities would be monitored and periodically reviewed to determine if they are negatively impacting wildlife resources or create conflicts with other users. If it is determined that impacts or conflicts are occurring, those activities would be curtailed.

All of the Holgate Peninsula, above and below the mean high tide line, would continue to be closed to all public access during the piping plover breeding season (April through August). The piping plover is Federally-listed as threatened and State-listed as endangered. The southern tip of Holgate may also be closed beyond September 1, to protect late-nesting black skimmers.

Little Beach Island (Atlantic Co., Galloway Township) within the Brigantine Wilderness Area would continue to be closed to all public access year-round.

Migratory game bird hunting in salt marshes that are in designated migratory game bird hunt units within the Brigantine Wilderness Area would continue to be allowed.

We would continue to use full-sized motor vehicles (Off-road Vehicles, four-wheel drive trucks) primarily below the mean high tide line for law enforcement and, periodically, for partners to assist stranded marine mammals and sea turtles. We would continue to use low-ground pressure All Terrain Vehicles (ATVs) to perform management activities at Holgate during the piping plover breeding season.

Air quality would continue to be monitored at an Interagency Monitoring of Protected Visual Environments (IMPROVE) site to track visibility and compounds affecting visibility (smog components, particulates, perceived air quality). We would also continue to monitor air quality at a National Atmospheric Monitoring Program (NADP) site to characterize precipitation chemistry (e.g., acidity, conductance, etc.).

A Wilderness Review of all lands acquired since 1972 would be conducted as part of the revision of the Refuge CCP in 2015 to determine what additional areas meet the criteria for possible Wilderness designation.

Land Protection

We would maintain the present rate of land acquisition to acquire the remaining 12,300 acres of land within the currently approved 56,600 acre Refuge acquisition boundary. (See **Maps 2-7a, b, c**

and d beginning on page II- 35.) The Service would continue its policy of buying from willing sellers and focus its land acquisition efforts on developable upland properties first.

The approved Refuge acquisition area includes the 535-acre Forked River State Game Farm in Lacey Township, which is no longer needed by the New Jersey Division of Fish and Wildlife.

We would maintain the present level of participation in off-Refuge land use planning efforts with governmental and private partners (e.g., the Barnegat Bay National Estuary Program and the Jacques Cousteau National Estuarine Research Reserve).

Resource Protection and Visitor Safety

The current law enforcement staffing level of two full-time Park Rangers and one seasonal Park Ranger would be maintained. The amount of acreage and miles of coastline to patrol per full-time officer is 22,000 acres and 25 miles respectively.

Refuge Buildings and Facilities

No new office or visitor buildings would be constructed. The existing Refuge headquarters and visitor center building is located at the Brigantine Division at the end of Great Creek Road, Oceanville, New Jersey. (See **Map 2-9c** on page II- 41.) The eight-mile Wildlife Drive begins at this location. Visitor facilities would be remodeled to provide higher-quality visitor experiences. There is a separate visitor contact station for visitors to obtain brochures and other information when the office is closed. The existing Barnegat Division field office is located on Collinstown Road, Barnegat, New Jersey. (See **Map 2-9b** on page II-40.)

To acquire the remaining 12,300 acres of land within the approved Refuge acquisition area, we would require an additional \$19,700,000 (average cost of \$1,600 per acre). This figure does not include incidental acquisition costs. The average annual Land and Water Conservation appropriation for this Refuge, based on the five-year period, FY-1995/1999, is \$1,700,000.

Alternative A – the No Action Alternative

Cape May National Wildlife Refuge

Under the No Action Alternative, there would be no change in our current management programs at Cape May Refuge. We would initiate few, if any, new wildlife population, habitat or ecosystem management activities, provide no new public recreation opportunities, and undertake no new major land acquisition efforts. The Refuge would continue to pursue land acquisition and Refuge operations and maintenance under its current staffing and funding levels. (See also **Table 2-3. Actions and Strategies Matrix for Cape May Refuge**, beginning on page II-81.)

Habitat and Wildlife Populations

We would complete a step-down habitat management plan, detailing habitat objectives and implementation strategies. We have already developed a preliminary habitat prescription for all currently owned Refuge lands. However, we would not actively pursue the habitat management objectives contained in the plan, except for those habitat types that are targeted for natural regeneration (e.g., conversion of old field to upland forest). Refuge lands targeted as grasslands would continue to be maintained through mowing. (See **Maps 2-10a and b** beginning on page II-42.)

Baseline population surveys (song bird point counts, Monitoring Avian Production and Survivorship banding program or MAPS, and frog call surveys), would continue as long as non-base funding for these activities is available. We would also seek to establish a partners-based monitoring program for contaminants (with USFWS Ecological Services, EPA, and NJDEP) and water quality (with USGS and NJDEP).

We would continue to provide minimal on-site support for research projects.

The entire Refuge would remain closed to public trapping. (See **Map 2-11** on page II-44.)

Invasive and Overabundant Species

We would not manage invasive species. There would be no Refuge special hunts targeting populations of snow geese and resident Canada geese, which are not now considered to be

overabundant on the Refuge.

Pesticide Use

We would continue current levels of pesticide use for mosquito control, which largely follow an Integrated Pest Management (IPM) approach. We would allow Open Marsh Water Management (OMWM) in previously ditched Refuge salt marshes to aid in biological control of mosquitos. The Cape May County Mosquito Control Commission has not used pesticides on the Refuge during the last three years.

Current mosquito control efforts on the Refuge would continue until further planning prescribes other actions.

Big Game Hunting

Virtually the entire Refuge would continue to be open for all six of New Jersey's deer seasons, subject to Refuge and State regulations. (See **Maps 2-12a and b** beginning on page II-45.) The two closed areas in Middle Township would remain closed.

Upland Game Hunting

The entire Refuge would continue to be closed to upland game hunting. (See **Maps 2-13a and b** beginning on page II-47.)

Migratory Game Bird Hunting

Migratory game bird hunting would continue on the Refuge, with no new opportunities provided. (See **Maps 2-14a and b** beginning on page II-49.) All Refuge lands west of NJ Route 47 in the Delaware Bay Division and all lands east of the power lines in the Great Cedar Swamp Division would continue to be open to migratory game bird hunting, according to State and Refuge regulations. The Refuge would be open to hunting the following species: ducks, geese, rails, coots, moorhens, mergansers, woodcock, and snipe. The Refuge would continue to be closed to crow hunting.

Fishing

The entire Refuge would continue to be closed to fishing.

Wildlife Observation and Photography

We would provide no new opportunities or improved facilities for wildlife observation and photography. The Woodcock Trail would remain the only improved and maintained facility for wildlife observation and photography. Existing trails and woodland roads

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would not be improved or maintained. Almost the entire Refuge would continue to be available for wildlife observation and photography, but would probably remain underutilized due to the difficulty

Environmental Education and Interpretation

No new opportunities for environmental education and interpretation would be provided. Opportunities would remain limited to the few programs provided each year with the help of partner organizations. We would continue to maintain interpretive signs and provide Refuge brochures at existing public use sites.

Wilderness Management

A Wilderness Review of all Refuge lands would be conducted as part of the revision of the Refuge CCP in 2015 to determine if any lands should be recommended for designation as part of the National Wilderness Preservation System.

Land Protection

We would continue our efforts to acquire the remaining 7,600 acres of inholdings within the currently approved Refuge acquisition boundary of 17,600 acres. (See **Maps 2-16a and b** beginning on page II-53.) The Service would continue its policy of buying from willing sellers and focus its land acquisition efforts on developable upland properties first.

To acquire the remaining 7,600 acres of land within the approved Refuge acquisition area, we would require an additional \$4,560,000 (average cost of \$600 per acre). This figure does not include incidental acquisition costs. The average annual Land and Water Conservation funding for this Refuge, based on the five-year period, FY-1995/1999, is \$1,200,000.

We would also maintain the present level of participation in off-Refuge land use planning efforts would continue, with government and private partners (e.g., the Migratory Bird Stopover Project).

Resource Protection and Visitor Safety

The current law enforcement staffing level of one full-time and one seasonal Park Ranger would be maintained.

Refuge Buildings and Facilities

No new office or visitor buildings would be constructed. The Refuge headquarters is located on

of access in many areas. (See **Maps 2-15a and b** beginning on page II-51.)

Kimbles Beach Road, Cape May Court House, New Jersey. There is a separate visitor contact kiosk for visitors to obtain brochures and other information when the office is closed.

Alternative A – the No Action Alternative

Two Mile Beach Unit

The No Action Alternative for the Two Mile Beach Unit is one of custodial management. The beach would be closed to access by the public. No active wildlife or public use management would be undertaken, and no public use opportunities would be provided. The Service's major focus would be on posting and patrolling the property. We would abandon all buildings or improvements in place, except those required for the Coast Guard LORAN Support Unit. (See also **Table 2-4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page II-85.)

Habitat and Wildlife Populations

There would be no active management or restoration of habitats or wildlife populations, and no wildlife surveys would be conducted.

There would be no public trapping opportunities under this Alternative.

Invasive Species

No new programs would be initiated.

Pesticide Use

Previous mosquito control efforts (maintenance of drainage ditches and tidal flushing of wetlands) would continue.

Beach Access

The beach would be closed to all public use.

Hunting

There would be no hunting opportunities. The Service and the Coast Guard have agreed that hunting would not be allowed because of the potential for catastrophic damage to the 625' LORAN tower if insulators on the support cables were damaged.

Fishing

There would be no fishing opportunities.

Wildlife Observation and Photography

There would be no wildlife observation or photography opportunities; public access would be prohibited.

Environmental Education and Interpretation

There would be no environmental education opportunities or programs; public access would be prohibited.

Refuge Buildings and Facilities

All of the buildings on the property would be kept closed, and we would disconnect electrical service in selected buildings. We would not do any routine maintenance or make repairs to the buildings. All of the buildings would deteriorate over time, necessitating future demolition due to public safety hazards. The Coast Guard would continue to use building A-5 under a mutual agreement.

There are currently 16 buildings or structural improvements on the Two Mile Beach Unit property.

The Service would abandon the buildings or improvements in place, except those buildings which must be maintained to assure continued utilities access for the Coast Guard LORAN Support Unit. All of the improvements on the property are within the 100-year floodplain (USCG, 1996).

Alternative B – The Service's Proposed Action

Edwin B. Forsythe National Wildlife Refuge

Under the Service's Proposed Action, all lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would initiate efforts to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.

Refuge staffing and funding levels would be increased and we would initiate new wildlife population, habitat, and ecosystem management activities; provide new compatible wildlife-dependent recreational opportunities; increase our land protection efforts; and construct new office and visitor facilities to support the goals and objectives of the Refuge.

Special emphasis would be placed on the six priority general public uses defined in the Refuge Improvement Act, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. Public use surveys, along with wildlife and habitat monitoring, would help us estimate the volume and impacts of public use, and adapt our management strategies for that use. (See also **Table 2-2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page II-74.)

Habitat and Wildlife Populations

We would expand our endangered and threatened species management efforts. In addition to protecting and monitoring piping plover and swamp pink, we would survey all Refuge lands for currently and potentially occurring threatened and endangered species (Federal and State-listed). Newly discovered occurrences would be protected and managed to maintain or expand those populations. A feasibility assessment would be conducted for sites where a listed species does not currently occur, but could potentially be restored. We would attempt to restore species at restoration sites with a reasonable chance for success.

We would complete the step-down habitat management plan as stated in Alternative A and implement a comprehensive program of habitat

management on and off Refuge lands. We have already developed a preliminary habitat prescription for all currently owned Refuge lands. This prescription will be the basis for step down habitat management plan. It was developed to provide habitat management objectives that characterize a desired physiognomic condition (major vegetative structure, e.g., forest, grassland, brush, marsh) and hydrologic regime (e.g., upland, tidal wetland, non-tidal wetland). Specific habitat requirements for endangered or other high priority trust resources (e.g., piping plover) and ecological communities with special emphasis (e.g., Atlantic white cedar swamps) were considered in establishing site specific habitat objectives. A number of additional guiding principles were followed in developing the habitat prescription. They are as follows:

1. salt marshes will be restored to pre-grid-ditched hydrology;
2. grasslands or fields would be maximized for open land character;
3. forests would be maximized for interior character;
4. scrub/shrub would be maintained between forest and grassland to create soft boundaries;
5. sensitive areas would be buffered;
6. only native plant species and local genotypes would be used;
7. habitat strategies would favor low intensity of maintenance, taking advantage of driving systems processes;
8. the definition of native species, community composition, and landscape configuration would be based on a pre-colonial baseline;
9. conversion or restoration of habitat types would be done with natural regeneration, exceptions might include no seed source, threat from exotic species, or physical stabilization required.

Listed below are the habitat management objectives for Refuge-owned lands. (See also **Maps 2-1a, b, c and d** beginning on page II-13.)

Marsh, Salt - 27,956 acres would be managed as Salt Marsh, comprised of: 5,547 acres of pristine unditched marsh that is part of the Brigantine

Wilderness Area, 22,388 acres of parallel grid-ditched marsh that would be targeted for restoration to pre-ditching hydrology, Salt Marsh restored to 12 **Forest, Upland** - 5,659 acres would be managed for Upland Forest. Of the total acreage, 733 acres would be converted (allowed to regrow) from Upland Brush and 30 acres from Crop-Pasture; restoration would be required on 49 acres of Developed land, three acres of Dredged Lagoon, and a three acre Sand-Gravel Pit.

Marsh, Impoundment - 1,685 acres of marsh would be managed under the Brigantine and Barnegat Impoundment Systems. Water levels and flow are actively manipulated throughout the year to produce mud flats, deep water (with submerged aquatic vegetation), moist soil (with annual wetland plants), and salt marsh. Although the impoundments are managed with current resources, additional resources are needed to replace obsolete water control structures and continue rehabilitation of the dikes.

Dune - Beach - 589 acres would be managed as barrier island dune - beach habitat; the actual acreage would vary based on the highly dynamic shoreline changes. Most of the acreage lies within the Brigantine Wilderness Area (Holgate Unit and Little Beach Island), and, with the exception of control for exotic species, would be left largely to natural processes. One 11 acre area would be created from a Dredge Spoil Site.

Forest, Wetland - 581 acres would be managed as Wetland Forests, with 2 acres restored from a Sand-Gravel Pit. Additional research may support Atlantic White Cedar restoration in current Wetland Forest sites.

Brush, Wetland/Bog - 197 acres would be managed as same habitat type, generally in a complex with Cedar Swamp Forests. One 36 acre site, Cedar Run Bog, is a former diked cranberry bog, and would be restored to its pre-diked shoreline with fish passage opened.

Brush, Upland - 196 acres would be maintained or converted to early succession brushy uplands. Mechanical or fire techniques would be used to maintain 112 acres in a brushy state, 34 acres of brush would be allowed to regrow from crop/pasture or developed cover types, and 50 acres of upland forest would be set back to a brushy state.

Grassland - 178 acres would be managed for Grassland habitat (native grasses and forbs). Grassland would be restored from Developed (139

acres of Dredged Lagoon, three acres of Developed land, and two acres of Upland Brush.

acres, includes dikes of impoundments), Crop-Pasture (24), Dredge Spoil Site (15), and Upland Brush (15). Most areas currently covered with grasses and forbs are dominated by exotic and invasive species, requiring active restoration to native species.

Forest, Island - 118 acres would be managed as Forest Island in salt marshes and bays of the estuary, of which 93 acres would be rehabilitated dredge spoil sites.

Water, Open - 96 acres would be managed as Open Fresh Water, with a priority to restore fish passage to any corridor restrictions. There are also thousands of acres of non-Refuge navigable waters interlacing and adjacent to other Refuge habitats (e.g. salt marshes). Navigable waters will be monitored for water quality and fish and wildlife use in cooperation with the State.

Marsh, Fresh Non-tidal - 45 acres would be maintained as Fresh Non-tidal Marsh.

Forest, Pitch-Pine Lowland - 24 acres would be maintained as Pitch-Pine Lowland Forest.

Forest, Cedar Swamp - 20 acres of sand/gravel pit would be restored to Cedar Swamp Forest habitat, and 239 acres would be maintained as the same.

Developed - 17 acres associated with offices and other Refuge facilities would remain as developed. This area would be landscaped with native plants to support Refuge activities and reduce negative impacts on wildlife.

Dredged Lagoon - 15 acres would not be changed unless further study indicates that it could be converted to another cover type, such as salt marsh, in a legal and ecologically sound manner.

Prescribed fire would be applied to all of the upland habitats, as follows:

Upland Forest - reduce hazardous fuel, reduce overstory stand density, reduce understory density, increase heath or grass/forb density, control invasive species; frequency of burning - once every 8-15 years.

Upland Brush - reduce hazardous fuel, set back succession, control invasive species; frequency of burning - Once every 5-15 years.

Grassland - reduce hazardous fuel, set back succession (woody growth), control invasive species; frequency of burning - once every 1-3 years.

Further detail on the prescribed burning program
A private lands habitat restoration plan would be developed and implemented in cooperation with other agencies and organizations that have private lands programs, such as the Service's Ecological Services Division, and the U.S. Department of Agriculture's Natural Resource Conservation Service and Forest Service.

We would conduct comprehensive baseline flora and fauna surveys of plants, raptors, water birds, fish, reptiles, amphibians, invertebrates, and mammals. From the baseline surveys (including song bird point counts, frog call surveys, and MAPS banding stations), we would establish a long-term monitoring program (infrequent but periodic sampling - e.g., sample a group for five years, every 15 years). We would also implement species monitoring before and after major habitat management projects, and expand use of Geography Information Systems (GIS) to document and model species and habitat. A computer archive of data and publications would be developed to ensure access to information for staff, partners, and the public.
We would use the results of baseline surveys, project evaluation surveys, and monitoring to develop, evaluate, and revise management objectives for wildlife populations, habitat, and public use.

We would encourage research not only by identifying needs, but in co-developing research proposals and pursuing funding through Service and non-Service sources.

New research under this Alternative would include the:

- Impact of mosquito control techniques, such as pesticide applications and Open Marsh Water Management (OMWM), on wildlife;
- Impact of different kinds and levels of public use on wildlife;
- Impact of public use on the dynamics of beach and shoreline environment;
- Impact of watershed development on water quality/quantity and wetland resources;
- Pre-colonial ecology of the southern New Jersey coastal landscape (e.g., role of fire, plant and animal community composition);

would be provided in the Fire Management Plan and Burn Prescriptions. Research and monitoring would provide refinement in the burn frequency and prescriptions.

- Assessment of ecological integrity of the landscape based upon proposed land protection and management.

Technical assistance would be provided to local communities and partners, on wildlife-related issues (e.g., wildlife and habitat monitoring; contaminant spill planning/response).

We would initiate efforts to restore colonial nesting birds to barrier and bay islands. We would initiate research, if necessary, to determine limiting factors to successful restoration of bird colonies.

We would also initiate efforts to identify and manage critical habitat on the Refuge for interjurisdictional fish. This would be covered in a step-down Wildlife Population Management Plan.

Public trapping opportunities for raccoon, fox, muskrat, coyote and beaver, under Refuge special use permits, would be expanded into the Reedy Creek area in Brick Township, the Stouts Creek area in Lacey Township, and the Four Mile Branch Bogs area in Stafford Township to manage furbearer populations. (See **Maps 2-2a, b, c and d** beginning on page II-17.)

Invasive and Overabundant Species

We would survey invasive and overabundant species on the Refuge, leading to the development and implementation of Integrated Pest Management (IPM) control strategies for phragmites and at least six other problem species. A monitoring program, in concert with habitat monitoring, would assess progress and identify additional problem species. Alternative methods of controlling certain species would be researched. We would also offer technical assistance and support to restoration and control efforts on nearby public and private lands.

Efforts to manage greater snow and resident Canada geese would continue as stated under Alternative A, until further planning prescribes other actions.

Pesticide Use

We would aggressively pursue alternatives to pesticides through Integrated Pest Management (IPM) efforts. We would offer technical assistance

on IPM strategies to local communities for controlling common problem species.

Big Game Hunting

The current white-tailed deer hunting program would continue. Additional hunting opportunities would be provided by enlarging Deer Management Zone (DMZ) 58 and establishing handicapped

- Selected properties east of US Route 9, Eagleswood, Stafford, and Barnegat Townships;
- Middle Branch of Forked River, Lacey Township (permit bow season only);
- Cedar Run Creek between the Garden State Parkway and Route 9, in Stafford Township (permit bow season only).

The Refuge would weigh a number of factors in actually expanding big game hunting opportunities:

- the size and configuration of new Refuge-owned properties;
- the availability of public access;
- safety considerations including the State mandated 450-foot safety zone around buildings and playgrounds.

We would reduce these activities if we determine that incompatible levels of big game hunting were occurring.

Upland Game Hunting

We would also initiate the Refuge's first upland game hunting opportunities in the Oak Island Unit of the Brigantine Division, Bass River Township, Ocean County. (See **Map 2-4** on page II-24.) A parking and sign-in area would be established at the old McDonald house site, located on Route 9 in New Gretna.

The Refuge would weigh a number of factors in actually expanding upland game hunting opportunities:

- the size and configuration of new Refuge-owned properties;
- the availability of public access;
- safety considerations including the State mandated 450-foot safety zone around

accessible sites in DMZ 56. The following areas would be added to DMZ 58 (**Maps 2-3a, b and c** beginning on page II-21):

- Forked River Game Farm, Lacey Township;
- Former AT&T property, Lacey Township;

buildings and playgrounds.

We would reduce these activities if we determine that incompatible levels of upland game hunting were occurring.

Migratory Game Bird Hunting

We would make the following changes in migratory game bird hunting opportunities:

- Allow foot access to Brigantine Division Unit 5, Little Egg Harbor Township;
- Allow jump shooting in Barnegat Division Unit A, from Jeremy Point in Little Egg Harbor Township to Cedar Run Creek in Eagleswood Township;
- Eliminate foot access and jump shooting in part of Barnegat Division Unit A from Cedar Run Creek in Eagleswood Township, to Beach Haven West in Stafford Township;
- Allow jump shooting and eliminate site requirements in the Barnegat Division Unit C, Clam Island.

Detailed maps of the migratory game bird hunting units are available from Refuge headquarters.

We would also open additional areas for waterfowl hunting within the following areas (**Maps 2-5a, b, c and d** beginning on page II-25):

- Reedy Creek in Brick Township;
- Stouts Creek property in Lacey Township;
- Forked River Game Farm in Lacey Township;
- Former AT&T property, in Lacey Township;
- Cedar Run Creek, between Route 9 and the Garden State Parkway, in Stafford Township.

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The Refuge would weigh a number of factors in actually expanding migratory game bird hunting opportunities:

- the size and configuration of new Refuge-owned properties;
- the availability of public access;
- safety considerations including the State mandated 450-foot safety zone around buildings and playgrounds.
- By 2002, provide universally accessible saltwater fishing and crabbing opportunities on the Mullica River (Atlantic Co., City of Port Republic) off U. S. Route 9;
- By 2003, upgrade the saltwater fishing opportunities at Cedar Creek, Cedar Run Creek and Parker Run;
- By 2004, provide universally accessible freshwater fishing opportunities at Cedar Run Bog (Ocean Co., Stafford Township) west of U. S. Route 9.

We would reduce these activities if we determine that incompatible levels of fishing were occurring.

Fishing opportunities in the Wilderness Area are discussed under **Wilderness Management** beginning on page II-59.

Wildlife Observation and Photography

We would open new foot trails, with appropriate parking areas, entrance kiosks, and interpretive wayside signs at the following locations (**Maps 2-7a, b, c and d** beginning on page II-31):

- Four Mile Branch Bogs, Stafford Township by 2003;
- Stouts Creek (Murray Grove), Lacy Township by 2006;
- Cedar Run Bog, Stafford Township by 2010;
- Collinstown Road, Barnegat Township by 2014.

We would also:

- Complete the existing trail and add an observation platform at the Reedy Creek Trail in Brick Township by 2004;

We would reduce these activities if we determine that incompatible levels of migratory game bird hunting were occurring.

Fishing

We would expand fishing opportunities on the Refuge as follows (**Maps 2-6a and b** beginning on page II- 29):

- Construct universally accessible observation platforms, with appropriate parking areas, at Bonnet Island, Stafford Township by 2005, & off the Wildlife Drive, overlooking the Experimental Pool by 2007;
- Develop parking sites & kiosks for canoeists & kayakers at Westecunk Creek by 2008 & Cedar Run Creek by 2012.

We would reduce these activities if we determine that incompatible levels of wildlife observation and photography were occurring.

Wildlife observation and photography opportunities in the Wilderness Area are discussed under **Wilderness Management** below.

Environmental Education and Interpretation

Our participation in local environmental education and outreach events would be increased. We would also focus on developing and initiating outreach to groups and organizations with which the Service has not typically interacted. Outreach efforts and environmental education would stress the importance of conservation for maintaining all citizens' quality of life, and emphasize the positive and negative impacts of people on wildlife, including the impacts of personal water craft.

We would increase the availability of interpretive information in new and existing public use areas, develop two outdoor classroom sites along the Wildlife Drive, provide teacher workshops, develop a Refuge video, and develop wildlife learning materials for children. (See **Maps 2-7a, b, c and d** beginning on page II-31.) We would also increase seasonal availability of interpretive information for hunters and anglers, develop five new Refuge brochures, increase involvement and partnership with the educational community, and add scheduled seasonal nature tours at the Wildlife Drive, Holgate, and Reedy Creek (with the help of partners such as Friends of Forsythe).

We would reduce these activities if we determine that incompatible levels of environmental education and interpretation were occurring.

Wilderness Management

All lands above mean high tide in the Holgate Unit would be closed to motor vehicle (also referred to as off-road vehicles or ORVs) use by the public year-round. (See **Map 1-2** on page I- 5.) Seasonal motor vehicle use (September through March) would Wave and storm actions associated with the Atlantic Ocean are constantly changing Holgate's shoreline. Permanent horizontal and elevational control points will be set permanently in the dunes of Holgate. From the control points, the mean high tide boundary will be surveyed every year and posted.

We would continue to offer seasonal surf fishing, wildlife observation and photography opportunities at the Holgate Unit, when the beach is open for public access from September through March. Access would be either by foot or motorized vehicles driving below mean high tide.

We would also initiate efforts to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula. The Service, in coordination with County and City officials, and representatives of the local metropolitan planning organization, would sponsor a review of appropriate alternative transportation systems to improve and replace current vehicular access to the beach at Holgate. Representatives of the Federal Highway Administration, Federal Transit Administration, New Jersey Department of Transportation and National Transit Institute at Rutgers University would be invited to participate.

We would continue to close all of the Holgate Peninsula and Little beach Island, above and below the mean high tide line, to all public access during the piping plover breeding season (April through August). The piping plover is Federally-listed as threatened and State-listed as endangered. The southern tip of the Holgate may also be closed beyond September 1, to protect late-nesting black skimmers.

We would open Little Beach Island (Atlantic Co., Galloway Township) through Refuge special use permits to seasonal (September through March) surf fishing and wildlife observation and photography. We would use these special use permits to limit the numbers and impacts of visitors to the island. Seasonal surf fishing at Little Beach Island is

continue under State law, only in the adjacent State-owned riparian lands, which are below mean high tide. The riparian lands are not part of the Refuge or the Wilderness Area.

We would post the mean high tide line boundary of the Holgate Unit. This would help keep motor vehicles out of the Holgate Unit. We would use a seasonal Park Ranger to patrol the Unit during the peak use periods (September through December).

authorized under the Code of Federal Regulations (CFR) 50, section 32.49. Motor vehicle use is not an issue at this location, either above or below the mean high tide line, because there is no vehicular access to the Island.

Migratory game bird hunting in salt marshes that are in designated migratory game bird hunt units within the Brigantine Wilderness Area would continue to be allowed. We would encourage greater use of the Wilderness Area by other Refuge visitors, in appropriate seasons and locations, through guided tours or Refuge special use permits. Access to highly sensitive areas would be restricted.

We would scrutinize all planned management actions to determine if they are necessary to protect wilderness resources and determine the "minimum tool" needed to carry them out. We would not use a tool simply because it is the most comfortable, convenient, or least expensive.

We would continue National Atmospheric Monitoring Program (NADP) and Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring programs as stated in Alternative A. In addition, we would add air-borne mercury monitoring in partnership with the New Jersey Department of Environmental Protection (NJDEP), and provide technical assistance to local communities on air quality issues and Class I air space.

We would increase public awareness of the Wilderness Area through various media, including TV, calendars, posters, presentations, and an Internet web-site. We would also develop wilderness-related partnerships with organizations such as NJDEP, local chambers of commerce, local government agencies, and other wilderness-oriented groups. Partnerships would seek to:

- Increase the public's understanding and appreciation of the Brigantine Wilderness Area;

- Identify new compatible uses for the area;
- Provide training on the “minimal tools” concept in managing and accessing Wilderness;
- Identify other alternatives to enhance the Wilderness quality and value to local communities of the Brigantine Wilderness Area.

We would set aside Little Beach Island and adjacent salt marshes as a representative natural barrier island complex. A study would be undertaken to determine what species should be represented on the Island, yet are absent because of past human

Land Protection

We would maintain the present rate of land acquisition to acquire the remaining 12,300 acres of land within the currently approved 56,600 acre Refuge acquisition boundary as described in Alternative A.

We have also identified 12 Focus Areas containing approximately 17,000 acres of wildlife habitat essential to the long-term ecological integrity of the Refuge. (See **Maps 2-8a, b, c and d** beginning on page II- 35.) We plan to acquire 11,500 acres within those Focus Areas, which were defined in close cooperation with the State, local municipalities and our conservation partners. These Focus Areas are located from the Cedar Creek drainage in Berkley Township southward to the Doughty Creek drainage in Galloway Township. They primarily fall within unprotected stream corridors between the Garden State Parkway on the west and the Refuge and Barnegat Bay to the east. We would continue the Service's policy of working with willing sellers.

For the Service to acquire all 11,500 acres within the 12 Focus Areas would require an additional \$38,000,000 (average cost of \$3,300 per acre), excluding incidental acquisition costs. This would require increasing the average annual Land and Water Conservation Fund appropriation for Forsythe Refuge by about \$2.5 million for the next fifteen years. For the five-year period, FY-1995/1999, the average annual Land and Water Conservation funding for this Refuge was about \$1.7 million.

We selected the 12 Focus Areas based on the following criteria:

- Known sites of threatened or endangered

disturbance. Those plant and animal species would then be restored so that the Island could act as a colonizing source to New Jersey's other barrier islands. Research would also be conducted to determine the impact of beach use on beach/dune dynamics, comparing Holgate and Little Beach Island.

We would develop a detailed step-down Wilderness Management Plan by 2005 for the existing Brigantine Wilderness Area. By 2010 we would also conduct a Wilderness Review of all lands acquired since 1972 to determine what additional lands, if any, should be recommended for designation as part of the National Wilderness Preservation System.

species and communities;

- Areas important to the ecological health of lands already owned (ensure intact ecosystem processes, such as, protecting the quality and quantity of water for wetlands, providing habitat corridors between existing conservation lands, or sufficient size of contiguous areas to protect viable populations);
- Areas important for priority wildlife species (e.g., critical stopover habitat for migrating birds);
- Areas identified as priority sites for protection by other conservation organizations;
- Areas still viable for conservation protection (i.e., not already developed).

The Focus Areas includes upland and wetlands crucial to the Refuge, Barnegat Bay, and Great Bay, such as:

- Cedar Creek South in Berkeley and Lacey Townships;
- The Pancoast Inland Area, Waretown Creek, and the Barnegat Bay Beach Inland area in Ocean Township; Westcunk Creek in Eagleswood Township;
- Mill Branch/Tuckerton Creek, Giffords Mill Branch, and Otis Bogs/Willis Creek in Little Egg Harbor Township;
- The Nacote Creek watershed and the Doughty Creek watershed in Galloway

Township.

The Trust for Public Land's *Century Plan* (TPL, 1995) and *Beyond the Century Plan* (TPL, 1997) describe and delineate most of these areas.

We would also expand our land planning efforts with municipalities, counties, and the State. We would focus on the value of ecosystem goods and services and alternatives to protect and restore these ecosystem elements. "Because ecosystem services are not fully 'captured' in commercial markets or adequately quantified in terms comparable with economic services and manufactured capital, they are often given little weight in policy decisions. This neglect may ultimately compromise the sustainability of humans in the biosphere. The economies of the Earth would grind to a halt without the services of ecological life support systems, in one sense, their total value to A new Refuge headquarters office and visitor center building(s) would be constructed at the Brigantine Division. The site would be identified through a Site Requirement Analysis. The Service has identified several potential sites for new Refuge headquarters and visitor center building(s). (See **Maps 2-9a, b and c** beginning on page II-39.)

The final decision on the location and construction of a new headquarters office and visitor center building(s) would be evaluated in a separate NEPA document at a later date. Chapter IV describes criteria for site selection and potential sites.

The facility at the Brigantine Division would provide office space for Refuge employees, as well as for the Service's New Jersey Field Office and Law Enforcement employees. The facility may also house personnel from conservation partners (e.g., National Oceanic and Atmospheric Administration, National Marine Fisheries Service, New Jersey Division of Fish and Wildlife, etc.).

We would also construct a new Barnegat Division office and visitor contact building along U.S. Route 9 in Ocean Township, Ocean County. The proposed site for a new Barnegat Division office and visitor contact building is shown in **Map 2-9b** on page II-40.

A Reedy Creek Unit office and visitor contact building would also be constructed. The proposed site for the new Reedy Creek Unit facilities is shown in **Map 2-9c** on page II-41.

the economy is infinite." (Costanza et al., 1997)

Appendix F outlines the array of ecosystem services that are crucial not only for fish, wildlife and plants, but also for humans.

Our efforts to work with public and private landowners to implement wildlife habitat protection and restoration off Service-owned land would also be expanded.

Resource Protection and Visitor Safety

Over the course of this plan, we would hire three new full-time Park Rangers, in addition to our current law enforcement staff, to better protect resources and visitors.

Refuge Buildings and Facilities

Alternative B – The Service's Proposed Action

Cape May National Wildlife Refuge

Under the Service's Proposed Action staffing and funding levels would be increased and we would initiate new wildlife population, habitat, and ecosystem management activities; provide new compatible wildlife-dependent recreational opportunities; increase our land protection efforts; and construct new office and visitor facilities to support the goals and objectives of the Refuge.

Special emphasis would be placed on the six priority general public uses defined in the Refuge Improvement Act, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. Public use surveys, along with wildlife and habitat monitoring, would help us estimate the volume and impacts of public use, and adapt our management strategies for that use. (See also **Table 2-3. Actions and Strategies Matrix for Cape May Refuge**, beginning on page II-81.)

Habitat and Wildlife Populations

We would expand our endangered and threatened species management efforts. We would survey all Refuge lands for currently and potentially occurring threatened and endangered species (Federal and State-listed). Newly discovered occurrences would be protected and managed to maintain or expand those populations. A feasibility assessment would be conducted for sites where a species does not currently occur, but could potentially be restored. We would attempt to restore species at sites with a reasonable chance of success.

We would complete the step-down habitat management plan as stated in Alternative A and implement a comprehensive program of habitat management on and off Refuge lands. We have already developed a preliminary habitat prescription for all currently owned Refuge lands. This prescription would be the basis for step down habitat management plan. It was developed to provide habitat management objectives that characterize a desired physiognomic condition (major vegetative structure, e.g., forest, grassland, brush, marsh) and hydrologic regime (e.g., upland, tidal wetland, non-tidal wetland). Specific habitat requirements for endangered or other high priority

trust resources (e.g., piping plover) and ecological communities with special emphasis (e.g., Atlantic white cedar swamps) were considered in establishing site specific habitat objectives. A number of additional guiding principles were followed in developing the habitat prescription. They are as follows:

10. salt marshes will be restored to pre-grid-ditched hydrology;
11. grasslands or fields would be maximized for open land character;
12. forests would be maximized for interior character;
13. scrub/shrub would be maintained between forest and grassland to create soft boundaries;
14. sensitive areas would be buffered;
15. only native plant species and local genotypes would be used;
16. habitat strategies would favor low intensity of maintenance, taking advantage of ecosystem processes;
17. the definition of native species and community composition would be based on a pre-colonial baseline;
18. conversion or restoration of habitat types would be done whenever practical with natural regeneration.

Listed below are the habitat management objectives for Refuge-owned lands. (See also **Maps 2-10a, b and c** beginning on page II-42.)

Forest, Upland - 4,090 acres would be managed for Upland Forest. Of the total acreage, 238 acres would be converted (allowed to regrow) from Upland Brush and 56 acres from Crop-Pasture; restoration would be required on 21 acres of developed land.

Forest, Wetland - 2,346 acres would be managed as Wetland Forests. Additional research may indicate Atlantic White Cedar to be restored in current Wetland Forest sites.

Marsh, Salt - 1,345 acres would be managed as Salt Marsh.

Brush, Wetland/Bog - 343 acres would be managed

as same habitat type, generally in a complex with Cedar Swamp Forests.

Grassland - 167 acres would be managed for Grassland habitat (native grasses and forbs). Grassland would be restored from developed (5 acres), Crop-Pasture (159 acres), forest upland (2 acres), and Upland Brush (1 acre). Most areas currently covered with grasses and forbs are dominated by exotic and invasive species, requiring active restoration to native species.

Brush, Upland - 104 acres would be maintained or converted to early succession brushy uplands. Mechanical or fire techniques would be used to maintain 11 acres in a brushy state, 71 acres of brush would be allowed to regrow from crop/pasture, sand/gravel pit or developed cover types, and 22 acres of upland forest would be set back to a brushy state.

Water, Open - 61 acres would be managed as Open Fresh Water, with a priority to restore fish passage. There are also thousands of acres of non-Refuge navigable waters interlacing and adjacent to other Refuge habitats (e.g. salt marshes). Navigable waters will be monitored for water quality and fish and wildlife use in cooperation with the State.

Marsh, Fresh Non-tidal - 25 acres would be maintained as Fresh Non-tidal Marsh.

Dune - Beach - 37 acres would be maintained or converted to dune - beach habitat, the actual acreage will vary based on the highly dynamic shoreline changes. One 5-acre developed area and one 4-acre brush upland would be restored to a dune-beach habitat.

Forest, Island - 8 acres of Upland Brush would be allowed to succeed into Forest Island habitat in salt marshes and bays of the estuary.

Forest, Cedar Swamp - 7 acres of sand/gravel pit would be restored to, and 402 acres maintained as Cedar Swamp Forest habitat type.

Developed - 1 acre associated with offices and other Refuge facilities would remain as developed, though landscaped with native plants and maintained in a way to support Refuge activities while minimizing impact on wildlife.

Prescribed fire would be applied to all of the upland habitats, as follows:

Upland Forest - reduce hazardous fuel, reduce overstory stand density, reduce understory density,

increase heath or grass/forb density, control invasive species; frequency of burning - once every 8-15 years.

Upland Brush - reduce hazardous fuel, set back succession, control invasive species; frequency of burning - Once every 5-15 years.

Grassland - reduce hazardous fuel, set back succession (woody growth), control invasive species; frequency of burning - once every 1-3 years.

Further detail on the prescribed burning program would be provided in the Fire Management Plan and Burn Prescriptions. Research and monitoring would provide refinement in the burn frequency and prescriptions.

We would develop and implement a private lands habitat restoration plan in cooperation with other agencies and organizations that have private lands programs, such as the Service's Ecological Services Division, and the U.S. Department of Agriculture's Natural Resource Conservation Service.

Comprehensive baseline flora and fauna surveys of plants, raptors, water birds, fish, reptiles, amphibians, invertebrates, and mammals would be conducted. From the baseline surveys (including song bird point counts, frog call surveys, and MAPS banding stations), we would establish a long-term monitoring program (infrequent but periodic sampling - e.g., sample a group for 5 years, every 15 years).

We would implement species monitoring before and after major habitat management projects, and expand use of Geography Information Systems (GIS) to document and model species and habitat. We would also develop a computer archive of data and publications to ensure access to information for staff, partners, and the public. The results of baseline surveys, project evaluation surveys, and monitoring would be used to develop, evaluate, and revise management objectives for wildlife populations, habitat, and public use.

We would encourage research not only by identifying needs, but also in co-developing research proposals and pursuing funding through Service and non-Service sources. New research would include:

- 1) Impact of mosquito control techniques (such as pesticide applications and Open Marsh Water Management treatment) on wildlife;

- 2) Impact of different kinds and levels of public use on wildlife;
- 3) Impact of public use on the dynamics of beach and shoreline environment;
- 5) Pre-colonial ecology of the southern New Jersey coastal landscape (e.g., role of fire, plant and animal community composition);
- 6) Describe habitat requirements for migratory birds (raptors, passerines, etc.).

We would provide technical assistance to local communities and partners on wildlife-related issues (e.g., wildlife and habitat monitoring or contaminant spill planning/response).

We would provide public trapping opportunities for raccoon, fox, muskrat, coyote and beaver, under Refuge special use permits, on Refuge lands north of Highway 550. (See **Map 2-11** on page II-44.)

Invasive and Overabundant Species

We would survey invasive and exotic species on the Refuge, leading to development and implementation of IPM control strategies for problem species. A monitoring program, in concert with habitat monitoring, would assess progress and identify additional problem species. Alternative methods of controlling certain species would be researched. We would also offer technical assistance and support to restoration and control efforts on nearby public and private lands.

Pesticide Use

We would aggressively pursue alternatives to pesticides through Integrated Pest Management (IPM) efforts. We would offer technical assistance on IPM strategies to local communities for controlling common problem species.

Big Game Hunting

Same as Alternative A. We would reduce these activities if we determine that incompatible levels of big game hunting were occurring.

Upland Game Hunting

We would also initiate the Refuge's first upland game hunting opportunities on selected areas of the Refuge. In the Delaware Bay Division, Refuge lands west of Highway 47 would be opened for hunting gray squirrel and cottontail rabbit. In the Great Cedar Swamp Division, Refuge lands north of

- 4) Impact of watershed development on water quality/quantity and wetland resources;

Highway 550 would be opened to hunting gray squirrel, cottontail rabbit, and turkey. (See **Maps 2-13a and b** beginning on page II-47.)

The Refuge would weigh a number of factors in actually expanding upland game hunting opportunities:

- the size and configuration of new Refuge-owned properties;
- the availability of public access;
- safety considerations including the State mandated 450-foot safety zone around buildings and playgrounds.

We would reduce these activities if we determine that incompatible levels of upland game hunting were occurring.

Migratory Game Bird Hunting

We would open additional Refuge areas to migratory game bird hunting. In addition to Refuge lands west of NJ Route 47 in the Delaware Bay Division, all lands north of County Route 550 in the Great Cedar Swamp Division would be open to migratory game bird hunting, according to State and Refuge regulations. (See **Maps 2-14a and b** beginning on page II-49.)

The Refuge would weigh a number of factors in actually expanding migratory game bird hunting opportunities:

- the size and configuration of new Refuge-owned properties;
- the availability of public access;
- safety considerations including the State mandated 450-foot safety zone around buildings and playgrounds.

We would reduce these activities if we determine that incompatible levels of migratory game bird hunting were occurring.

Fishing

We would open the entire Refuge to fishing and crabbing. These activities are functionally limited to

just a few freshwater ponds and various tidally influenced creeks. By opening the entire Refuge, the regulations would be simplified and the public would enjoy maximum fishing opportunities.

We would make numerous improvements throughout the Refuge to provide visitors a quality experience. Planned improvements would make the Refuge much more accessible and enjoyable to the visitor. (See **Maps 2-15a and b** beginning on page II-51.)

New projects would include:

- A universally accessible trail at the Refuge headquarters. This trail would include a rolled and compacted surface of stone dust and numerous benches.
- A parking lot and kiosk in the area of Gracetown Road/Woodbine Blvd. in Dennis Township. These improvements would be in conjunction with the proposed 35-mile trail on the former railroad bed running from Cape May to Manumuskin, Cumberland County. A portion of the “rails to trails” trail through the Refuge would be open to hiking, bicycling, and horseback riding. Hiking trails into the adjacent cedar swamp would also be improved.
- A canoe landing and designated canoe route would be established on Cedar Creek in Upper Township, providing opportunities for wildlife observation in areas otherwise difficult to access.
- The Refuge would establish parking lots, kiosks, and other trail improvements at Peach Orchard Road in Upper Township, and the Stocker and Schellinger tracts in Middle Township. These improvements would be similar to what has already been done at the Woodcock Trail. These three sites already have unimproved trails that are in need of upgrade and regular maintenance.

We would reduce these activities if we determine that incompatible levels of wildlife observation and photography were occurring.

Environmental Education and Interpretation

We would increase our participation in local special events, and our efforts to reach non-traditional audiences. Numerous interpretive signs would be

We would reduce these activities if we determine that incompatible levels of fishing were occurring.

Wildlife Observation and Photography

placed along Refuge trails and in kiosks. (See **Maps 2-15a and b** beginning on page II-51.) Some signs would be periodically changed to describe seasonal events, such as the spring shorebird/horseshoe crab phenomenon on Delaware Bay. Nature walks would be scheduled regularly, especially with the assistance of volunteers and partner organizations. A variety of Refuge brochures, maps, and fact sheets would be produced, highlighting Refuge programs and natural resources, Delaware Bay, and the south Jersey shore. Teacher workshops would be developed and an outdoor classroom established on the Refuge. A Friends Group would also be established and a Refuge Web site set up.

We would reduce these activities if we determine that incompatible levels of environmental education and interpretation were occurring.

Wilderness Management

A Wilderness Review of all Refuge lands would be conducted in 2010 to determine if any lands should be recommended for designation as part of the National Wilderness Preservation System.

Land Protection

We would maintain the present rate of land acquisition to acquire all the remaining land - 7,600 acres of privately owned lands within the currently approved 17,600 acre Refuge acquisition boundary as described in Alternative A.

We have also identified Focus Areas containing approximately 4,900 acres of wildlife habitat essential to the long-term ecological integrity of the Refuge. (See **Maps 2-16a and b** beginning on page II-53.) We plan to acquire 3,600 acres within these Focus Areas. The Service would cooperate with State and other land conservation organizations to protect the remaining 1,300 acres.

For the Service to acquire all 3,600 acres within the Focus Areas, an additional \$8,640,000 million (average cost of \$2,400 per acre) would be required, excluding incidental acquisition costs. This would require increasing the average annual Land and Water Conservation Fund appropriation for Cape May Refuge by \$1.1 million for the next six years. The average annual Land and Water Conservation funding for this Refuge, based on the five-year

period, FY-1995/1999, was \$1.2 million.

We selected these Focus Areas based on the following criteria:

- Known sites of threatened or endangered species and communities;
- Areas important to the ecological health of
- Areas important for priority wildlife species (e.g., critical stopover habitat for migrating birds);
- Areas identified as priority sites for protection by other conservation organizations;
- Areas still viable for conservation protection (i.e., not already developed).

We would expand our land planning efforts with municipalities, counties, and the State and focus on the value of ecosystem goods and services and alternatives to protect and restore these ecosystem elements. "Because ecosystem services are not fully 'captured' in commercial markets or adequately quantified in terms comparable with economic services and manufactured capital, they are often given little weight in policy decisions. This neglect may ultimately compromise the sustainability of humans in the biosphere." (Costanza et al., 1997) **Appendix F** outlines the array of crucial ecosystem services that are crucial not only for fish, wildlife and plants, but also for humans.

We would expand work with public and private landowners to implement wildlife habitat protection and restoration off Service-owned land.

Should the Coast Guard's LORAN Support Unit (adjacent to the Two Mile Beach Unit), become excess to its needs, we would work to acquire the site. (See **Map 1-3** on page I-6.)

Resource Protection and Visitor Safety

We would hire one additional full-time and one additional seasonal Park Rangers to better protect resources and visitors.

Refuge Buildings and Facilities

We would construct a new, larger office and visitor contact building at the Kimbles Beach Road headquarters site. We would also construct a new storage building and a maintenance building at the headquarters site.

lands already owned (ensure intact ecosystem processes, such as, protecting the quality and quantity of water for wetlands, providing habitat corridors between existing conservation lands, or sufficient size of contiguous areas to protect viable populations);

Alternative B – The Service's Proposed Action

Two Mile Beach Unit

Under the Service's Proposed Action we would initiate a seasonal closure of the beach, above and below the mean high tide line, to benefit:

- beach nesting birds such as piping plover, least tern, and black skimmer;
- migratory shorebirds during spring and fall migration periods.

The closure would take place from April 1 to September 30, during which time, beach access would be allowed only during Refuge-scheduled bird/beach walks. This seasonal closure would be evaluated after two years to determine its effectiveness and to implement changes if necessary.

Motor vehicles, and non-wildlife dependent uses such as swimming, sunbathing, and surfing, would be prohibited at all times. The beach would be open for walking and surf fishing from October through March, accessible from the north boundary of the beach and at the location of the former Coast Guard Beach Hut. Sand dunes would be closed to public access except at designated crossing points.

A visitor center would be established in building A-14 and environmental education and interpretation programs would be provided on a regular basis. We would also use building B-6 for Refuge administration, and all other buildings or improvements on the property would be removed, except those required for the Coast Guard LORAN Support Unit. (See also **Table 2-4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page II- 85.)

Habitat and Wildlife Populations

The biological program would emphasize stopover habitat for migratory birds, management for endangered species, and restoration of the Dune-Beach and Salt Marsh habitat types. Habitat restoration subsequent to building removal would include planting of native vegetation. We would study habitat management needs and implement a habitat management plan. Habitat management may require planting, prescribed burning, mowing, control of exotic or invasive species, or modifying the dune/beach structure. We would develop and

implement a management plan for beach nesting birds and migrant shorebirds. This plan would include managing predators, and other techniques employed to attract and benefit beach nesting birds.

We would initiate a comprehensive wildlife inventory program, including bird abundance and distribution surveys, as well as surveys for reptiles, amphibians, small mammals, and invertebrates.

We would monitor beach and sand dune dynamics. Vegetation surveys and mapping would also be done to refine habitat management activities. Surveys and studies would utilize and incorporate GIS. Management actions would favor restoration of Federal and State-listed endangered and threatened species. We would also, under cooperative agreement, provide technical assistance for habitat management and wildlife surveys on adjacent Coast Guard lands.

We would manage furbearer populations through a Refuge trapping program, but we would not allow public trapping.

Invasive and Overabundant Species

We would survey invasive species and develop and implement an Integrated Pest Management (IPM) plan to control these species. This may include mechanical, biological, and chemical control of phragmites, mosquitoes, and other invasive species.

Pesticide Use

We would implement an Integrated Pest Management plan (IPM), including considerations for mechanical, biological, and chemical control of undesirable species, including phragmites and mosquitoes.

Beach Access

The beach would be closed to public access from April to September and opened from October through March.

Hunting

Same as Alternative A.

Fishing

We would offer seasonal surf fishing opportunities, when the beach is open for public access from October 1 through March 31. Fishing would be by walk-in access only; no motor vehicles would be allowed on the beach.

We would reduce these activities if we determine that incompatible levels of fishing were occurring.

We would offer wildlife observation and photography opportunities on specific roads and trails. We would offer wildlife observation and photography opportunities on the beach only during the period October 1 through March 31. We would make improvements to provide visitors a quality experience, including signs, kiosks, universally accessible trails, and platforms. A wildlife observation platform would be established, possibly utilizing the existing former radar platform.

We would reduce these activities if we determine that incompatible levels of wildlife observation and photography were occurring.

Environmental Education and Interpretation

We would take an active role in environmental education and interpretation. A visitor center, with displays, exhibits, and regular programs, would be established in building A-14. This facility would be operated by Refuge staff and volunteers. We would provide regular programs and guided nature walks, especially during peak bird migration periods. Cooperating partners would provide additional opportunities and programs. Various self-guiding interpretive signs and kiosks would also be installed.

We would reduce these activities if we determine that incompatible levels of environmental education and interpretation were occurring.

Refuge Buildings and Facilities

There are currently 16 buildings or structural improvements on the Two Mile Beach Unit property.

We would use existing buildings A-14 and B-6 and any other improvements necessary for Refuge maintenance, storage, law enforcement, administration, etc. The Coast Guard would continue to use building A-5 under a mutual agreement. Building A-14, a new 5,000 square foot structure, would be renovated to accommodate a visitor center, with displays, exhibits, and regular programs, and some office space. All other buildings or improvements on the property would be removed, except those which must be maintained to assure continued utilities access for the Coast Guard LORAN Support Unit. We would explore the beneficial use of rubble resulting from the demolition of buildings and structures.

Executive Order 11988, Flood Plain Management

Wildlife Observation and Photography

requires Federal agencies to provide leadership and take action, "...to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains..." All the improvements on the excess property are within the 100-year floodplain (USCG, 1996).

Alternative C

Edwin B. Forsythe National Wildlife Refuge

Under this Alternative all lands above mean high tide in the Holgate Unit of the Brigantine Wilderness Area would be closed to motor vehicle use by the public year-round in compliance with the provisions of the Wilderness Act. We would also seek to further restrict motor vehicle access at the Holgate Unit by obtaining a license from the New Jersey Tidelands Council to close State-owned riparian lands below the mean high tide line. Efforts would be initiated to establish a seasonal boat concession to ferry anglers and other Refuge visitors to the southern tip of the Holgate Peninsula.

Refuge staffing and funding levels would be increased and we would provide increased public use and access opportunities, including Refuge-wide hunting, trapping, fishing, and wildlife observation and photography. New office and visitor facilities would be constructed to support the goals and objectives of the Refuge. In addition, this Alternative would also place more emphasis on our habitat and wildlife management, environmental education, interpretive, and outreach efforts. (See also **Table 2-2. Actions and Strategies Matrix for Forsythe Refuge**, beginning on page II-74.)

Habitat and Wildlife Populations

In addition to actions identified in Alternative B, we would develop an ecological community-level habitat map of the Refuge and the surrounding landscape. We would also develop and implement an ecological community/species-based habitat management plan for the Refuge and nearby lands. A cooperative private lands habitat restoration plan using community/species-based habitat targets would be developed and implemented. Through partnerships, we would increase available nesting structures for peregrine falcon, osprey, and barn owls. We would also identify and evaluate all stream or river blockages that impede spawning runs for interjurisdictional fish.

In addition to the actions identified in Alternative B, we would open the entire Refuge to public trapping for raccoon, fox, muskrat, coyote and beaver, under Refuge special use permits. (See **Maps 2-2a, b, c and d** beginning on page II-17.)

Invasive and Overabundant Species

Same as Alternative B.

Pesticide Use

Same as Alternative B.

Big Game Hunting

In addition to the actions identified in Alternative B, we would expand deer hunting by opening Deer Management Zones (DMZ) 57 and 58 to the six-day shotgun, fall and winter bow seasons. (See **Maps 2-3a, b and c** beginning on page II-21.) These three seasons do not require permits. This would essentially open the Refuge to "at-large hunting," because DMZ 57 and 58 cover most of the upland habitat. We would not open DMZ 56 to these three seasons, because the Wildlife Drive runs through it. We currently close the Drive during the DMZ 56 permit deer hunt season.

Upland Game Hunting

In addition to the actions identified in Alternative B, we would open all remaining upland habitat to upland game hunting. (See **Map 2-4** on page II-24.)

Migratory Game Bird Hunting

In addition to the actions identified in Alternative B, we would open all remaining Refuge lands to migratory game bird hunting. (See **Maps 2-5a, b, c and d** beginning on page II-25.)

Fishing

In addition to the actions identified in Alternative B, we would allow fishing from all shore locations outside the Holgate Unit and Little Beach Island portions of the Brigantine Wilderness Area and the Wildlife Drive. (See **Maps 2-6a and b** beginning on page II-29.)

See **Wilderness Management** on page II-71 for fishing within the Wilderness Area.

Wildlife Observation and Photography

In addition to the actions identified in Alternative B, we would open all Refuge lands to wildlife observation and photography, with the exception of those areas involved in endangered species recovery efforts. (See **Maps 2-7a, b, c and d** beginning on page II-31.)

Environmental Education and Interpretation

Maps 2-7a, b, c and d beginning on page II-31.)

In addition to the actions identified in Alternative B, we would participate in the development of a watershed-wide cooperative outreach group. (See

Wilderness Management

In addition to the actions identified in Alternative B, we would seek a license from the New Jersey Tidelands Council to stop motor vehicle use in the State-owned riparian lands on the Holgate Peninsula. These riparian lands are below mean high tide, and are not part of the Refuge or the Wilderness Area. We would not have to post the mean high tide line portion of the Holgate Unit boundary, if we obtained a license from the Council to prohibit motor vehicle use in the State-owned riparian zone. We would also work in cooperation with Town of Long Beach to provide an observation platform on Town lands north of the Holgate Unit. We would perform most beach maintenance and management activities by boat.

Land Protection

Same as Alternative B.

Resource Protection and Visitor Safety

Same as Alternative B.

Refuge Buildings and Facilities

Same as Alternative B.

Alternative C

Cape May National Wildlife Refuge

Under this Alternative staffing and funding levels would be increased and we would allow hunting, trapping, and fishing Refuge-wide. The existing Refuge office and visitor contact building would be enlarged and remodeled and new storage and maintenance facilities constructed. Wildlife and habitat management activities would be increased, while wildlife observation and photography, environmental education and interpretation opportunities would be reduced. (See also **Table 2-3. *Actions and Strategies Matrix for Cape May Refuge***, beginning on page II-81.)

Habitat and Wildlife Populations

In addition to the actions identified in Alternative B, we would develop an ecological community-level habitat map of the Refuge and the surrounding landscape. We would also develop and implement an ecological community/species-based habitat management plan for the Refuge and nearby lands. A cooperative private lands habitat restoration plan using community/species-based habitat targets would be developed and implemented. Through partnerships, we would increase available nesting structures for osprey, barn and barred owls.

In addition to the actions identified in Alternative B, we would allow public trapping of raccoon, fox, muskrat, coyote and beaver Refuge-wide, under Refuge special use permits. (See **Map 2-11** on page II-44.)

Invasive and Overabundant Species

Same as Alternative B.

Pesticide Use

Same as Alternative B.

Big Game Hunting

Same as Alternative A.

Upland Game Hunting

In addition to the actions identified in Alternative B, we would open all remaining Refuge upland habitat to upland game hunting. (See **Maps 2-13a and b** beginning on page II-47.)

Migratory Game Bird Hunting

In addition to the actions identified in Alternative B, we would open all remaining Refuge lands to migratory game bird hunting. (See **Maps 2-14a and b** beginning on page II-49.)

Fishing

Same as Alternative B.

Wildlife Observation and Photography

We would complete fewer projects for improving access than in Alternative B. Improvements would be limited to the universally accessible trail at the headquarters site and the “rails to trails” project as described in Alternative B. (See **Maps 2-15a and b** beginning on page II-51.)

Environmental Education and Interpretation

We would be involved less with education and interpretation programs than in Alternative B. These efforts would be more self-guiding, that is, Refuge visitors would receive education and interpretation messages strictly through signs, brochures, etc. Interpretive signs would be placed on Refuge trails and in kiosks. Brochures, maps, and fact sheets would also be produced for distribution in kiosks and remote brochure boxes. (See **Maps 2-15a and b** beginning on page II-51.)

Wilderness Management

Same as Alternative A.

Land Protection

Same as Alternative B.

Resource Protection and Visitor Safety

Same as Alternative B.

Refuge Buildings and Facilities

We would enlarge and remodel the current office and visitor contact building at the Kimbles Beach Road headquarters site, and construct new storage and maintenance buildings.

Alternative C

Two Mile Beach Unit

Under this Alternative we would provide year-round public access to the beach for walking and surf fishing. No motor vehicles would be permitted on the beach. Public trapping would be allowed, as would commercial bait fishing (both under Refuge special use permit). Public use improvements would be limited, and only a visitor contact station would be provided.

We would use building B-6 for Refuge administration, provide selected building(s) to partners/cooperators for purposes compatible and complementary to the purpose of the Refuge, and remove all other excess buildings, except those required for the Coast Guard LORAN Support Unit. (See also **Table 2-4. Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge**, beginning on page II-85.)

Habitat and Wildlife Populations

As buildings, parking lots, or other manmade structures are removed, the sites would be left to the processes of natural succession. Few habitat management or wildlife survey programs would be initiated. Baseline surveys of migratory bird and beach nesting birds would be conducted. Vegetation surveys would be conducted to document cover types and occurrence of rare plants or plant communities.

We would allow public trapping, under Refuge special use permits, to manage furbearer populations.

Invasive and Overabundant Species

Same as Alternative B.

Pesticide Use

Same as Alternative B

Beach Access

The beach would be open to public access on a year-round basis.

Hunting

Same as Alternative A.

Fishing

We would allow surf fishing on the beach and fishing/crabbing in the back bay wetlands year-round. Commercial bait fishing would be allowed under Refuge special use permit.

Wildlife Observation and Photography

We would offer fewer wildlife observation and photography opportunities than in Alternative B. We would make limited improvements to the area to provide visitors a quality experience. We would maintain selected trails and roads, but not improve them.

Environmental Education and Interpretation

We would take a less active role in environmental education and interpretation than in Alternative B. We would install some self-guiding interpretive signs and kiosks. Occasional programs and guided nature walks would be provided by partner organizations. A visitor contact station, would be established in an existing building and operated by partner organizations.

Refuge Buildings and Facilities

We would use building B-6 and any other improvements necessary for Refuge administration, maintenance, storage, and law enforcement. The Coast Guard would continue to use building A-5 under a mutual agreement. We would provide selected building(s) to partners/cooperators for purposes compatible and complementary to the purpose of the Refuge. This would include such things as a visitor contact station (possibly staffed by partners), biological research classroom, seasonal housing for interns, etc.

We would remove all other excess buildings within 15 years and explore the beneficial uses of the clean building rubble.

Edwin B. Forsythe National Wildlife Refuge

Physical Environment

Climate

Both the Edwin B. Forsythe National Wildlife Refuge (Forsythe Refuge) and Cape May National Wildlife Refuge (Cape May Refuge) are within the New Jersey coastal weather station zone (Sandy Hook, Long Branch, Atlantic City, and Cape May weather stations). The ocean moderates the State's continental climate within the coastal weather zone. The average monthly temperature is 35°F in January, the coldest month of the year, and 75°F in July, the hottest month of the year. The growing season for the Refuges ranges from 245 days, at the north end of Forsythe Refuge, to 255 days at the southern end of Cape May Refuge. The growing season is the period of the year in which the average temperature is 43°F or more. The average annual precipitation in the coastal zone is 42.6 inches. Precipitation is distributed fairly evenly through the year, with slightly more in July and August, and less in February.

Air Quality

New Jersey is the most densely populated State in the country. The State also has the highest densities of roads and traffic. These factors impact air quality. The greatest adverse impact seems to be elevated levels of low-altitude ozone in the State. The ozone levels exceed Environmental Protection Agency (EPA) thresholds set for the State. Investigations at the Brigantine Division of Forsythe Refuge indicate that the low-altitude ozone levels at that site are high, with resultant damage to vegetation (Davis, 1995).

In 1978, Congress designated the Brigantine Wilderness Area (Wilderness Area) as a Class I air quality area, giving it special protection under the Clean Air Act. Congress charged the Service with the responsibility of protecting the air quality and air quality related values (AQRVs) of the area from manmade pollution. AQRVs include vegetation, wildlife, soils, water quality, visibility, odors, and cultural and archaeological resources.

Despite this protection, air pollution is impacting the Wilderness Area. The area lies in a highly industrialized airshed, with air pollution coming from many sources, including industry, automobiles, and power plants. Surveys conducted from 1993 to 1996 indicated that certain plant species exhibited typical symptoms of ozone injury (e.g., stippling and chlorosis).

Hydrology

In addition to these documented effects, there is concern that other effects may be occurring. Rainfall throughout the area is acidic; rainfall pH at sampling locations in New Jersey is often less than 5.0. As is the case in most of the eastern US, visibility in the Wilderness Area is affected by pollution-caused haze. Also, inshore waters of the Wilderness Area may be at risk from atmospheric nitrogen pollution. Research along the Atlantic Coast has demonstrated that atmospheric nitrogen (primarily from power plant and automobile emissions) has contributed to nutrient level increases of inshore waters, with subsequent algae blooms, loss of seagrass beds, and deterioration of fish and wildlife habitat.

The New Jersey Department of Environmental Protection (NJDEP) operates continuous sulfur dioxide and ozone monitors at the Nacote Creek Station at the west side of Forsythe Refuge. The ozone monitor has recorded various violations of the National Air Quality Standards for ozone (the entire State of New Jersey is a "non-attainment area" for ozone).

In addition, the Service monitors air quality at the Wilderness Area through two national programs. The Service monitors atmospheric pollutants in rain as part of the National Atmospheric Deposition Program (NADP; the "acid rain" program). The Service monitors fine particles as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program.

The Service and NJDEP cooperate in the emission permitting process to protect air quality in the Brigantine Wilderness.

Geology, Topography and Soils

The Forsythe Refuge is within the Outer Coastal Plain, which consists of sedimentary deposits dating from the Tertiary period.

Elevations on the Refuge range up to 50 feet above mean sea level. Topography is nearly level to gently sloping. Uplands slope gradually to a wide band of salt marsh to shallow bays. These bays are separated from the ocean by barrier islands or spits.

The major soil series in the Barnegat Division are: Sulfaquents-Sulfihemists association and Manahawkin-Atsion-Berryland association. Major soil series in the Brigantine Division are Tidal Marsh-Coastal Beach association and Downer-Hammonton-Sassafras association.

III

The major aquifer underlying the Refuge is the Kirkwood-Cohansey system, which dates from the Miocene and Pliocene Epochs. The Kirkwood Formation is chiefly sand, silt, and clay. The Cohansey Sand is chiefly unconsolidated quartz sand with some gravel and many clay beds. This system provides most of the potable water to the area.

Pleistocene and Recent Age deposits overlie the Kirkwood-Cohansey formations and contain sand, gravel, silt, peat, and organic muck. Some shallow wells from these formations may be tapped locally for domestic use. Several aquifers underlie the Kirkwood-Cohansey system and are tapped to a lesser extent for public and domestic supply.

The Refuge has both tidal and non-tidal surface waters. Non-tidal waters include marshes, bogs, ponds, creeks, artificial impoundments, and seasonally flooded forests. Tidal waters include ponds, salt and fresh marshes, creeks and old ditches, coves, bays, river channels, and inlets. Most of the salt marsh is tidally flooded daily, with the greatest inundation occurring at new and full moons.

The Barnegat Division is drained by Reedy Creek, Sloop Creek, Clamming Creek, Maple Creek, Stouts Creek, Bridge Creek, Forked River, Oyster Creek, Double Creek, Gunning River, Cedar Creek, Mill Creek, Cedar Run, Dinner Point Creek, Westecunk Creek, Parker Run, Jesse Run and Salp Creek.

The Brigantine Division is drained by the Mullica River, Roundabout Creek, Ballenger's Creek, Bass River, Nacote Creek, Motts Creek, Oyster Creek, Landing Creek, Rubes Creek, and Doughty Creek.

Contaminants

The Service collected sediments, mummichogs, and fiddler crabs in and adjacent to Forsythe Refuge in 1996 to determine baseline contamination. Sediments were collected at 25 locations; mummichogs and fiddler crabs from 10 of the 25 locations. The samples were analyzed for trace metals, organochlorine pesticides, polychlorinated biphenyls (PCB's), and butyltin compounds (USFWS, 1998).

The Service analyzed the samples for 19 trace metals: aluminum, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, strontium, vanadium, and zinc. All of these trace metals were detected in the sediment samples. None of the sediment samples contained metal concentrations that exceeded severe toxic effects guidelines for sediment.

Many sediment trace metal concentrations exceeded lower

toxic effects guidelines, but these concentrations were notably greater than background levels within New Jersey. Fiddler crabs contained higher mean metal concentrations than mummichogs for all detected metals except zinc.

There was no strong relationship between the sediment concentrations of metals and those in crabs. Inorganic contaminant concentrations in Refuge biota were not notably greater than reference levels and were less than levels measured in areas known to be polluted. The whole body concentrations of inorganic contaminants in bogs and crabs were not sufficient to cause acute or sublethal effects to piscivorous birds and predatory fish.

Several organic contaminants, dichlorodiphenyl-dichloroethane (DDD), dichlorodiphenyl-dichloroethane (DDE), total PCB's, and PCB 77, were detected in measurable quantities in all sediment samples. Levels of several organic contaminants, particularly the metals of DDT (DDD and DDE) were greater than available reference concentrations from other areas within southern New Jersey. Some of the highest sediment concentrations of these organic contaminants were detected at sampling stations located just downstream of inactive cranberry bogs. One bog yielded a DDD concentration of significant ecotoxicological concern. A few other sampling stations also contained levels of DDE and total chlordane that exceeded severe toxic effect sediment guidelines.

Detectable levels of p,p'-DDD, p,p'-DDE, dieldrin, heptachlor epoxide, oxychlordane, and total PCB's were found in all crab and fish samples analyzed. Unlike the inorganic contaminant result, crabs did not have higher organic contaminant levels than fish. Organic contaminant concentrations in Refuge biota were not notably greater than reference levels and were less than levels measured in areas known to be polluted. Body burdens of organic contaminants in mummichogs did not indicate that these fish should be suffering physiological impairment. The whole body concentrations of organic contaminants in both fish and crabs were not sufficient to cause acute or sublethal effects to piscivorous birds and predatory fish.

Overall, the contaminant levels in sediment and biota from the Forsythe Refuge, with some exceptions, were found to be low and of little concern with regard to the potential for adverse effects on resident biota or the predators. Exceptions were limited to seven sampling stations where the concentrations of DDD, DDE, or

total chlordane exceeded severe toxic effects sediment guidelines. Two of these stations were located at the surface water outfalls of inactive cranberry bogs. Unfortunately, biota were not collected from these two stations. It is reasonable to suspect even greater concentrations of organic contaminants exist inside the cranberry bogs themselves. These inactive cranberry bogs may be a serious threat to Federal trust resources foraging there. In addition, these cranberry bogs may be a risk to Refuge visitors, if the areas were open to the public.

Biological Environment

Jersey Coast Refuge plant and animal communities are described in "Significant Habitats and Habitat Complexes of the New York Bight Watershed" (USFWS, 1997). The key biological value of Forsythe Refuge is the coastal estuaries and associated watershed. The Refuges hosts a number of rare species and communities. Many birds depend upon the habitat during migration and commercial fish species depend on the waters for a portion of their life cycle.

Threatened, Endangered, Recovered and Rare Species

In and around Forsythe Refuge, there are 14 animal species Federally-listed as endangered, threatened, recovered, or species of concern, formerly called candidate species (**Appendix H**). We actively manage for the piping plover (*Charadrius melodus*), peregrine falcon (*Falco peregrinus*), and bald eagle (*Haliaeetus leucocephalus*).

Piping plovers nest on the protected Wilderness Areas of the Holgate Unit and on Little Beach Island. Generally 19-37 pairs nest at the two areas. These breeding pairs represent about 29 percent of New Jersey breeding population.

Peregrine falcons use the Forsythe Refuge throughout the year. Two nesting pairs use artificial nesting structures on the Refuge. The peregrine falcon has successfully nested on the Refuge since 1980. The Refuge is also important for wintering peregrines.

Bald eagles regularly use the Refuge wetlands to forage while migrating through or wintering in the area. During the nesting season, most use is along the Mullica River, but occasionally eagles forage over Refuge impoundments and adjacent salt marsh. During the winter eagles regularly forage in the impoundments and Beaches and vegetated dunes make up about 2% of the Refuge land at the Forsythe Refuge. These habitats are critical for species unique to those communities. Most of the Refuge's shrub/scrub habitat is located on islands. Additional shrub/scrub habitats (upland brush) are found

salt marshes of the Brigantine Division.

Vegetation and Habitat Types

About 82% of the Refuge land at the Forsythe Refuge is wetland, and 18% is upland. Salt marsh makes up about 78% of the Refuge land at the Forsythe Refuge. This is the largest single land use/habitat type within the Refuge. The dominant salt marsh species are salt marsh cordgrass (*Spartina alterniflora*) and salt-meadow grass (*Spartina patens*). Most of the salt marsh was grid-ditched during the first part of this century for mosquito control. Approximately 6,000 acres of salt marsh is unditched, and was designated as wilderness under the Wilderness Act. The salt marsh is interlaced with small tidal streams, mudflats, and ponds or pannes.

Forested wetlands make up about 4% of the Refuge land at the Forsythe Refuge. The dominant overstory trees in this habitat are red maple (*Acer rubrum*), oaks (*Quercus* spp.), black gum (*Nyssa sylvatica*), sweetgum (*Liquidambar styraciflua*), and occasional stands of Atlantic white cedar (*Chamaecyparis thyoides*). Bogs and brush-dominated wetlands are interspersed through the forested wetlands. The cedar swamps and bogs are classified as sensitive ecological communities, with several rare plant species (e.g., bog asphodel - *Narthecium americanum* and swamp pink - *Helonias bullata*).

Forested uplands make up about 13% of the Refuge land at the Forsythe Refuge. Upland forests range from deciduous to coniferous dominated overstory composition, with tree species including: pitch pine (*Pinus rigida*), oaks (e.g., white oak - *Quercus alba*, chestnut oak - *Q. prinus*, black oak - *Q. velutina*, scarlet oak - *Q. coccinea*), black cherry (*Prunus serotina*), and sweet gum (*Liquidambar styraciflua*). Fire played a prominent role in defining the composition and structure of upland plant communities, both historically and prehistorically (Little, 1998). There are still some nearby State lands in the Pine Barrens that receive regular fire treatment (both prescribed and wild), but fire on Refuge lands has been suppressed for decades.

Grassland uplands make up about 3% of the Refuge land at the Forsythe Refuge. These grasslands contain forbs and grasses interspersed with sassafras (*Sassafras albidum*), eastern red cedar (*Juniperus virginiana*), and winged sumac (*Rhus copalina*). Current grasslands are comprised of both native and exotic species.

on the mainland, and represent early successional stages of upland forest. The Holgate Unit and Little Beach Island, which are part of the Brigantine Wilderness Area, represent these community types.

Open water habitat types of the Refuge include bays, streams, rivers and small ponds or reservoirs. These shallow waters are critical elements of the coastal ecosystem. However, only the small ponds and reservoirs are owned by the Refuge. All navigable waterways and inter-tidal areas (between mean high and low tide) fall within the jurisdiction of the State of New Jersey. Ownership notwithstanding, open waterways found throughout the lands owned by the Refuge have a major influence on the ecological functions of those communities.

Three large, managed impoundments are an important feature of the Brigantine Division. The Northwest Pool and the Southwest Pool, about 500 and 300 acres respectively, are fed by Doughty Creek and springs. These two pools are managed as a freshwater impoundment and moist-soil unit. The East Pool (536 acres), receives water from the two west pools and tide gates. This pool is managed as a brackish impoundment.

Other freshwater bodies in the Brigantine Division include: the spring-fed Experimental Pool, Lily Lake (a 22-acre reservoir upstream from the impoundments on Doughty Creek), and two ponds that were former borrow pits. Several freshwater impoundments and one brackish impoundment (totaling about 350 acres) are located in the Barnegat Division.

Wildlife Resources

Migratory Birds: Migratory birds use the Refuge in three different ways. First, many thousands of birds of all kinds use the Refuge as stopover habitat during the spring and fall migrations. Second, a wide variety and, in some cases, very large portions of populations depend upon the Refuge for wintering habitat. Finally, a rich variety and number of birds breed on the Refuge.

The coastal wetlands of New Jersey are of international importance to wintering waterfowl. In 1991, 39% of the Atlantic Flyway American black duck (*Anas rubripes*) population, 67 % of the Atlantic brant (*Branta bernicla*) population, and 34% of the greater snow goose (*Chen caerulescens*) population were recorded in New Jersey during the Service's mid-winter inventory.

The wetlands of the Forsythe Refuge are classified as Many songbirds species use the Refuge for nesting and to rest or feed during migration. The most important nesting species are those dependent upon the marshes and coastal island habitats, for example, seaside sparrow (*Ammodramus maritimus*), marsh wren (*Cistothorus palustris*), and sedge wren (*Cistothorus platensis*). A large number of birds nesting on or migrating through the Refuge are Neotropical migrants (wintering in

Wetlands of International Importance under the RAMSAR Convention, one of only seventeen sites so designated in the United States. During a December 1991, aerial survey of the Refuge, 85,570 waterfowl were observed. The highest waterfowl concentrations at the Refuge do not occur until late December. Weekly waterfowl counts conducted at the Brigantine Division Impoundments indicate waterfowl populations nearly double from early in the month, so it is possible nearly 180,000 birds use the Refuge during the peak period.

Many marsh and water birds use the Refuge. The common include great blue heron (*Ardea herodias*), egret (*Casmerodius albus*), snowy egret (*Egretta thula*), black-crowned night heron (*Nycticorax nycticorax*), ibis (*Plegadis falcinellus*) and cattle egret (*Bubulcus ibis*). Herons and egrets nest on or near the Refuge, frequently foraging in the salt marshes, streams, ponds, and impoundments. Until recently, least terns and black skimmers nested in substantial numbers on Holgate and other barrier/bay islands.

Shorebird use of the Refuge peaks during the spring migration. The most common species are: sanderling (*Calidris alba*), semi-palmated sandpiper (*Calidris pusilla*), dunlin (*Calidris alpina*), semi-palmated plover (*Charadrius semipalmatus*), short-billed dowitcher (*Limnodromus griseus*), willet (*Catoptrophorus semipalmatus*), greater yellowlegs (*Tringa melanotos*), lesser yellowlegs (*Tringa flavipes*), black-bellied plover (*Pluvialis squatarola*), least sandpiper (*Caladris minutilla*), ruddy turnstone (*Arenaria interpres*), rock knot (*Caladris canutus*), whimbrel (*Numenius phaeopus*), spotted sandpiper (*Actitis macularia*) and pectoral sandpiper (*Calidris melanotos*).

Many raptors breed on the Forsythe Refuge, including red-tailed hawks (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), sharp-shinned hawks (*Accipiter striatus*), broad-winged hawks (*Buteo platypterus*), shouldered hawks (*Buteo lineatus*), northern harrier (*Circus cyaneus*), great horned owls (*Bubo virginianus*), common barn owls (*Tyto alba*), barred owls (*Strix varia*) and short-eared owls (*Asio flammeus*). Many other raptors may be seen during migration; some of them winter at the Refuge.

Central and South America). As a group, Neotropical migrants have shown recent population declines due to habitat loss and deterioration in wintering areas and along migration corridors.

Mammals: Over 30 species of mammals occur on the Refuge, in assemblages characteristic of the Mid-Atlantic coastal communities. Forest species include red fox

(*Vulpes vulpes*), grey fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), short-tailed weasel (*Mustela erminea*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), grey squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), red-backed vole (*Clethrionomys gapperi*), pine vole (*Microtus pinetorum*), masked shrew (*Sorex cinereus*), short-tailed shrew (*Blarina brevicauda*), eastern mole (*Scalopus aquaticus*), and a variety of bat species. Shrubland and grassland species of mammals include the meadow vole (*Microtis pennsylvanicus*), meadow jumping mouse (*Zapus hudsonius*), woodchuck (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), and several of the forest and wetland species. Mammals associated with wetlands include mink (*Mustela vison*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), meadow vole, southern bog lemming (*Synaptomys cooperi*), and least shrew (*Cryptotis parva*).

Several mammals have substantial impacts on the habitat and populations managed on the Refuge. High densities of white-tailed deer have negatively affected the structure and composition of plant communities. High densities of muskrats, have compromised the integrity of dikes needed to retain and manipulate water in impoundment.

Many species of nesting, migrating, or wintering raptors dependent on the availability of small mammal populations in all cover types.

Reptiles and Amphibians: Nineteen species of reptiles and amphibians occur on the Refuge. These species fall into two major groups -- Pine Barrens and coastal estuarine environment. Important species from the Pine Barrens group include wood turtles (*C. insculpta*), Cope's gray and pine barrens treefrog (*Hyla chrysoscelis* and *H. andersonii*), ambystomid salamanders (*Ambystoma* spp.). The most important estuarine environment species is the northern diamondback terrapin (*Malaclemys t. terrapin*).

Fish: The salt marshes, streams, ponds, bays, and rivers that comprise the estuaries of the Refuge are critical to a rich variety of fish, shell fish, and crabs. These species Except for a handful of studies prior to Refuge construction projects, Forsythe Refuge lands have never been surveyed for archaeological sites. Prehistoric site potential is high, but site discovery is complicated by major changes in sea level over the last 12,000 years. Much of the Refuge is tidal marsh, and archaeological sites in this setting are especially difficult to locate and study. In exposed areas, they have often been lost to erosion. The upland portions of the Refuge have generally high potential for prehistoric sites, as much of this land adjoins wetland resources used by their

are the foundation for sport and commercial fisheries, as well as food base for many birds and mammals. Most of the species are found in navigable waterways, areas the Service does not own.

Invertebrates: A wide variety and number of invertebrates, both terrestrial and aquatic, are of biological importance. Invertebrates are not well documented from this area, unless they are economically important. Tiger beetles and lepidopterans, some rare, are frequently observed. There is a long history of aggressive mosquito control, which has impacted other species.

Archaeological and Historical Environment

Prehistoric Period

Human occupation of the New Jersey coast began with the arrival of Native American hunter-gatherer bands, approximately 10,000 B.C. Only a few archaeological sites earlier than about 5000 B.C. have been found in the area, probably partly due to a major rise in sea level due to Pleistocene glacial melting. The coastline of that time is now lies submerged in the Atlantic Ocean, and former freshwater river valleys are now salt marsh. An artifact collection from the area of Cape May Refuge is one of the few signs of settlement in this period.

Human population on the coast seems to have increased somewhat after 5000 B.C., as the climate became notably warmer. The locations and contents of archaeological sites reflect a more diverse mix of hunting and gathering of upland, wetland, and aquatic resources that varied with the seasons. Sea level change became much more gradual by about 2000 B.C., and the extensive coastal wetlands that developed provided rich hunting, shellfishing, and plant gathering environments. This greater resource reliability supported a larger and more stable human population. Small scale hoe agriculture, pottery, and the bow and arrow are notable developments found at sites dating after about 1000 B.C.

inhabitants.

Historic Period

Permanent settlement of the Forsythe Refuge area by Euro-Americans began in the second quarter of the 18th century. This was preceded by a long period of contact with Native American Lenape through offshore fishing and the fur trade. By the middle of the century, the Lenape were severely diminished by European diseases and had lost nearly all of their former lands. Many

emigrated to northwest New Jersey and the Ohio Valley during this period.

Colonial towns on the New Jersey shore were generally established at estuaries with suitable harbors for fishing and trade, such as the Mullica River. The New York Road linked these communities along the shore. Ore from bogs and charcoal from the pine barrens provided raw materials for an ironworks at Batsto that produced munitions for the American Revolution. A British raid in 1778 burnt the community of Chestnut Neck and all the vessels in the harbor, including some privateers, but did not achieve its secondary goal of destroying the ironworks. Limited by shallow and small harbors, these shore communities experienced slow economic and population growth during the 19th century. Fishing, shellfishing, and agriculture remained the primary economic activities for most families. The later development of Atlantic City, Cape May, and other resorts had little effect on the surrounding areas without beachfront. This factor has done much to preserve the rural character of the Refuge vicinity.

Upland areas on Forsythe Refuge generally consist of former farmland associated with historic period settlement. Much of the Brigantine Division, for example, was part of a large early 19th century farm based on Brigantine Island. Therefore, historic period archaeological resources are unlikely except in a few settings, such as present or former landing areas. Some remains of wharves for these landings, and possibly sunken small craft, may exist in the marshes. A lifesaving station site near Brigantine City is one of the few documented historic archaeological sites at the Refuge.

There are currently no standing historic structures on the Refuge, but the Forked River Game Farm, proposed for acquisition from the New Jersey Division of Fish and Wildlife, has several structures that will require review of their eligibility for inclusion in the National Register of Historic Places.

Socioeconomic Environment

The Forsythe Refuge receives over 300,000 visitors per year. The predominant public uses of the Refuge are hunting, fishing, clamming, crabbing, wildlife. There is a substantial commercial fishing industry in southern New Jersey. For example, fishing is the second largest industry after tourism in Cape May County. Important species include: finned fish, clams, mussels, and crabs. There is an increase in shellfish aquaculture, especially oysters. Bait fish, eel, and horseshoe crabs are also a major component of the industry.

In addition to the above more apparent environmental economic connections, there are others. A study

observation, environmental education, and boating dikes surrounding the impoundments at the Brigantine Division serve as an 8-mile auto tour for the public. The Brigantine impoundment area accounts for about one-half of the Refuge visitors. The impoundment area is renowned as one of the premier birding sites in North America. A recent study shows that birders alone, make up about 75% of the auto tour visitors, annually add about \$4.01 million to the local economy (Kerlin 1995).

Wildlife-dependent public use at the Refuge is consistent with the primary industry for the region—tourism. The New Jersey shore has long been a major tourist destination. Boating, fishing, hunting, shellfishing, beach-related pursuits are typical for tourists. Most of the tourists come from major nearby metropolitan centers: Philadelphia, Newark, and New York City.

Over the last 20 years, the development of casinos and related industries has created a large influx of people. This has spurred the rapid construction of housing and support infrastructure (e.g., roads, malls, plazas, utility towers and corridors). The increase in human density and associated uses have caused considerable strain on the ecosystem from the following factors:

1. Habitat loss - direct conversion of natural habitat types to developed types.
2. Habitat fragmentation - conversion of large contiguous tracts of natural habitat types to a mosaic of discontinuous, smaller habitat types; or erecting barriers that cause direct lethal impacts to fish, wildlife and plants (e.g., roads, towers, dams).
3. Habitat degradation - partial deterioration of habitat due to pollution (siltation, nutrient loading, pesticides, metals), exotic and pest species (phragmites, house cats), incompatible uses (off-road terrain vehicles, personal watercraft).
4. Water consumption - reducing subsurface and surface waters due to irrigation, home water consumption, and industrial applications.

A study conducted in Minnesota determined that there is a statistically significant positive relationship between the amount of wetland acres in an area and residential property values (Lupi, et al., 1991). The authors were able to identify which values were captured (i.e., open space, view, habitat, etc). A study conducted in Maryland outlines the economic benefits of open space to local communities (American Farmland Trust, 1992).

Beyond the economic factors in land use planning to

are ethical considerations. Is the land a commodity that belongs to us? Or is land a community to which we belong? Are we the masters of the land or are we stewards of the land?

Cape May National Wildlife Refuge

Physical Environment

Climate and Air Quality

Both the Edwin B. Forsythe National Wildlife Refuge (Forsythe Refuge) and Cape May National Wildlife Refuge (Cape May Refuge) are within the New Jersey coastal weather station zone (Sandy Hook, Long Branch, Atlantic City, and Cape May weather stations). The ocean moderates the State's continental climate within the coastal weather zone. The average monthly temperature is 35°F in January, the coldest month of the year, and 75°F in July, the hottest month of the year. The growing season for the Refuges ranges from 245 days, at the north end of Forsythe Refuge, to 255 days at the southern end of Cape May Refuge. The growing season is the period of the year in which the average temperature is 43°F or more. The average annual precipitation in the coastal zone is 42.6 inches. Precipitation is distributed fairly evenly through the year, with slightly more in July and August, and less in February.

Geology, Topography and Soils

Elevations in Cape May County range between sea level and 55 feet above mean sea level. The interior of Cape May County consists of low rolling hills and poorly drained depressions. The ocean side of the County consists of broad tidal marsh areas fronted by barrier islands. There are well developed sand dunes in some places on the ocean barrier islands and along the shore of Delaware Bay in the southwestern part of the County.

The major soil series in the Great Cedar Swamp Division of Cape May Refuge are Pocomoke-Muck association and Tidal Marsh association. The major soils series in the Delaware Bay Division are Hammonton-Woodstown-Klej association, Pocomoke-Muck association, Downer-Sassafras-Fort Mott association, and Tidal Marsh association.

Hydrology

The sediment trace metal concentrations were considered to be typical for sediments in southern New Jersey and probably represent site-specific background levels. Although low, the concentrations of arsenic, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc at one or more sample locations exceeded sediment "effects range-low" levels developed by the National Oceanic and Atmospheric Administration, and freshwater sediment "lowest effects" levels developed by

The aquifers that underlie Forsythe Refuge also underlie Cape May Refuge. However, there are major differences.

First, the Cape May Peninsula is surrounded on three sides by salt water. Second, the groundwater recharge areas for the aquifers are not as large as farther north along the coast. Because of these two factors, saltwater intrusion into the Cohansey aquifer is a substantially greater problem than further north. The City of Cape May has constructed a \$5 million desalination plant because it can no longer extract suitable freshwater from some of its five wells. The plant's capacity is two million gallons of water per day. The estimated operating and maintenance costs are \$500,000 per year.

Like Forsythe Refuge, Cape May Refuge has both tidal and non-tidal surface waters. Non-tidal waters include marshes, bogs, ponds, creeks, and seasonally flooded forests. Tidal waters include ponds, salt and fresh marshes, creeks and old ditches, coves, bays, and inlets. Most of the salt marsh is tidally inundated daily, with the greatest inundation occurring at new and full moon.

The Great Cedar Swamp Division is drained by Cedar Creek and Dennis Creek; the Delaware Bay Division is drained by Bidwell Creek, Dias Creek, Green Creek, and Fishing Creek. These streams display low runoff, about half the volume of other streams in the State, which indicates a high infiltration rate. The Bidwell's Creek drainage basin has been identified by the County as one of the region's most important groundwater recharge areas. Other major groundwater recharge areas in the County are near Cape May Court House and Cold Spring.

Contaminants

The Service collected sediments, mummichogs, and fiddler crabs at 25 locations in and adjacent to the Cape May Refuge in 1992 to determine baseline contamination.

The 25 locations included all major drainages and selected tidal creeks. The Service analyzed the sediments and mummichogs for trace metals, organochlorine pesticides and polychlorinated biphenyls (PCB's); the fiddler crabs were analyzed only for organochlorine pesticides (USFWS, 1994b).

the Ontario Ministry of the Environment. Because sediment trace metal concentration levels did not exceed more severe effects levels, the potential for adverse effects on benthic organisms exposed to the contaminants is low to non-existent. The mean trace metal levels in mummichogs and fiddler crabs were at the low end of ranges typically observed in New Jersey. The maximum trace metal levels found in mummichogs and fiddler crabs appeared to be well below levels of concern for

and wildlife.

None of the twenty organochlorine tested for were detected in the sediment samples (average detection limit = 0.04 ppm dry weight). The only organochlorine detected in the mummichogs and fiddler crabs were the DDT breakdown products, DDD and DDE. The average combined DDD and DDE concentrations were comparable to background levels for New Jersey. The maximum combined DDD and DDE level found (0.18 ppm wet weight in mummichogs and 1.04 ppm wet weight in fiddler crabs), however, were greater than the background levels. Organochlorine concentration levels in Cape May Refuge area mummichog and fiddler crab populations are low and are not expected to adversely affect the organisms or their immediate predators.

Although low, the concentrations of DDD and DDE did not appear to decline significantly since 1989—the last previous sampling. Although the use of the parent compound DDT ceased in the mid-1960's, it is possible that weathered material continues to enter the estuarine ecosystem as previously contaminated areas are disturbed through dredging or erosion.

Biological Environment

There is an extensive description of the plant and animal communities in the Cape May Refuge area in "Significant Habitats and Habitat Complexes of the New York Bight Watershed" (USFWS, 1997). The most important biological features of the locality include the estuaries associated with Delaware Bay and the Atlantic coast, the transition between southern and northern species assemblages, and the unique and critical role the peninsula plays as a staging area and corridor for bird migration.

Threatened, Endangered, Recovered and Rare Species

There are 12 species in and around Cape May Refuge that are Federally-listed endangered, threatened, recovered, or species of concern, formerly called candidate species (**Appendix H**). The listed species for which the most information is available are the peregrine falcon and bald eagle. Fall raptor surveys conducted at Cape May Point by the Cape May Bird Observatory since 1976 have demonstrated a dramatic increase in observations of both species. Over the past 10 years, peregrine falcon sightings have undergone a five-fold increase, while bald eagle sightings have doubled.

There is one major vegetative community present in the Cape May Refuge area that is not found in the Forsythe Refuge area: the Cape May lowland swamp. Unique to the peninsula, it is a deciduous forest swamp with an

Migrating and wintering eagles utilize the extensive marshes for hunting, and the wooded swamp and forest edge habitats for roosting. The Dennis Creek Marsh is one of the most heavily used raptor sites in New Jersey. The Great Cedar Swamp is an historic nesting site for bald eagles. Although eagles now only roost in the swamp, the area is a potential nesting site.

A number of the other listed species have been documented on Cape May peninsula. There is a strong potential for their occurrence on lands currently owned by the Refuge, or proposed for acquisition.

Vegetation and Habitat Types

About half of the Refuge land at the Cape May Refuge is wetland and about half is upland. Forests (combining upland and wetland types) represent the largest single habitat type for the Refuge.

Unlike the Forsythe Refuge, most of the wetlands in the Cape May Refuge are dominated by woody vegetation (swamps) not emergent vegetation (marshes). Salt marsh makes up about 15% of the Refuge land, forested wetlands make up 30%, shrub/scrub wetlands and bogs make up about 4%, and open water makes up less than 1%.

Most of the salt marshes were either impounded earlier in the century to create meadows for salt hay production or grid ditched for mosquito control. Most of the impounded areas have been reopened by tidal action or human intervention.

Forested uplands make up about 42% of the Service-owned property at the Cape May Refuge. Upland forests range from deciduous to coniferous dominated overstory composition, with tree species including: pitch pine (*Pinus rigida*), oaks (e.g., white oak - *Quercus alba*, chestnut oak - *Q. prinus*, black oak - *Q. velutina*, scarlet oak - *Q. coccinea*), black cherry (*Prunus serotina*), and sweet gum (*Liquidambar styraciflua*). Fire played a prominent role in defining the composition and structure of upland plant communities, both historically and prehistorically (Little, 1998). There are still some nearby State lands in the Pine Barrens that receive regular fire treatment (both prescribed and wild), but fire on Refuge lands has been suppressed for decades. Other upland habitats include shrub/scrub uplands which make up about 3%, and grassland/old fields uplands which make up about 3%. Beaches make up less than 1% of the Service-owned property.

unusually high species diversity and found in headwaters areas.

Wildlife Resources

Migratory Birds: The Cape May Peninsula has long been renowned for its spectacular concentrations of birds during the spring and fall migrations. Because of its unique configuration and geographic location along the Atlantic Flyway, thousands of songbirds, raptors, and woodcock are funneled into Cape May during the fall migration. Facing a 12-mile open water crossing, migrants may rest and feed in the area until favorable winds allow them to either cross Delaware Bay or head back north, up and around the Bay. In addition, the peninsula's extensive marshes attract large numbers of waterfowl, particularly wintering black ducks, while the bay's narrow beaches attract major assemblages of shorebirds in the spring. Over 360 species of birds can be observed in Cape May County during the year.

The upland shore edge of Delaware Bay is well recognized as a critical fall migratory bird corridor. The wetlands of the Delaware Bay Estuary, which include the Delaware Bay wetlands in the Cape May Refuge, are classified as Wetlands of International Importance under the RAMSAR Convention, one of only 17 sites so designated in the United States.

The coastal wetlands of New Jersey, including the Delaware Bay marshes, are of international importance to wintering waterfowl, annually wintering 34% of the entire Atlantic Flyway black duck (*Anas rubripes*) population. During severe winters, black ducks rely heavily on freshwater fringe areas along the upland edges of the marsh, where the relatively constant temperature of the upper reaches of small streams and creeks cause them to remain ice-free when the remainder of the marsh has iced over. These marshes also provide important black duck breeding habitat. Nesting surveys conducted by the New Jersey Division of Fish, Game, and Wildlife have found high nest densities in the Delaware Bay Division.

In addition to black duck, Cape May Refuge also supports large numbers of other migrating waterfowl, many of which remain throughout the winter: wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), green-winged teal (*A. crecca*), American wigeon (*A. americana*), mallard (*A. platyrhynchos*), gadwall (*A. strepera*), northern shoveler (*A. clypeata*), northern pintail (*A. acuta*), canvasback (*Aythya valisineria*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), bufflehead (*Bucephala albeola*), and Canada goose (*Branta canadensis*).

Marsh and waterbird use at the Cape May Refuge is similar to that at Forsythe Refuge.

Mammals: The mammals occupying Cape May Refuge would be nearly identical to those described for Forsythe Refuge. The one possible exception may be the marsh rice rat (*Oryzomys palustris*). At the northern extreme of

The Delaware Bay shoreline is a major shorebird site in North America, second only to the Copper River Delta in Alaska. Delaware Bay is a hemispherically important shorebird site. Hundreds of thousands of shorebirds, nearly 80% of some populations, stop to rest and feed here during their spring migration from South America to their breeding grounds in the Arctic. The arrival of over 20 species of shorebirds, primarily ruddy turnstones, knots, ruddy turnstones, sanderlings, and semipalmated sandpipers coincides with the peak horseshoe crab spawning season. Horseshoe crab eggs provide an abundant source of food for these shorebirds to replenish their energy reserves.

There is substantial raptor migration through Cape May Refuge, with large numbers of 15 species observed. Each year since 1976, an average of 75,000 hawks have been recorded by the Cape May Bird Observatory. Because these birds are hesitant to cross wide expanses of water, most species migrate along the length of the Bay corridor, utilizing the Bayshore upland edge as a migratory corridor.

Notable raptor species include sharp-shinned hawk, Cooper's hawk (*A. cooperii*), red-tailed hawk, broad-winged hawk, red-shouldered Hawk, northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and merlin (*F. columbarius*).

Large numbers of owls also migrate through the Cape May Refuge. Typical species include the common barn owl, northern saw-whet owl (*Aegolius acadicus*), and long-eared owl (*Asio otus*). The thick cedar groves and woodlands of the expansion area are important to wintering populations of owls, including long-eared short-eared owl, and northern saw-whet owl.

American woodcock concentrate in large numbers on the Cape May peninsula during the fall migration. They utilize the field/forest edge and old field habitats. Charles, Virginia, is the only other area along the Atlantic coast that concentrates woodcock in comparable numbers.

During the fall migration, nearly 100 species of songbirds pass through the County, utilizing a variety of habitat types. An abundance of songbirds also breeds in the field/forest edge habitat of the cedar swamps and salt marsh. Cape May Refuge also provides nesting habitat for regionally and nationally significant species such as rails, Neotropical migrants, and raptors.

Along its range along the Delaware Bay, it may not occur as far north on the Atlantic Coast. At both Refuges, several species of bats occur in forested habitat types during the summer breeding season. Forest opening

common foraging areas for this group. A number of other migrating bat species probably pass through southern New Jersey during migration, while others would use caves for hibernacula (not found locally). Very little research has been done on bats in this ecosystem.

Reptiles and Amphibians: The reptiles and amphibians known to occur on the Refuge represent two major assemblages – Pine Barrens and coastal estuarine environment. Important species from the Pine Barrens group include wood turtles (*C. insculpta*), Cope's gray and pine barrens treefrog (*Hyla chrysoscelis* and *H. andersonii*), ambystomid salamanders (*Ambystoma* spp.). An important estuarine ecosystem species is the northern diamondback terrapin (*Malaclemys t. terrapin*).

Fish: The estuarine habitat at Cape May Refuge is similar to that at Forsythe Refuge, and hosts many of the same species of fish. Some species, like the mummichog (*Fundulus heteroclitis*), a common prey species for many larger fish and for wading birds, depend on salt marsh as their primary habitat. Other species depend on the estuary for only a portion of their life cycle. Important commercial and recreational finfish and shellfish species that utilize the estuary during a portion of their life cycle include horseshoe crab (*Limulus polyphemus*), weakfish (*Cynoscion regalis*), summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), blue crab (*Callinectes sapidus*), and hardshell clam (*Mercenaria mercenaria*). The horseshoe crab is particularly noteworthy. The Delaware Bay hosts the largest concentration of horseshoe crabs, and many birds depend on horseshoe crab eggs for food. (See **Migratory Birds** above.)

Archaeological and Historical Environment

Prehistoric Period

The Cape May Refuge and the surrounding area was the subject of an archaeological field school sponsored by Rutgers University and Stockton College from 1995 through 1998. Several prehistoric sites were discovered, most notably a large site or group of sites on a tidal marsh island that is rapidly eroding. In addition to the expected shellfish and mammal remains, a substantial amount of turtle bone from a variety of species was identified here.

There is a proposal to study the paleoecology of the

2. Habitat fragmentation - conversion of large contiguous tracts of natural habitat types to a mosaic of discontinuous, smaller habitat type relicts; or erecting barriers that cause direct lethal impacts to fish, wildlife and plants (e.g., roads, towers, dams).

adjacent marshland, to determine the biological resources available at the time the site was occupied. While the field school was not designed specifically as a planning study to identify archaeological sites in the Refuge, its findings show that the highly varied and changing mix of upland and wetland supported Native American populations in the area for an apparently unbroken period covering the last 12,000 years.

Historic Period

Historic period settlement on the Refuge appears to have been limited. Most of the area was marshland, woodland, or farmland, with little recorded settlement on Refuge property, and apparently few landing areas to provide opportunities for maritime sites. A mill location on one of the streams within the Refuge is one of the few recorded sites. There are no standing historic structures on the Refuge, however there is a family cemetery.

Socioeconomic Environment

As is the case along the rest of the New Jersey coast, tourism is the number one industry in Cape May County.

Cape May County is ranked as the second best birding hotspot in all of North America (Konrad, 1996). A recent study estimated that the 100,000 birders who annually visit Cape May County bring more than \$31 million into the local economy (Kerlinger, 1997).

There is also a substantial commercial fishing industry in southern New Jersey. Fishing is the second largest industry after tourism in Cape May County. There is an increase in shellfish aquaculture, especially oysters. Bait fish, eel, and horseshoe crabs are also a major component of the industry.

Over the last 20 years, casino development in Atlantic City has spurred a large influx of people to Cape May County. As farther north along the New Jersey coast, this has spurred a rapid construction of housing and support infrastructure (e.g., roads, malls, plazas, and utility towers). The increase in human density and associated uses have caused considerable strains on the ecosystem from the following factors:

1. Habitat loss - direct conversion of natural habitat types to developed types.
3. Habitat degradation - partial deterioration of habitat due to pollution (siltation, nutrients, pesticides, metals), exotic and pest species (phragmites, house cats), incompatible uses (all-terrain vehicles, personal watercraft).

4. Water consumption - reducing subsurface and surface waters due to irrigation, home consumption, and industrial applications.

In addition to these environmental-economic connections, there are others. A study conducted in Minnesota determined that there is a statistically significant positive relationship between the amount of wetland acres in an area and residential property values (Lupi, et al., 1991). The authors were not able to identify which values were captured (i.e., open space, view, habitat, etc).

A study conducted in Maine outlines the economic benefits of open space to local communities (American Farmland Trust, 1992).

Beyond the economic factors in land use planning there are ethical considerations. Is the land a commodity that belongs to us? Or is land a community to which we belong? Are we the masters of the land or are we stewards of the land?

Two-mile Beach Unit

Physical Environment

The "Draft Environmental Assessment for the Closure of Electronic Engineering Center (EECEN)" (USCG, 1996) and the Environmental Baseline Survey Report EECEN (ABB, 1997) contain an extensive description of the Physical, Biological, and Socioeconomic environments of the Electronic Engineering Center.

The Two Mile Beach Unit (Unit) occupies 491 acres, 221 of which are above the mean high tide line. Of the 221 acres above the mean high tide line, upland habitat makes up 90 acres, and wetland habitat the remaining 131.

Almost all of Unit is within the 100-year flood plain; the entire Unit is within the 500-year flood plain. The 100-year flood, or intermediate regional tide, would have an elevation of 10.0 feet above mean sea level. The 500-year flood, or standard project tide, would have an elevation of 14.0 feet above mean sea level. The September 1944 hurricane that struck New Jersey had a tide 8.0 feet above mean sea level.

In a 100-year flood, or intermediate regional tide, all of the Unit would be flooded, except for a narrow strip along the top of the barrier dunes. In a 500-year flood, or standard project tide, all of the Unit, including the protective barrier dunes, would be underwater. In either event virtually all the buildings at EECEN would be destroyed or severely damaged (USCG, 1996).

Biological Environment

The Unit is recognized for its biodiversity.

Threatened, Endangered, Recovered and Rare Species

The piping plover has historically used the beaches as nesting grounds, up to three nesting pairs recorded in a given year. Peregrine falcons stop over before heading for the north coast of South America in the fall, and the American bald eagle has been documented in the area.

Vegetation and Habitat Types

The lands above mean high tide consist of coastal beach and dune habitat and salt marsh habitat.

The beach community is composed of sparse vegetation,

Archaeological and Historical Environment

including American searocket (*Cakile edentula*), coast-blite goosefoot (*Chenopodium rebrum*) and beach-heather (*Hudsonia tomentosa*). The beach dunes are densely vegetated. The dominant dune vegetation includes beachgrass (*Panicum amarum*), bitter panic grass (*Panicum amarulum*), American beachgrass (*Ammophila breviligulata*), American wormseed (*Chenopodium ambrosioides*), and seaside goldenrod (*Solidago sempervirens*), bayberry (*Myrica pennsylvanica*), and black cherry (*Prunus serotina*). The site is an excellent example of a maritime forest.

Common salt marsh species include saltmarsh cordgrass (*Spartina alterniflora*), saltmarsh camphor-weed (*Pluchea purpuranscens*), Carolina sealavender (*Limonium carolinianum*), salt-meadow grass (*Spartina patens*), saltmarsh rush (*Juncus gerardii*), marsh elder (*Iva frutescens*), and common reed (*Phragmites australis*).

Wildlife Resources

Migratory birds: Common species include mallard (*Anas platyrhynchos*), common merganser (*Mergus merganser*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), herring gull (*Larus argentatus*), turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk, American kestrel (*Falco sparverius*), mourning dove (*Zenaidura macroura*), eastern screech-owl (*Otus asio*), belted kingfisher (*Ceryle alcyon*), northern flicker (*Colaptes auratus*), hairy woodpecker (*Picoides villosus*), downy woodpecker (*Picoides pubescens*), and purple martin (*Progne subis*).

Mammals: Many of the mammal species found in dune and tidal wetlands communities of Cape May County occur on the Unit.

Reptiles and Amphibians: Reptile species common in the area include the eastern box turtle (*Terrapene carolina*), diamond back terrapins, eastern fence lizard (*Sceloporus undulatus*), and common garter snake (*Thamnophis sirtalis*). Amphibian species common in the area include eastern newt (*Notophthalmus viridescens*), grey treefrog (*Hyla versicolor*), and bullfrog (*Rana catesbeiana*).

Fish: Fish occurring at Unit would be grouped into two major types: estuarine and near-shore marine. The estuarine systems have already been described above under Forsythe Refuge and Cape May Refuge.

Prehistoric Period

No archaeological surveys have been done at Unit, but the property has potential for prehistoric archaeological sites, especially in areas of wetland edge environments. Several late prehistoric sites have been found nearby in similar settings.

Historic Period

Although Cape May was settled by the middle of the 17th century, there is no record of historic occupation of this property until 1870, when a lifesaving station was built on or near it. Many remains of shipwrecks have been reported in the area, and there may be some evidence of these in the beachfront portion of the property. There are no standing historic structures on this property. The Coast Guard facility was established in the late 1940's, and its buildings are typical modern construction.

Socioeconomic Environment

See **Socioeconomic Environment** section for Cape May Refuge.

This section assesses the physical, biological, and socioeconomic environmental impacts of implementing the Alternatives in Chapter II on the Jersey Coast Refuges and on the Affected Environment described in Chapter III. These first two pages describe general consequences common to all Alternatives, while the following sections discuss consequences as they relate to the specific actions and strategies of the Alternatives described in Chapter II.

Physical Environment

Climate

None of the Alternatives would measurably impact the climatic conditions within the New Jersey coastal weather station zone (Sandy Hook, Long Branch, Atlantic City, and Cape May weather stations). All of the Alternatives would impact the micro-climatic conditions within the Refuge acquisition areas and the immediate surroundings (e.g., vegetated undeveloped lands would moderate local temperatures compared to developed lands).

Air Quality

All of the Alternatives would positively impact the air quality in Ocean, Burlington, Atlantic, and Cape May Counties, because the Brigantine Wilderness Area is a Class I Air Quality area. The Clean Air Act provides for special emissions control regulations in areas surrounding Class I Air Quality areas. Furthermore, all the Alternatives would maintain or improve the air quality in the municipalities in which Refuge property is located, in direct relationship to the extent of the areas protected from development.

Not protecting the air quality of the Brigantine Wilderness Area, would likely threaten or destroy unique floral, faunal and scenic values.

Geology, Topography, and Soils

The Alternatives would not substantially impact these environmental features, except that the Alternatives would protect, in perpetuity, soil formation processes on lands the Refuge acquires. Some disturbances to surface soils and topography will occur at those locations selected for administrative, maintenance and visitor facilities, including visitor center, visitor contact stations, trails, platforms, and other structures.

Hydrology

Each Alternative would protect the natural hydrology of the affected areas. Alternative A would provide the least would protect the least amount of habitat, while Alternatives B and C would protect the most.

protection, while Alternatives B and C would provide the most protection. Each Alternative would prevent substantial upland acreage from being developed through land acquisition and through planning assistance to local governments and other conservation partners. They would maintain groundwater recharge areas, and prevent groundwater withdrawal, factors important for protecting wetlands and long-term water supply for those dependant on wells for their water supply. The upland and wetlands protected through the Alternatives would maintain natural catchments to hold and absorb surface waters, thereby minimizing flooding.

Water Quality

All the Alternatives would substantially impact the water quality in individual streams and possibly in the bodies of water into which these streams flow, for example, Barnegat Bay, Little Egg Harbor, Great Bay, Great Egg Harbor, and Delaware Bay. These positive impacts would result from the protection of ground water recharge areas, runoff prevention, sediment retention and by minimizing non-point source pollution. Positive impacts would also result from maintaining the ecosystem functions of disturbance regulation, water regulation, and waste treatment.

Biological Environment

Threatened and Endangered Species

Each Alternative would protect sites important to these species. Alternative A would provide the least protection, while Alternatives B and C both have the potential to provide the most protection.

Vegetation and Habitat

Each Alternative would prevent the conversion of agricultural and forest/shrub upland and wetlands to developed land. They would provide additional protection to wetlands beyond the protection afforded by existing wetlands regulations. They would also protect landscape characteristics such as habitat connectivity. Alternative A would provide the least protection, while Alternatives B and C both have the potential to provide the most protection, and contribute the greatest to habitat quality and the ecological integrity of the landscape.

Wildlife Resources

Each Alternative would protect habitat types important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates. Alternative A

Archaeological and Historical Environment

All the Alternatives would protect archaeological and historical resources that may occur on land the Refuge acquires. They would not only protect archeological and historical resources from vandalism, but also during the planning and construction of all administrative, maintenance and visitor facilities.

All the Alternatives would allow interpretation of human interaction with the Refuge environment over the last 12,000 years, and provide data on the nature and degree of change that have occurred to that environment.

Socioeconomic Environment

All the Alternatives would reduce the amount of developable land in townships where the Service acquires developable property for the Refuges. This would increase the value of the remaining developable land.

The Alternatives would channel development to less environmentally sensitive areas, which would likely help townships reduce infrastructure costs related to any new development. They would also help assure the sustainable economic viability of the area, and promote the values which attract people to the Jersey Shore in the first place.

Alternatives B and C would increase compatible wildlife-dependent recreational opportunities (hunting, fishing, wildlife observation and photography, environmental education and interpretation) in the area. These Alternatives would also stimulate ecotourism, potentially increasing tourism expenditures.

Under some of the Alternatives certain newly acquired Refuge lands would be closed to all wildlife-dependent recreational uses, i.e., hunting, fishing, wildlife observation and photography, environmental education and interpretation. This does not necessarily mean, however, that this would result in a net loss of opportunities in the area. While some private land owners allow the public to use their lands, others may not allow public access or only allow certain individuals to use their property. Thus, most lands we acquire may never have been open to the public. If we open these lands to public access it may very well represent a net increase in wildlife-dependent recreational opportunities in the area.

All the Alternatives would decrease gross property tax revenues to townships in which the Service acquires developable property for the Refuges. However, the impact on net property tax revenues may be positive. Net property tax revenue equals the increase in gross property

tax revenues from development, less the increase in tax revenues to the municipality for services and infrastructure needed for the development.

All the Alternatives would increase Refuge Revenue Sharing Payments to townships in which the Service acquires lands for the Refuge.

The Refuge System contributes directly and indirectly to human welfare through a number of ecosystem services and functions. **Appendix F** lists 17 ecosystem services and functions to which the System substantially contributes. The global economic value of the ecosystem is estimated at \$33 trillion (Costanza *et al.*, 1997).

Alternative A -The No Action Alternative

Edwin B. Forsythe National Wildlife Refuge

Habitat and Wildlife Populations

Only the Refuge impoundments, representing 4% of the Refuge, would be actively managed. For the remaining 96% of the Refuge, the current habitat mix and configuration would continue.

Many forest blocks would remain fragmented or have convoluted edges. These conditions reduce the value of forests to forest interior migratory bird species and reduce ecosystem functioning. For example, Red-shouldered hawks and barred owls' which breed only in large forest tracts would not benefit, while Red-tailed hawks and great horned owls would benefit. Furthermore, brown-headed cowbirds (*Molothrus ater*), a forest edge species that parasitizes song bird nests, would continue to depress breeding success of forest interior passerine bird species.

Many of the upland habitat types (e.g., forest, grassland) were heavily influenced by fire. Because fire has been suppressed for many years, many plants and animal species would be reduced or absent from these habitats under this Alternative. Fire suppression has also caused the build-up of high stand densities in the upland forests, with the accumulation of heavy fuel loads. This condition, with the regular drought during the summer poses a risk for an extreme wildfire situation, with corresponding potential for loss of property, human safety, and severe impact to upland habitats on the Refuge.

Grassland habitat would succeed to shrub/scrub habitat and shrub/scrub habitat would succeed to sapling habitat. This would benefit wildlife species associated with these habitats, but would not benefit wildlife species dependant on the grassland habitats. Wildlife species associated with large extensive grassland habitat would also not benefit.

Some threatened and endangered species, such as piping plover and swamp pink, would benefit from Refuge management activities. There would be no active management for other threatened and endangered species. New surveys and management for endangered species and rare communities would not be implemented. Rare species and communities would likely be lost due to habitat changes from succession, invasive exotic species, or Refuge impoundment management.

The current biological monitoring program would provide only minimal information on the highest priority species.

The lack of information would mean that the Refuge would not know what impact management actions, or lack thereof, would have on wildlife populations and habitat. The expected impacts would include not knowing when some species decline, when habitat alterations favoring some target species but negatively impacting more critical species (e.g., endangered species) occur, and how we could improve our management techniques. The lack of information would also lessen our ability to operate the Refuge as part of the National Wildlife Refuge System (Refuge System), and work with our partners in southern New Jersey.

The current trapping program would continue under this Alternative. Raccoon and red fox populations would be maintained at levels needed to achieve ground-nesting bird production objectives within the Refuge impoundments. Muskrat populations would be managed to reduce the risks of marsh "eat-outs" and structural damage to impoundment dikes. This would not have an impact on Refuge-wide populations of muskrat. At the Holgate Unit and Little Beach Island, raccoon and fox populations would be maintained at levels needed to achieve sensitive species production objectives, especially piping plovers and colonial nesting birds. These predators have historically adversely impacted piping plover breeding success at the Holgate Unit and Little Beach Island. See discussion of the impacts of driving on the beach under **Wilderness Management** beginning on page IV-6.

Invasive and Overabundant Species

The only invasive plant species the Refuge would manage is phragmites. Only a small part of the phragmites area would be managed. The phragmites areas treated would revert to native plant species. These native plants would produce greater seed and invertebrate biomass. These foods are very important to waterfowl and other migrating and wintering birds.

Hundreds of acres dominated by other invasive plant species would not be treated under this Alternative. Consequently, those acres would not provide viable habitat for many native plant and animal species.

Resident Canada goose and greater snow goose damage in the Brigantine impoundments and surrounding salt marshes would be managed. There would be some level of disturbance to other species during the days and locations of the special resident Canada goose and greater snow goose hunts.

The special hunts would close the Wildlife Drive at the Brigantine Division to other wildlife-dependent recreational uses on the 12 to 15 days that the hunts are held. If current special hunts do not adequately control the damages, other strategies would be adopted in line with the Service's resident Canada goose and snow goose initiatives. (See **Control of resident Canada geese** and **Control of white geese** on page I-17.)

Pesticide Use

About 150 acres of the Refuge per year would be treated with the herbicide Rodeo to control phragmites. An additional 300 acres would continue to be managed for phragmites control by tidal inundation.

State and County mosquito control agencies would treat areas of the Refuge with insecticides under an existing Service and State cooperative agreement. Non-target species may be affected, and control of mosquitoes (larvae or adults) may result in temporary depressions in food availability to other wildlife. Sufficient staff time is not available to administer the program following Service guidelines. Mosquito control activities during 1999 resulted in the application of more than 1,000 pounds of pesticides on Refuge lands. This would continue under the No Action Alternative, subject to the results of the NEPA compliance efforts. (See **Mosquito control** on page I-17.)

Big Game Hunting

The risk of excess deer numbers and damage from over browsing would be managed in and around the portions of the Refuge open to deer hunting. Over browsing would remove the shrub layer in forests and would cause the loss of associated animal species dependant on that habitat component. It would also reduce or eliminate recruitment of forest canopy species, especially Atlantic white cedar and other preferred species. For example, Atlantic white cedar is a species targeted for habitat restoration, and also a species preferred by deer as winter browse. Controlling deer numbers manages the risks of damage to agricultural crops and landscape plants off-Refuge. It also manages the risk of vehicle damage and human injury from collisions between deer and vehicles.

Upland Game Hunting

This Alternative provides no upland game hunting opportunities on the Refuge. While this represents

a potential lost hunting opportunity, the absence of hunters would reduce disturbances to migratory birds and other wildlife thus providing more viewing opportunities. Upland game hunting opportunities are provided off Refuge at State wildlife management areas. Currently, there are five New Jersey State Wildlife Management Areas totaling over 74,000 acres within Ocean and Atlantic Counties that offer upland game hunting seasons.

Migratory Game Bird Hunting

The size and locations of areas for hunting have been designed to balance opportunities for hunting while still maintaining substantial areas as sanctuary for all species of wildlife. The total acreage is within the 40% limit prescribed by the Migratory Bird Conservation Act and the Fish and Wildlife Improvement Act.

The wetland habitats protected and managed at the Refuge provide critical resting and feeding areas to migrating/wintering waterfowl and other waterbird species on the Atlantic Flyway. Hunter presence out on the wetlands causes disturbances to waterfowl and non-game species. Many factors affect the extent of this disturbance, but since the majority of the wetlands would remain an inviolate sanctuary, the overall impact would be minimal.

There would also be the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

Fishing

This Alternative would directly impact a small percentage of the Refuge's freshwater or saltwater shoreline. The physical environmental consequences would include soil compaction, shoreline erosion (with associated water turbidity), and littering. Biological environmental consequences would include reduced plant productivity in near-shore water due to the increased turbidity, and reduced use by certain migratory bird species. This Alternative would also continue to provide free shoreline fishing and crabbing access for local residents and visitors who may not own, or have access to, a boat.

Wildlife Observation and Photography

The Refuge's major public use facility is its eight-mile Wildlife Drive. The Drive is a broad, hard-packed dirt road atop a dike which surrounds and

separates 1,400 acres of managed freshwater and brackish-water wetlands from the tidal saltmarsh. These impoundments are used extensively by birds year-round. Because of the exceptional wildlife viewing opportunities this situation offers, an

1. The configuration of the Drive only allows visitors to drive around the periphery of the impoundments, thus allowing wildlife to have sole use of undisturbed habitat toward the center.
2. Vehicles on the Drive serve as photo blinds, and most visitors remain in their vehicles for much of their visit.

Some disturbance does occur along the impoundment edges when visitors step out of their vehicles to get a better look at wildlife; and thousands of visitors also bicycle, walk, or jog on the drive each year, as weather and biting fly conditions allow.

Because visitors to the Drive come from near and far, they bring millions of dollars into the local communities each year.

While the Wildlife Drive is famous and draws large numbers of visitors, there are currently only a handful of other sites on the Refuge which are developed for wildlife observation. The small number of wildlife viewing sites is a limiting factor, in terms of providing opportunities for visitors to enhance their appreciation and support for wildlife by first-hand viewing experience.

Environmental Education and Interpretation

About 5,000 students per year visit the Refuge's auditorium, Wildlife Drive and interpretive trails. On the Drive, the impact of the students on wildlife and habitat are greatly reduced by the fact that the students generally remain in a vehicle, which acts as a photo blind. Impacts of school classes visiting other Refuge sites (normally closed to the public) have been limited by conditions specified in Refuge special use permits. There are currently no outdoor classroom sites designed to provide a hands-on experience to students.

Environmental education promotes understanding of our connections with the natural world, and good stewardship of our natural resources. As the Refuge continues to expand, and environmental impacts of adjacent burgeoning human development also increase, it becomes clear that current levels of Refuge environmental education are not adequate to

average of 200,000 visits are made to the Drive each year, concentrated mainly in the spring and fall. The impact on wildlife of so many visitors is limited by two major factors:

meet the exploding local need to raise environmental consciousness.

Wilderness Management

This Alternative does not affect the current spring and summer closure of the Holgate Unit and Little Beach Island to all public use during the piping plover breeding season (April through August).

The continued illegal use of motor vehicles (commonly referred to as ORVs or off road vehicles) above the mean high tide line from September through March under this Alternative would adversely impact the physical and biological environment of the Holgate Unit. It is only a question of how severe the impact and how long the resource would take to recover. Ongoing motor vehicle use has resulted in increased litter, threats to wildlife, and loss of solitude and the sense of remoteness that a wilderness area is supposed to provide.

Dunes and dune vegetation are the community types most vulnerable to motor vehicle traffic, followed by salt marshes, dune/marsh interface, sand flats, backshore, foreshore, and intertidal areas (Godfrey, Leatherman, and Buckley, 1978; Leatherman and Godfrey, 1979). The areas traveled by motor vehicles on Holgate would be classed as foreshore, backshore, and intertidal. During a 24-hour period in September, the number of vehicle trips on Holgate is estimated at 50 on a weekday and 180 on a weekend day. In October/November, the number of vehicle trips is lower, 40 on weekday and 150 on a weekend day; and lowest from December through March, 5 on a weekday and 20 on a weekend day. From April through August, the beach is closed to the public and access is restricted to maintenance, wildlife management, and law enforcement patrols.

Motor vehicle use on the beach can cause erosion (Anders and Leatherman, 1987; Baccus and Horton, 1980). This happens through direct seaward movement of sand and indirectly by wind (disruption of salt crust, raised surfaces along track edge). Accelerated seaward movement of beach sand likely negatively affects the development of future dunes (between the berm and backshore areas) and increases the vulnerability of existing dunes to storms.

Motor vehicles also cause compaction in sand (as much as 20cm below the surface). Impacts can incur after just a few vehicle passages (10-50). The area of the beach least impacted appears to be the intertidal zone, which is also the quickest to recover because of its highly dynamic nature. Compaction by vehicles Wrack or drift lines are critical to ecological processes on barrier islands, and can be heavily impacted by less than ten passes of motor vehicles (Zaremba, Godfrey, and Leatherman, 1979; Zaremba, Leatherman, and Godfrey, 1980). Wrack lines are areas on the beach where vegetation and other organic debris are deposited by high tides, especially storm and lunar tides. The wrack line can be in the intertidal zone during normal high tides, or well up on the beach during storm tides (fore and back shore areas). Some of the organic material may be fed on directly by birds, or may attract insects and amphipods, which are fed on by birds. The wrack line also includes live plant fragments that are important to the establishment of dune plant species. Plant growth from the wrack line captures blowing sand particles, contributing to dune formation. Fungi and bacteria quickly breakdown the material, providing nutrients to the beach and adjacent waters. Motor vehicles destroy wrack with just a few passes (less than 10), breaking up the organic debris and killing regenerating plants.

Beach erosion and accretion would also occur from natural events. Frequent storms can cause significant erosion, especially between September and March, when hurricanes and nor'easters prevail.

Motor vehicles may have a significant impact on migrating and staging shorebirds during the fall months (Godfrey, Leatherman, and Buckley, 1978; Pfister, Harrington and Lavine, 1992; Morton 1996). The impacts may directly disturb resting or feeding birds, or indirectly impact birds by reducing their food resources. The water's edge in the intertidal zone and wrack lines are important foraging habitat for shorebirds.

Beach habitats are particularly important during rising tides. Human disturbance affects birds by causing increased energy expenditures (especially flight response), lower energy intake (reduced foraging effort, foraging in poorer sites), or direct displacement. In terms of behavioral disturbance to birds, vehicles have been documented to have less of an impact on bird behavior (e.g., causing flight) than walking people, or people with pets. However, if

on the seaward side of the foredune would kill subsurface roots of dune beach grass, resulting in the loss of stabilizing vegetation and erosion of sand rather than accretion (Anders and Leatherman, 1987; Behrens *et al.*, 1976).

people are getting out of vehicles, they may still cause that disruption.

This Alternative has no foreseeable archaeological or historical resource consequences at the Holgate Unit, because there are no known archaeological or historical resources in the area. This Alternative has no archaeological or historical consequences at the Little Beach Island, because the area is closed to all public uses. There is a historic foundation of a former Coast Guard Station on Little Beach Island.

This Alternative has socioeconomic resource consequences. At Holgate we would allow the continued use of motorized vehicles in the Wilderness Area, which is a violation of the Wilderness Act of 1964 and Executive Order 11644. The Wilderness Act does not allow the Secretary of the Interior to permit the continued use of any motorized vehicles, even where the use existed before a Wilderness was established, except for the continued use of aircraft and motorboats.

The use of motorized vehicles elevates the number of anglers and other wildlife dependent visitors who use the area. The use of motorized vehicles does not provide a "...community of life ... untrammelled by man ..." and "... outstanding opportunities for solitude or primitive ... recreation;" which are characteristics of wilderness defined in Section 2(c) of the Wilderness Act of 1964.

In 1988, the Holgate Peninsula was closed from early April to September to both pedestrian and motor vehicle traffic to protect piping plovers. Under this Alternative the seasonal closure would continue, with no additional anticipated social or economic impacts. The seasonal closure did impact surf fishermen along Holgate beach, as most of Long Beach Island's beaches were already closed to motor vehicle traffic between May and September to accommodate seasonal beach use for swimming and sunbathing. Furthermore, the seasonal closure prevented recreational fishing opportunities at Holgate for species like summer flounder, which are primarily targeted in the months of July and August, and thus the closure reduced fishing opportunities for some anglers.

Bait and tackle shops throughout the island appear to have suffered some loss in revenues from the seasonal closure, and one shop nearest to the Refuge entrance reported losing 30 % or more of its revenues in the first few years after the closure. In addition, several other motels and restaurants which specifically catered to anglers also reported a loss in revenues. However, the 1998 Industrial Economics report concluded that all these businesses survived the seasonal closure and This Alternative would result in the Service acquiring the remaining 12,300 acres of land within the currently approved Refuge acquisition boundaries, if the lands are not developed prior to acquisition. At the current rate of Service land acquisition and the current rates of residential/commercial development, the Service is unlikely to be able to acquire all the remaining land within the currently approved Refuge acquisition boundaries, before they are developed.

If the Service purchases all the lands within the currently approved boundaries, large contiguous blocks of salt marsh and some upland/wetland margins would be protected. However, extensive parts of watersheds (uplands, upland/wetland margins, stream corridors and headwaters) would remain unprotected. Since the salt marshes are downstream from these other areas, development of those areas would cause biological isolation from other conservation lands, and cause degraded air and water quality that would directly impact Refuge lands and the air and water quality of surrounding areas.

Even with the limitations discussed above, this Alternative would have substantial, and mostly positive, long-term physical, biological, and socioeconomic environmental consequences for Jersey coastal communities from Brick Township, Ocean Co. to Galloway Township, Atlantic Co.

This Alternative would also protect archaeological and historical resources from demolition once the Service acquires the properties in which they are located.

Refuge Revenue Sharing payments to municipalities within which the Service acquires property would increase as the remaining lands within the currently approved Refuge acquisition boundaries are acquired. The current full payment value of Refuge Revenue Sharing for the Refuge is \$336,000. With the acquisition of the additional 12,300 acres of land within the currently approved Refuge acquisition boundaries the full payment value of Refuge Revenue Sharing would increase by \$147,000.

remained viable. See **Appendix G** for a more detailed socioeconomic analysis of motor vehicle use at Holgate.

Land Protection

As of September 30, 1999, the Service owned, or had conservation easements on, 44,302 acres within the currently approved Refuge acquisition boundaries.

Resource Protection and Visitor Safety

Under this Alternative, damage to Refuge property and vandalism to archaeological and historical resources would continue. Other illegal activities would continue, including habitat damage from illegal timber harvest, all terrain vehicle (ATV) trespass, and illegal harvest of wildlife species. All of these activities currently occur within the Refuge and have the potential of increasing as more lands are acquired and adjacent development continues. There would be no change in the current law enforcement staffing level.

Refuge Buildings and Facilities

The current Brigantine Division office, visitor center, and storage and maintenance area directly impacts about eight to ten acres. The current Barnegat Division field office, storage and maintenance area directly impacts about one acre. The impacts are related to building-created impervious areas, graveled entrance roads, parking lots and maintenance areas, and lawn areas. These features reduce the habitat quality for most Federal trust resources, but increase the habitat quality for some grassland-associated Federal trust resources, for example, blue birds and purple martins.

Alternative A - The No Action Alternative

Cape May National Wildlife Refuge

Habitat and Wildlife Populations

This Alternative would result in a continuation of the current habitat and wildlife management programs on the Refuge. Consequently 93% of the Refuge habitats would not be actively managed. Approximately 7% (646 acres) of Refuge upland habitat is targeted for conversion to grassland, upland brush and forest by natural succession. These habitat types, in their current state, do not reflect an ideal arrangement for biodiversity in the landscape. Many of the forest blocks are fragmented or have convoluted edges, resulting in reduced forest interior character. Consequently, forest interior species and ecosystem functions are lost. For example, nesting Red-shouldered hawks and barred owls depend on extensive forest character and, in an environment fragmented by humans, may be displaced by great horned owls or red-tailed hawks. Similarly, brown-headed cowbirds (*Molothrus ater*), a forest edge species that parasitizes songbird nests, can greatly diminish nest success of forest interior species in fragmented forests.

Many of the upland habitat types (e.g., forest, grassland) were heavily influenced by fire. Because fire has been suppressed for many years, many plants and animal species would be reduced or absent from these habitats under this Alternative. Fire suppression has also caused the build-up of high stand densities in the upland forests, with the accumulation of heavy fuel loads. This condition, with the regular drought during the summer poses a risk for an extreme wildfire situation, with corresponding potential for loss of property, human safety, and severe impact to upland habitats on the Refuge.

Grassland habitat would succeed to shrub/scrub habitat and shrub/scrub habitat would succeed to sapling habitat. This would benefit wildlife species associated with these habitats, but would not benefit wildlife species dependant on the grassland habitats. Wildlife species associated with large extensive grassland habitat would also not benefit.

New surveys and management for endangered species and rare communities cannot be fully realized under this Alternative. It is probable that rare species and communities would be lost due to habitat changes from succession, invasive exotic species, or habitat alteration without the staff's knowing the consequences.

The current biological monitoring program provides only minimal information on the highest priority species. There is not sufficient staff time and dollars to complete baseline surveys, vegetation maps, and research programs addressing critical management issues. The lack of information means the Refuge does not know what impact management actions, or lack thereof, would have on wildlife populations and habitat. The expected impacts would include not knowing when some species decline, when habitat alterations favoring some target species but negatively impacting more critical species (e.g., endangered species) occur, and how we could improve our management techniques. The lack of information may also lessen our ability to operate the Refuge as part of the Refuge System, and work with our partners in southern New Jersey.

The Refuge would remain closed to trapping under this Alternative. Without control of predator species, increased impacts to migratory bird populations can be expected, along with elevated risks to public health and safety from rabies, distemper and other animal transmitted diseases. Any economic benefits from the use of furs and other furbearer products would be denied. This action, or lack thereof, would prevent the potential for both conflicts between user groups and disturbance to wildlife.

Invasive and Overabundant Species

Not controlling invasive species on several hundred acres where they are known to occur has a clear biological consequence. Those acres would not be able to provide habitat for native plant species and dependant wildlife, without action being taken.

Without control, more native habitat would be lost to invasive species, which lowers habitat quality and threatens biological integrity of ecosystems.

Pesticide Use

This Alternative would result in virtually no use of pesticides by Refuge staff.

The Refuge would continue to allow mosquito control agencies to use pesticides to control mosquitoes under a Statewide cooperative agreement. The use of larvicides and adulticides would result in pesticide entering the ecosystem from Refuge lands. Non-target species may be affected, and control of mosquitoes (larvae or adults) may result in temporary depressions in food availability to other wildlife. Because of previous Open Marsh Water Management (OMWM), no pesticides were used from 1997 through 1999 for mosquito control. New lands may require additional treatment with OMWM or pesticides, subject to the results of the Service's NEPA compliance efforts. (See **Mosquito control** on page I-17.)

Big Game Hunting

Development continues around Cape May Refuge, increasing deer dependence on Refuge habitats. Increased development also limits hunting opportunities, thereby reducing a practical means of regulating deer populations. The Refuge deer hunt may become more important in the future for maintaining local deer numbers at levels compatible with the habitat. As coastal development and associated habitat fragmentation increase, Refuge land would become more important for food and cover for a number of wildlife species.

The risk of excess deer numbers and damage from over browsing would be managed in and around the portions of the Refuge open to deer hunting. Over browsing would remove the shrub layer in forests and would cause the loss of associated animal species dependant on that habitat component. Over browsing would also reduce or eliminate recruitment of forest canopy species, especially Atlantic white cedar and other preferred species. For example, Atlantic white cedar is a species targeted for habitat restoration, and also a species preferred by deer as winter browse. Controlling deer numbers manages the risks of damage to agricultural crops and landscape plants off-Refuge. It also manages the risk of vehicle damage and human injury from collisions between deer and vehicles.

Upland Game Hunting

Under this Alternative the Refuge would remain closed to upland game hunting. This would provide no new opportunities for the public. This action would also prevent the potential for both conflicts between user groups and disturbance to wildlife. There would be no benefit to the local economy.

Migratory Game Bird Hunting

With no change in the current migratory bird hunting program, this Alternative would continue to provide opportunities for hunters on a large area of the Refuge, a means for harvest of a renewable resource, and local economic benefits. Hunter presence causes disturbances to waterfowl and non-game species. Many factors affect the extent of this disturbance, but since only a portion of the Refuge is open for the hunting of migratory game birds, sanctuary areas are provided for waterfowl and other wildlife.

There would also be the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

Fishing

Under this Alternative the Refuge would remain closed to fishing. No new opportunities would be provided for the public. This would prevent the potential for disturbance to wildlife. There would also be no benefit to the local economy.

Wildlife Observation and Photography

Few facilities for wildlife observation and photography have been developed on the Refuge, limiting visitor opportunities for enhancing their appreciation and support for wildlife. Under this Alternative no new trails would be completed nor would existing trails or woodland roads be improved. By not initiating extensive improvements to facilitate these activities, there would be fewer disturbances to the flora and fauna through construction, maintenance, and the associated impacts of public use. This Alternative would provide minimal benefit to the local economy.

Environmental Education and Interpretation

Under this Alternative, no new opportunities would be created. Visitor use for these activities would remain limited by difficult access. By not initiating extensive improvements to facilitate these activities, there would be fewer disturbances to the flora and fauna through construction, maintenance, and the associated impacts of public use. This Alternative provides minimal benefit to the local economy.

Wilderness Management

There is no designated Wilderness at Cape May Refuge. A Wilderness Review of all Refuge lands,

including the Two Mile Beach Unit, would be conducted as part of the revision of the Refuge Comprehensive Conservation Plan (CCP) in 2015.

Land Protection

This Alternative would result in the Service acquiring the remaining 7,600 acres of land within the currently approved boundaries, if the lands are not developed prior to acquisition. At the current rate of Service land acquisition and the current rates of residential/commercial development, the Service is unlikely to be able to acquire all the remaining land within the currently approved Refuge acquisition boundaries, before they are developed.

If the Service purchases only lands within the currently approved boundaries, substantial parts of various watersheds would remain unprotected. Since the Refuge-owned property would be downstream from these other areas, development of those areas would have negative effects that would directly impact Refuge lands and the air and water quality of surrounding jurisdictions. Continued development would also isolate wildlife populations and habitats protected by the Refuge from other conservation lands.

Even with the limitations discussed above this Alternative would have substantial positive long-term physical, biological, and socioeconomic benefits for Cape May County communities.

Refuge Revenue Sharing payments to municipalities within which the Service acquires property would increase as the remaining lands within the currently approved Refuge acquisition boundaries are acquired. The current full payment value of Refuge Revenue Sharing for the Refuge is \$129,000. With the acquisition of the additional 7,600 acres of land within the currently approved Refuge acquisition boundaries the full payment value of Refuge Revenue Sharing would increase by \$34,200.

Resource Protection and Visitor Safety

This Alternative would cause no change in the current law enforcement staffing level. Complaints and information on illegal activities obtained from the public often receive little or no action because of limited law enforcement staff. Damage to Refuge property and vandalism to archaeological and historical resources would continue. Additionally, other illegal activities would continue including habitat damage from illegal timber harvest, ATV

As of October 22, 1999, the Service owned 10,001 acres within the currently approved Refuge acquisition boundaries.

trespass, dumping, and the illegal harvest of wildlife species. All of these activities are currently ongoing within Refuge boundaries and have the potential of increasing as more lands are acquired and development continues.

Urban development lies in close proximity to much of the Refuge. This is especially true adjacent to the newly acquired Two Mile Beach Unit in Lower Township. High rise condominiums lie immediately adjacent to the north boundary, and increase the potential for additional law enforcement violations, including trespassing and property damage.

Refuge Buildings and Facilities

The current Cape May Refuge office, visitor contact and storage area directly impacts about one acre. The impacts are related to building-created impervious area, graveled entrance roads, parking lots, and lawn areas. These features reduce the habitat quality for most Federal trust resources, but increase the habitat quality for some grassland associated Federal trust resources, for example, blue birds.

Alternative A - The No Action Alternative

Two Mile Beach Unit

Habitat and Wildlife Populations

The current types and distribution of habitat would not be managed, but would be subject to natural processes. While some of the wildlife may benefit from this approach, other species or plant communities may not realize the benefits of habitat enhancements. Further study would not be initiated to determine the ideal management program. New surveys and management for endangered species and rare communities cannot be fully realized under this Alternative. It is probable that rare species and communities would be lost due to habitat changes from succession, invasive exotic species, or habitat alteration, without the staff knowing the consequences.

The lack of baseline data and monitoring activities means the Refuge would not know what impact management actions, or lack thereof, would have on wildlife populations and habitat. The expected impacts would include not knowing when some species decline and when habitat alteration favoring some species negatively impacts more important species (e.g., endangered species). The lack of information may also lessen the Refuge's ability to function as part of the Refuge System, and work with our partners in southern New Jersey. There would also be negative impacts on some wildlife species, especially rare and endangered species, due to the lack of any program for managing undesirable or overabundant wildlife.

There would also be no trapping under this Alternative. A continuation of high predator populations would likely have negative impacts on

beach nesting birds, possibly precluding the piping plover from nesting again on former breeding areas at Two Mile Beach.

Invasive Species

Under this Alternative, no new programs would be initiated for the monitoring and/or control of invasive species. In this case, the establishment and increase of invasive species may negatively impact native wildlife and plant communities. Invasive species already known to occur include phragmites and other exotic grasses. Management of these species would not be initiated.

Pesticide Use

No pesticides are currently used. Under this Alternative, an integrated pest management plan (IPM) would not be initiated. The net result would be that alternatives to pesticides would receive less consideration, should the need arise.

Beach Access

This Alternative would keep the beach closed to all public use. This would be a significant change from the past, as the Coast Guard had allowed the public to walk on the beach. While a variety of wildlife would benefit from a relatively undisturbed environment, the public would lose an opportunity for wildlife observation, photography, fishing, education, and interpretation. A consequence would be the disruption of some previous public uses and expectations. There would likely be reduced local public interest and support for the Refuge. This Alternative would also likely reduce economic benefits to the local area as visitors may look elsewhere for these opportunities.

Hunting

Hunting is not under consideration per agreement with the Coast Guard. The Coast Guard has

prohibited hunting as part of the management agreement with the Service in order to protect their LORAN Station tower and transmission equipment.

This action is undertaken in the interest of national security. While a variety of wildlife would benefit from a relatively undisturbed environment, there would be no hunting opportunities and no associated benefits to the local economy.

Fishing

Fishing would not be permitted under this Alternative resulting in the loss of opportunity to surf fish or beach seine. Shorebird populations would experience less disturbances and their resting and feeding would be uninhibited.

Environmental Education and Interpretation

Under this Alternative there would be no environmental education and interpretation programs. While a variety of wildlife would benefit from a relatively undisturbed environment, the public would lose opportunities for these activities. The Refuge would not realize its full educational and public service potential, and there would be no economic benefits to the local area as visitors may look elsewhere for these opportunities.

Refuge Buildings and Facilities

Under this Alternative the Refuge would put no funding or effort into maintaining and/or utilizing any of the buildings. All of the buildings would be allowed to deteriorate, and would eventually require demolition. There would be maximum revegetation of all disturbed/developed areas and the maximum increase of the quantity, but not the quality, of wildlife habitat. Under this Alternative, the Refuge and local community would realize no beneficial use of the existing buildings for either management or environmental education purposes, and there would be no local economic gain.

Wildlife Observation and Photography

Under this Alternative there would be no opportunity for wildlife observation and photography. While a variety of wildlife would benefit from a relatively undisturbed environment, the public would lose opportunities for these activities. A consequence would be the disruption of some previous public uses on the beach. There would likely be reduced local public support for the Refuge. This action would not benefit the local economy and would likely reduce economic benefits to the area, as residents and visiting tourists may look elsewhere for these opportunities.

Alternative B – The Service’s Proposed Action

Edwin B. Forsythe National Wildlife Refuge

Habitat and Wildlife Populations

The habitat restoration and maintenance program on Refuge lands would be completed under a 15-year time frame, and result in a fundamental improvement in ecosystem quality. More acres of phragmites and other exotics, such as Japanese honeysuckle, (*Lonicera japonica*), would be controlled (see also *Invasive and Overabundant Species*). Grasslands, which include a high proportion of introduced species, would be converted to native species of grasses and forbs. The size and location of these grasslands would favor use by declining bird species in nesting, migration, and wintering periods.

Wetland communities, especially salt marshes, cedar swamps and bogs, would be restored. Removal of man-made restrictions to fish passage would restore interjurisdictional fish habitat to upstream areas (e.g., Cedar Run Creek). If successful, restoration of previously ditched salt marshes would enhance habitat quality for many species of waterfowl and marsh birds. The impoundments would be actively managed with close monitoring of water levels, plant and invertebrate production, and wildlife use to develop the best management prescription to meet wildlife objectives.

Implementing controlled burns in upland habitats for fuel load reduction would have the dual benefits of reducing risks from wildfires and establishing conditions that favor native species. The upland forests historically and prehistorically encountered fires at much higher frequencies (estimates range from once every three years to once every 15 years). Should wildfire occur after reducing fuel loads and stand density through prescribed burns and mechanical treatments, the fire would be much easier to contain, and less likely to escalate to an extreme fire situation. Restoring natural fire frequency through prescribed burns would favor native species, help control invasive species, and provide a habitat structure that is now rare in the mid-Atlantic coastal plain (oak-pine savannah).

Prescribed burns would be conducted in a way that minimizes adverse impacts to the physical, biological, and human environments. Burn prescriptions would be Expanded baseline surveys and long-term monitoring programs would improve the quality and evaluation of management actions, and provide information for partners and education of the public. Researching long-term impacts on wildlife resources from mosquito control

developed to allow personnel to keep the fire contained within the defined boundaries, smoke to dissipate at appropriate altitudes, and safe and healthy conditions for personnel and the public, while meeting the objectives of fuel load reduction and physical alterations to the habitat.

Prescriptions may require clearing or cutting of overstory and understory trees/shrubs and plowing a fire line. Plowed lines would be filled after completion of the burn. Nearby publics would be notified of scheduled burns. While there are short-term impacts to air quality and the physical and biological components of the environment, prescribed burns would be necessary to meet Refuge goals and to reduce the risks of wildlife in an urban/wildland environment. Further detail on wildfire suppression and prescribed burns will be developed in the Fire Management Plan.

The habitat distribution envisioned in the habitat management plan would result in the maximum benefit to forest interior, grassland, shrub/scrub, and wetland species.

Indirect benefits of an increase in wildlife species number and diversity may include increased public visitation (hunters, birders, and photographers) and the subsequent additional positive socioeconomic outcome. Also, an increase in academia interest and visitation to view restoration projects would occur. The Refuge would serve as a demonstration and research site for academia and land management agencies.

The inventory of rare species and communities would result in a map of existing and potential sites for restoration. The Refuge would also draft a strategy to protect and manage those sites, and begin its implementation. Additional populations of State and Federally listed bog species (e.g., swamp pink, bog asphodel, pine barrens tree frog) would be identified, protected, and if appropriate, enhanced. Experimental restoration of other rare species may result in new populations, which may include the seabeach amaranth and Northeastern beach tiger beetle.

Colonial nesting birds would benefit from restoration of dredge spoil sites to suitable nesting habitat. If required, additional efforts would be employed to initiate site use by birds (e.g., black skimmers or terns). Nest structures provided for raptor species would result in expanded recruitment to populations of peregrine falcons, osprey, and barn owls.

(both pesticide use and Open Marsh Water Management) and the myriad types and amounts of public use would ensure that decisions in these controversial areas are based upon the best data. Research would also be tied to periodic monitoring of public use (type, amount, and

distribution) and coincident impact on wildlife and habitat. Development of a computer archive of research results, publications, and monitoring data would minimize loss of data, and ensure cost-efficient access to information by staff, partners, and the public.

The Refuge would provide assistance on habitat planning and restoration to nearby landowners, to improve environmental quality locally, and slow degradation of the landscape.

This Alternative would increase opportunities for the public to trap selected furbearer species (muskrat, mink, opossum, raccoon, fox, beaver, and coyote) in order to manage these species consistent with Refuge objectives. Approximately 1,309 acres of new habitat would be opened to trapping by Refuge special use permit, when acquired. While this may have the potential to increase disturbance of other wildlife species because trappers would be operating in more areas of the Refuge, the small number of trappers involved would tend to make their impact negligible. The abundance of these species would be seasonally and locally reduced consistent with Refuge management objectives. It is unlikely that there would be any negative impact to their overall populations.

Invasive and Overabundant Species

Flora surveys focusing on invasive species would identify their biological impacts on native plants and wildlife, and help prioritize where to focus control efforts. Implementation of the control strategy across the Refuge would result in restoration of hundreds of acres back to native plant and animal species that comprise the ecological communities and biodiversity in the landscape. Many other invertebrate and vertebrate wildlife species would respond positively to the increased habitat available. The techniques used for invasive species control would follow an Integrated Pest Management (IPM) approach, resulting in minimal use of pesticides and more effective control with the least amount of impact on native plant and animal species. Control efforts for invasive species on the Refuge would be coordinated with nearby landowners, to whom we would also provide technical assistance to prevent recolonization from sites off of the Refuge, improve habitat on private lands, and minimize use of pesticides.

There would be no change in consequences due to control of snow and resident Canada geese because the actions would be the same as those described in Alternative A.

Pesticide Use

The Refuge would periodically use pesticides to control other invasive or overabundant species, in addition to current applications for phragmites. The Refuge's use of an IPM approach specifies use of techniques other than pesticides whenever possible, and when pesticides are used, the least amount and most specific type would be employed. Some quantity of pesticide would be introduced into the ecosystem, with an expectation of some impact on non-target species. Any Service activities dealing with mosquito control would be subject to the results of ongoing NEPA compliance efforts. (See **Mosquito control** on I-17.)

Big Game Hunting

Rapid development continues around the Refuge, increasing the local deer population's dependence on Refuge habitats. Increased development also reduces hunting opportunities, thereby reducing a practical means of regulating deer populations. The Refuge deer hunting becomes more important in the future in controlling deer numbers at levels consistent with the available habitat. As coastal development and its associated habitat fragmentation increase, Refuge land would become increasingly important for food and cover for a number of wildlife species.

Opening new areas to deer hunting would help keep deer within the carrying capacity of their habitat. Deer would be managed to minimize the potential for serious habitat alteration or degradation and density dependent disturbance. The risk of excess deer numbers and damage from over browsing would be managed in and around the portions of the Refuge open to deer hunting. Over browsing would remove the shrub layer in forests and would cause the loss of associated animal species dependant on that habitat component. It would also reduce or eliminate recruitment of forest canopy species, especially Atlantic white cedar and other preferred species. For example, Atlantic white cedar is a species targeted for habitat restoration, and also a species preferred by deer as winter browse. Controlling deer numbers manages the risks of damage to agricultural crops and landscape plants off-Refuge. It also manages the risk of vehicle damage and human injury from collisions between deer and vehicles.

Opening additional areas to deer hunting would increase recreational opportunities, and flexibility in managing deer populations. Increasing Refuge big game hunting opportunities would likely result in an increase in the number of hunting licences, supplies and equipment in the local area.

Among the items to be considered before opening additional areas to big game hunting is the negative impacts to other non-target species of wildlife and their habitats. In general, human activity causes disturbance to wildlife and wildlife habitat at varying degrees depending on the type of human activity, intensity of activity, timing of the activity, number of activities occurring simultaneously, and sensitivity of wildlife species. However, the short-term negative impacts of allowing additional deer hunting opportunities, including physiological and behavioral changes to various wildlife species, would be offset by the long-term benefits of reducing habitat destruction caused from over browsing by deer.

For the first time, hunting sites for persons with disabilities would be available on the Refuge. We would expand our hunting opportunities to specifically address hunters with disabilities by offering an area that would best accommodate and address their needs. We would work cooperatively with various government and non-governmental organizations to define the requirements and accommodations needed for hunters with disabilities.

Upland Game Hunting

This Alternative would provide new opportunities for one of the priority general public uses specified in the National Wildlife Refuge System Improvement Act of 1997. Providing Refuge upland game hunting opportunities would likely result in a small increase in the sale of hunting licences, supplies and equipment in the area.

This Alternative may increase disturbance to other wildlife species caused by an increase in the number of visitors and the time they are allowed within the Refuge. However, these negative impacts are expected to be minimal because there would be only a small increase in the time and areas available for upland game hunting.

The abundance of upland game species would be seasonally and locally reduced, however, there would be no negative impact to their overall populations.

Migratory Game Bird Hunting

This Alternative provides additional areas and techniques for migratory game bird hunting on the Refuge. The size and locations of areas for hunting have been designed to balance opportunities for hunting while still maintaining This Alternative would slightly increase the percentage of the Refuge's freshwater and saltwater shore line directly impacted by anglers. The physical environmental consequences would include soil compaction, shoreline erosion, with associated water turbidity, and littering. Biological environmental consequences would include

substantial areas as sanctuary for all species of wildlife. The total acreage is within the 40% limit prescribed by the Migratory Bird Conservation Act and the Fish and Wildlife Improvement Act.

The additional areas proposed for hunting may be beneficial in reducing the impact of feeding resident Canada geese and snow geese on the salt marshes and impoundments.

A negative consequence of increased hunting opportunities is the indirect (non-hunting) impact to wildlife species and their habitats caused by the increased number of hunters accessing the Refuge. The wetland habitats protected and managed at the Refuge provide critical resting and feeding areas to migrating/wintering waterfowl and other waterbird species on the Atlantic Flyway. A recent literature review conducted by Stillwater National Wildlife Refuge personnel (USFWS, 1998) has shown that disturbance caused by hunting can:

- modify the distribution and use of various habitats by birds;
- affect their activity budget and reduce their foraging time and consequently their ability to store fat reserves necessary both for migration and breeding;
- disrupt pair and family bonds and contribute to increased hunting mortality.

Also, though this Alternative increases areas and redefines techniques for migratory bird hunting, a large percentage of the Refuge would remain closed and provide needed sanctuary for migrating waterfowl.

There is also the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

As with big and upland game hunting, increased hunting opportunities would increase the number of licenses and duck stamps sold, as well as increase the amount of locally purchased hunting supplies.

Fishing

reduced plant productivity in near shore water, due to the increased turbidity, and reduced use by certain migratory bird species. This Alternative would have no archaeological and historical resource consequences, because we know of no archaeological and historical resources in the new fishing areas. We would conduct

site specific archaeological and historical resource surveys before undertaking any construction.

This Alternative would help the local economy by increasing the number of licenses and fishing supplies purchased locally.

Wildlife Observation and Photography

While increased disturbance to wildlife and habitat would be associated with expanded wildlife observation sites and numbers of visitors, precautions to minimize such impacts would be taken. Gabrielson and Smith (1995) note that wildlife is less likely to have a defensive response to humans in their habitat if the humans are in a predictable location (i.e., on a trail). To minimize disturbance to wildlife, they recommend the development of permanent trails for such activities as wildlife observation. All proposed new Refuge wildlife observation areas would have trails, and/or an observation platform – permanent locations at which wildlife can anticipate human visitors. In addition, these visitor facilities would be located and designed to minimize disturbance to wildlife. Designs to minimize impacts might include designation of special viewing areas (Boyle and Samson 1985), creation of observation/photo blinds (Klein 1993) or other, more natural visual and noise screens (i.e., vegetation), or creation of buffer zones (Rodgers and Smith 1997). The Refuge would also provide visitors with information on how to reduce their impacts.

Monitoring would determine wildlife observer impacts. Site surveys of wildlife species and habitat would be conducted before and after development and opening of new public use areas (i.e., nature trails). In addition, Refuge wildlife observation facilities which are already in use would be brought into the impacts assessment process. (See also **Habitat and Wildlife Populations** on page IV-14.) Initial species and habitat surveys would be conducted at the Wildlife Drive and associated trails, Reedy Creek, Holgate, and the Barnegat impoundment observation platform. Periodic monitoring would continue on all Refuge wildlife observation sites over time, to determine long-term impacts of public use. If impacts were determined to be too high in some areas or seasons, actions would be taken to reduce those impacts. Such actions might include limiting uses or visitor numbers.

Potential conflicts between wildlife observers, wildlife photographers and other Refuge user groups would continue to be minimized by partitioning activities in different locations or time periods.

- the development of “Outdoor classrooms” at which students can learn to appreciate the natural world

An increase in wildlife observation opportunities on Refuge would result in enhanced visitor appreciation support, which can indirectly benefit wildlife both on and off Refuge.

Creation of new wildlife observation and photography sites on the Refuge would draw members of local communities, as well as visitors from elsewhere. An increase in Refuge visitation can benefit local communities by bringing in ecotourism dollars. As in Alternative A, a study conducted by the New Jersey Audubon Society at Forsythe National Wildlife Refuge in 1993-94 indicated that “birding” visitors to our Wildlife Drive brought \$4.01 million to local communities the year alone! That study indicated that the average local visitor brought \$25 - \$41 to the local economy. While we do not anticipate that other, newly designated wildlife observation sites on the Refuge would become as renowned or visited as the Wildlife Drive, we anticipate that they would attract new visitors and the concomitant ecotourism dollars associated with them. The Service’s publication “Banking on Nature,” estimates that, on average, “nonconsumptive” recreational visitors to National Wildlife Refuges in the northeast spend \$20 per person per day in neighboring communities.

Environmental Education and Interpretation

Environmental education and interpretation are critical tools for the protection of our nation’s wildlife and habitat resources. By placing new emphasis on these tools at the Refuge, we anticipate that the number of students reached through on-Refuge visits would increase from 5,000 to 10,000 annually. These students would also receive a richer environmental education experience because of the expanded curricula and additional contact with Refuge staff. Their on-Refuge impacts would be tempered by several factors. Sensitive areas would be closed, or designated for limited access only. Increased access would not be allowed in areas of high bird concentrations, such as colonial nesting and roosting sites.

New Refuge initiatives would include:

- development of new children’s wildlife learning materials;
- partnerships with the local education community;
- offering of Refuge teacher training opportunities.

through hands-on experience (at sites which would be monitored for impacts).

Since people of every age are involved in and affected by the ever-increasing environmental issues of today, the Refuge's environmental education and interpretation efforts for adults would also be increased. Providing information about such issues as how people can help wildlife in their communities, or how to minimize wildlife-watching impacts, can create meaningful support for wildlife both on and off the Refuge.

Wilderness Management

This Alternative does not affect the current spring and summer closure of the Holgate Unit and Little Beach Island. These areas are seasonally closed (April through August) to all public use to protect piping plover breeding areas.

This Alternative would eliminate all motorized traffic year-round above mean high tide (the designated Wilderness Area known as the Holgate Unit) on the beach of the Holgate Peninsula. Relegating motor vehicles (commonly referred to as ORVs or off road vehicles) to use by the public below mean high tide would sharply reduce the impact they have on the physical and biological environment of the Holgate Unit.

The Borough of Barnegat Light, located on Long Beach Island, has prohibited all motorized access on Borough beaches for over 20 years. The ordinance only applies to Borough property, which extends to the mean high water line. However, there have been no enforcement problems due to the public accessing the State-owned intertidal zone. According to information obtained from the Borough's administrative office, motorized access on the State-owned intertidal zone has never been requested and has never occurred. This ordinance was established to protect the Borough's natural beaches. Additionally, the Borough of Barnegat Light does not rake the wrack lines that form on the beach. Of the four Boroughs of Long Beach Island, including Long Beach Township, only Barnegat Light allows the wrack line to remain. At the Holgate Unit, this Alternative would eliminate the violation of the Wilderness Act of 1964 and Executive Order 11644, which prohibit the use of motorized vehicles in Wilderness Areas. Restricting the use of motorized vehicles to the State-owned riparian land (below mean high tide) would reduce the amount of time such vehicles could be on the Holgate Peninsula, especially around the new moon and full moon. This restriction would tend to reduce the number of anglers and other wildlife dependent visitors who use the area. Establishing a boat taxi concession to ferry surf anglers and visitors from the bayside of Long Beach Island to the tip of the Holgate Peninsula would compensate for some of this reduction. Surf angling via foot or boat access would allow for a nature-oriented experience in a more remote setting. The prohibition of motorized vehicle use in the Wilderness

undisturbed. Scientific studies have shown that wrack lines are critical to the ecological processes on barrier islands.

The Borough operates a tractor trolley during the summer months (May-August) to ferry people to the northern tip of Long Beach Island and back. The trolley operates daily during the hours of 10:00 A.M. - 5:00 P.M. Occasionally, the Borough has extended the operation into October and November to accommodate surf-fishing enthusiasts.

Dune formation at the Holgate Unit would be more rapid without motor vehicle traffic above mean high tide, and, with better vegetation growth, would be more resistant to storm damage. Without vehicles on the beach, Holgate would also become viable for restoration of the Federally threatened seabeach amaranth (USFWS 1996), which could occur in the backshore zone.

The intertidal zone (between low and high tide) is the part of the beach environment most resistant to the physical disturbance caused by motor vehicles, and because of its dynamic nature, quickly recovers. However, there would still be biological consequences of motor vehicle use below mean high tide in the State-owned riparian lands. First, several species of migrating/wintering shorebirds forage in the intertidal zone. While each motor vehicle traveling down Holgate would disturb birds using the intertidal area, a variety of studies indicate vehicle passage disturbs birds the least. The Federally threatened Northeastern beach tiger beetle historically occurred at Holgate. The larval stage of the beetle is found in the intertidal zone, and is vulnerable to motor vehicles. Holgate is identified in the Recovery Plan (USFWS, September 1994) as a restoration site, but remains unviable for that purpose while vehicle use occurs on the beach and intertidal zone. If there is an overall reduction of vehicle use in the intertidal zone with this Alternative, this site may become viable for restoration of the beetle.

would increase the probability of providing a "...community of life ... untrammelled by man..." and "...outstanding opportunities for solitude or primitive ... recreation;" which are wilderness characteristics defined by Section 2(c) of the Wilderness Act of 1964.

At Little Beach Island, this Alternative would allow surf fishing and other wildlife-dependent recreation during the fall and winter through Refuge special use permits. This new access opportunity would partially compensate for the reduced motorized vehicle access for surf anglers and other wildlife dependent visitors on the Holgate Peninsula.

The proposed year-round closure of the Holgate Unit above mean high tide to public use of motor vehicles,

under the directives and principles of the Wilderness Act, can be expected to cause localized negative economic impacts to the Long Beach community. It is assumed that most people would not want to purchase a beach access permit and risk driving their vehicles below mean high tide in order to fish for a very limited period of time. Although the closure is not expected to negatively impact the overall Long Beach Island economy, individual businesses such as bait and tackle shops located near the southern end of Long Beach Island, would most likely suffer some economic losses under a year-round motor vehicle closure of the Holgate Unit.

The full extent of the economic impact on bait and tackle shops from the proposed year-round closure would really depend on: how many motorized anglers seek alternative fishing sites off the Island, how many anglers used the proposed boat ferry system, and whether the closure impacts participation in the annual Fall Long Beach Island Fishing Tournament. Overall, the reduction in expenditures at some Long Beach bait and tackle shops may be substantial under this Alternative and some businesses catering primarily to surf fishermen may suffer unsustainable economic losses to their operations.

Under this Alternative, restaurants and lodging businesses may experience a small decline in overall revenues. As with most Long Beach Island businesses, restaurants and motels on the Island primarily depend upon the summer season for revenues. However, some restaurants and motels do remain open during the fall season, and a limited amount of businesses remain open year round. Under the proposed closure these businesses can be expected to see some slight decrease in revenues if motorized fishermen choose alternative fishing sites off the Island. Because the Island still offers motor vehicle access to other beaches in the Township and fishing would continue during the fall, the impacts are expected to be minor.

Along with bait and tackle shops, it is anticipated that motorized surf fishing anglers would be the most directly impacted user group under the proposed closure. The year-round closure above mean high tide is expected to limit fishing opportunities for motorized anglers, especially those that primarily fished at Holgate beach. Under the Proposed Action, access to the southern tip of the Holgate Peninsula may be allowed through a boat ferry system. Originating out of Long Beach Island, a boat ferry system would be expected to bring positive economic returns to the local economy. Ferry system concessionaires are currently in use at several National Wildlife Refuges nationwide to access Wilderness Areas, including Cape Romain Refuge in South Carolina and Monomoy Refuge in Massachusetts. A boat ferry system

where some of the best surf fishing occurs. Under the proposed closure above mean high tide, anglers choosing to continue fishing on Long Beach Island would still be able to access long stretches of the beach elsewhere in the Township. Current Long Beach Island motor vehicle regulations would allow fishermen to access nearly 10 miles of beach from the entrance to the Holgate Unit north to Loveladies, if they secure the proper beach permits. Anglers would also still be able to access the Holgate Peninsula on foot or by driving their ORVs to the beach below the mean high tide line.

Although motorized anglers may still be able to access long stretches of the beach in the Township under the proposed closure, most would likely choose not to use the Holgate Peninsula and forego the opportunity to experience driving their motor vehicles along an undeveloped beachfront in a Wilderness Area. The size and scope of such impacts would really be dependent on the availability of alternative fishing sites for motorized anglers and their willingness to travel to those sites.

Long Beach Township may also be impacted by the Proposed Action. To reach the Holgate Unit with a vehicle, anglers must purchase a beach buggy permit from Long Beach Township in order to cross Township land. The pass has no official standing within the Holgate Unit. The same permit is required to access other beaches on the Island. Permit data collected from Long Beach Township identified that a total of 734 beach buggy permits were issued in 1999. Permits were issued under two categories, either for the full season or for limited use, such as during the fall fishing tournaments. Full season permits cost \$50, and a limited use fall permit sold for \$25. In 1999, Long Beach Township issued 630 full season permits and 104 fall permits. Overall, beach buggy permit sales brought in approximately \$34,000 in direct revenues to Long Beach Township in 1999. Considering that many of the beach buggy permits were issued to anglers specifically to reach the Holgate Unit, it is likely that the Township's revenue from beach buggy sales would decrease under the proposed closure. Conversely, some of the other local jurisdictions may sell more permits.

The proposed closure would allow surf anglers to continue to access the best fishing areas on Holgate for a fixed cost. Many anglers may choose to use the boat ferry system to fish in a Wilderness Area without crowds and noise from motor vehicles. The ferry system would also allow that segment of the public who do not have suitable motor vehicle access the opportunity to access a remote beach environment.

A boat ferry system may also promote an ecotourism business on the Island as birders and naturalists seek remote areas to experience nature. The Holgate Unit is an ideal place to view fall migrations of shore birds and marine life, and the Service encourages wildlife viewing on the Refuge System. Interest in ecotourism is growing and access to Holgate beach would provide an excellent opportunity to create new Long Beach Island ecotourism businesses. It is difficult to predict the level of revenues that would be associated with establishing such a business, but with promotions from organizations like the local Chamber of Commerce the returns could be significant. See **Appendix G** for a complete socioeconomic analysis of motor vehicle use at Holgate.

Land Protection

This Alternative would result in the Service acquiring 11,500 acres of land identified in 12 focus areas, in addition to the remaining 12,300 acres within the currently approved Refuge acquisition boundaries. Acquisition costs for the proposed 11,500 acres of focus areas are estimated at \$60 - \$80 million.

Because of increasing development pressure throughout the New Jersey coastal region, and Barnegat Bay in particular, public meeting participants emphasized the need for continued land acquisition and protection. Acquisition within the 12 focus areas would protect the watershed areas upstream from lands already owned, several additional sites with rare species, and corridors connecting Refuge lands with nearby conservation areas. Lands acquired under this Alternative would provide better protection for entire watersheds and their processes, ensure water quality and quantity for wetlands, provide more contiguous habitat for migrating birds, and allow for better conservation reserves for populations of non-migratory species (i.e., larger populations and linkages between populations).

Additional land acquisition would enable improved management and water quality protection for waters feeding into the Refuges and the Barnegat Bay ecosystem. Refuge land acquisition boundaries would be modified periodically to protect threatened and endangered species and watershed areas. Sustaining the output of ecosystem goods and services is the key to sustainable wildlife resources, sustainable economic activities, and a healthy human population.

Refuge visitors and adjoining private landowners would receive a benefit from additional law enforcement staff because of reduced response time to complaints, which would improve the Service's public image.

Refuge Buildings and Facilities

Increased land protection through planning and acquisition would result in a variety of economic benefits to Townships, Boroughs, and Counties along the Jersey Coast. Avoiding sprawl and planned smart growth would reduce the amount of direct and indirect expenses related to development. Acquisition of potentially developable lands would increase the value of remaining developable lands by increasing demand and preserving local ecosystem values.

Refuge Revenue Sharing payments to municipalities within which the Service acquires property would increase as we acquired the 11,500 acres of lands within the 12 focus areas. If all of this land were acquired, the full payment value of Refuge Revenue Sharing payments to the municipalities would increase by \$450,000 to \$600,000 per year. It should also be noted that Refuge lands require very few local services.

This Alternative would produce increases in:

- revenues from expanded visitor use;
- Service expenditures for equipment and supplies needed for Refuge management;
- Service expenditures resulting from expanding Refuge staffing.

Resource Protection and Visitor Safety

Of the three Alternatives, Alternative B would provide the greatest level of resource protection and visitor safety. Wildlife and their habitats, and archaeological and historical sites would be afforded the maximum protection. The Refuge is located in the most densely populated State in the nation and receives over 300,000 visitors annually. Commercial and residential development is evident and increasing immediately adjacent to current boundaries. Increasing law enforcement efforts can pro-actively deal with resource protection and visitor safety issues before they become violations. Also, increasing the Refuge law enforcement staffing level conveys to our neighbors, visitors and local communities, the Services dedication to protection of natural resources and improved visitor safety.

New office and visitor facilities at the Brigantine Division would directly impact about eight to ten acres, and three to four acres at the Barnegat Division. The impacts are related to building-created impervious area, graveled entrance roads, parking lots and maintenance areas, and lawn areas. The removal of some older buildings and facilities would reduce the net increase in directly

impacted acres. Landscaping for wildlife using native plant species would further reduce the impact.

There are six potential sites under consideration for the new Refuge headquarters office and visitor facility at the Brigantine Division. These include:

- the current headquarters area in Galloway Township;
- the Arboretum Tract area in Galloway Township;
- the King's Highway area in Galloway Township;
- the Nacote Creek/Chestnut Neck area in Port Republic;
- the Sim's Mansion area in Bass River Township;
- the Werbler Tract area in Little Egg Harbor Township.

The site proposed for a new Refuge office and visitor facility at the Barnegat Division is located in commercially zoned property on the west side of U. S. Route 9 in Ocean Township, Ocean Co. Any construction would require a Site Analysis and associated NEPA compliance documents.

The expanded visitor facilities at the Brigantine Division headquarters and the Barnegat Division office would boost the local economy in the long term by increasing visitation to the areas. We estimate that a new, larger visitor center at the Brigantine Division would attract about 250,000 visitors per year. A Brigantine Division visitor center located near the Garden State Parkway would attract even more visitors, provided that educational programs, exhibits, and learning activities were offered.

We estimate that a visitor facility at the Barnegat Division would attract about 5,000 visitors per year. An independent study of the economic impact of ecotourism and demographic studies of ecotourists, conducted from October 1993 to September 1994 at the Refuge, revealed that nearly one-half of the visitors were from out of State, and 39.4% stayed more than one day in the area. Visitors averaged 2.1 days in the area, and spent about \$273 on their entire trip to and from the Refuge. This totaled \$26.76 million, with associated economic benefits to local communities from lodging, food, gas, and related purchases (Kerlinger, 1995). Several other studies have shown the economic value of birding and other ecotourism in other locations, including Cape May (Kerlinger and Weidner, 1988; Kerlinger, 1994; Kerlinger, 1997; USFWS 1997).

Higher visitor use would increase the amount of traffic in the vicinity of the Refuge office and visitor facilities, which may impact local air quality. The Service would mitigate impacts on biological resources that could be avoided. New facilities would be sited based on:

- buildable area;
- wetland buffers;
- buffers to neighbors;
- impact on open space;
- existing sewer and water service;
- proximity to major road;
- site impacts of building or parking areas;
- changes to the neighborhood;
- view and access to trails and other visitor resources.

The Refuge would consult with the local jurisdiction during planning and construction.

Hunting, fishing, and wildlife watching together generated over \$254 billion in total economic output in 1996 (American Sportfishing Association 1998; and Southwick Associates, 1998). The Service's 1996 fish and wildlife associated recreation survey reported participation by over 77 million people, who spent over \$29 billion on associated travel and equipment. Over 62 million participated in some form of wildlife observation or photography, or planting of beneficial shrubs.

A more recent Service publication, *Banking on Nature: Economic Benefits to local communities of National Wildlife Refuge Visitation, July 1997*, reports that visitation generated over \$400 million of sales in regional economies in 1995. In conjunction with this spending, more than 10,000 people were employed and \$162.9 million in income was generated.

Alternative B – The Service's Proposed Action

Cape May National Wildlife Refuge

Habitat and Wildlife Populations

The habitat restoration and maintenance program on Refuge lands would be completed under a 15-year time frame, resulting in a fundamental improvement in ecosystem quality. Increased acreage of phragmites and other exotics, such as Japanese honeysuckle, (*Lonicera japonica*), would be controlled (see also *Invasive and Overabundant Species*). Grasslands, which often include a high proportion of introduced species, would be converted to native species of grasses and forbs. The size and location of these grasslands would favor use by declining bird species in nesting, migration, and wintering periods.

Wetland communities, especially salt marshes, cedar swamps and bogs, would be restored. Removal of man-made restrictions to fish passage would restore interjurisdictional fish habitat to upstream areas. Restoration of previously ditched salt marshes would enhance habitat quality for many species of waterfowl and marsh birds.

Implementing controlled burns in upland habitats for fuel load reduction would have the dual benefits of reducing risks from wildfires and establishing conditions that favor native species. The upland forests historically and prehistorically encountered fires at much higher frequencies (estimates range from once every three years to once every 15 years). Should wildfire occur after reducing fuel loads and stand density through prescribed burns and mechanical treatments, the fire would be much easier to contain, and less likely to escalate to an extreme fire situation. Restoring natural fire frequency through prescribed burns would favor native species, help control invasive species, and provide a habitat structure that is now rare in the mid-Atlantic coastal plain (oak-pine savannah).

Prescribed burns would be conducted in a way that minimizes adverse impacts to the physical, biological, and human environments. Burn prescriptions would be developed to allow personnel to keep the fire contained within the defined boundaries, smoke to dissipate at appropriate altitudes, and safe and healthy conditions for

personnel and the public, while meeting the objectives of fuel load reduction and physical alterations to the habitat. Prescriptions may require clearing or cutting of overstory and understory trees/shrubs and plowing a fire line. Plowed lines would be filled after completion of the burn. Nearby publics would be notified of scheduled burns. While there are short-term impacts to air quality and the physical and biological components of the environment, prescribed burns would be necessary to meet Refuge goals and to reduce the risks of wildlife in an urban/wildland environment. Further detail on wildfire suppression and prescribed burns will be developed in the Fire Management Plan.

The habitat distribution envisioned in the habitat management plan would result in the maximum benefit to forest interior, grassland, shrub/scrub, dune/beach, and wetland species.

Indirect benefits of an increase in wildlife species number and diversity may include increased public visitation (hunters, birders, and photographers) and the subsequent additional positive socioeconomic outcome. Also, an increase in academia interest and visitation to view restoration projects may occur. The Refuge would serve as a demonstration and research site for academia and land management agencies.

The inventory of rare species and communities would result in a map of existing and potential restoration sites. Cape May Refuge would also draft a strategy for protection and management of those sites, and begin its implementation. Additional populations of State and Federally listed bog species (e.g., swamp pink, bog asphodel, pine barrens tree frog) would be identified, protected, and if appropriate enhanced. Experimental restoration of other rare species may result in new populations, which may include such species as seabeach amaranth in dune/beach communities.

Nest structures provided for raptor species would result in expanded recruitment to populations of osprey, barred and barn owls.

Expanded baseline surveys and long-term monitoring programs would improve the quality, defensibility, and evaluation of management actions, and provide information for partners and education of the public. Researching long-term impacts on wildlife resources from mosquito control (both pesticide use and Open Marsh Water Management) and the myriad types and amounts of public use

would ensure decisions in these controversial areas are based upon the best data. Research would be coordinated with periodic monitoring of public use (type, amount, and distribution) and coincident impact on wildlife and habitat. Development of a We would provide assistance on habitat planning and restoration to nearby landowners, both within and outside Refuge boundaries, to improve environmental quality locally, and slow degradation of the landscape.

Areas north of Route 550 would be opened to trapping for management of furbearer populations (e.g. muskrat, raccoon, and fox), by Refuge special use permit. This action would provide public use opportunities, a means for harvest of a renewable resource, and local economic benefits. There would be the potential for conflicts between user groups as the Refuge would remain open for other activities during the trapping season. There is also the potential for these activities to cause some disturbance to other wildlife species. Though the abundance of these species may be seasonally and locally reduced, it is unlikely that there would be any negative impact to their overall populations.

Invasive and Overabundant Species

Surveys of invasive species would identify their biological impacts on native plants and wildlife, and help prioritize sites for control efforts. Implementation of the control strategy across the Refuge would result in restoration of hundreds of acres back to native plant species and communities. Many other invertebrate and vertebrate wildlife species would respond positively to the increased habitat available. The techniques used for invasive species control would follow an Integrated Pest Management(IPM) approach, resulting in minimal use of pesticides and more effective control. Control efforts for invasive species on the Refuge would be coordinated with nearby landowners to prevent recolonization from sites off of the Refuge and improve habitat on private lands.

Pesticide Use

The Refuge may periodically use pesticides to control invasive or overabundant species. The Refuge's use of an Integrated Pest Management (IPM) approach specifies using techniques other than pesticides whenever possible, and when pesticides are used, the least amount and most specific type would be employed. Some quantity of pesticide would be introduced into the ecosystem, with an expectation of some impact on non-target species. Any Service activities dealing with

computer archive of research results, publications, and monitoring data would minimize loss of data, and ensure cost-efficient access to information by staff, partners, and the public.

mosquito control would be subject to the results of our NEPA compliance efforts. (See **Mosquito control** on page I-17.)

Big Game Hunting

The consequences of implementing this Alternative would be the same as Alternative A.

Upland Game Hunting

Under this Alternative selected areas of the Refuge would be opened for upland game hunting. This would provide new recreational opportunities, a means for harvest of a renewable resource, and local economic benefits. There is the potential for conflicts between user groups as the Refuge would remain open for other activities during the hunting seasons. There is also the potential for these activities to cause some disturbance to other wildlife species. Providing upland game hunting opportunities would likely result in an increase in the sale of hunting licences, supplies and equipment in the area.

The abundance of upland game species would be seasonally and locally reduced, however, there would be no negative impact to their overall populations.

Migratory Game Bird Hunting

This Alternative provides additional areas and techniques for migratory game bird hunting on the Refuge. The size and locations of areas for hunting have been designed to balance opportunities for hunting while still maintaining substantial areas as sanctuary for all species of wildlife. The total acreage is within the 40 % limit prescribed by the Migratory Bird Conservation Act and the Fish and Wildlife Improvement Act.

A negative consequence of increased hunting opportunities is the indirect (non-hunting) impact to wildlife species and their habitats caused by the increased number of hunters accessing the Refuge. The wetland habitats protected and managed at the Refuge provide critical resting and feeding areas to migrating/wintering waterfowl and other waterbird species on the Atlantic Flyway. A recent literature review conducted by Stillwater National Wildlife Refuge personnel (USFWS, 1998) has shown that disturbance caused by hunting can:

- modify the distribution and use of various habitats by birds;
- affect their activity budget and reduce their foraging time and consequently their ability

Also, though this Alternative increases areas and redefines techniques for migratory bird hunting, a large percentage of the Refuge would remain closed and provide needed sanctuary for migrating waterfowl.

There is also the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

As with big and upland game hunting, increased hunting opportunities would increase the number of licenses and duck stamps sold, as well as increase the amount of locally purchased hunting supplies.

Fishing

Under this Alternative the Refuge would be opened for fishing and crabbing, although opportunities would be functionally limited to just a few manmade ponds and tidal creeks. This would provide new recreational opportunities, a means for harvest of a renewable resource, and local economic benefits. There is also the potential for these activities to cause some disturbance to other wildlife species. Refuge staff would re-evaluate fishing access if demand or use were to approach levels potentially harmful to habitat or wildlife.

Wildlife Observation and Photography

Under this Alternative the Refuge would make considerable improvements to existing trails to facilitate public use and provide a quality experience. Increased opportunities for wildlife observation and photography may have some impact to the physical and biological resources in varying degrees, depending on the number of visitors and the season. Impacts may include temporary disturbance to wildlife in the immediate area and trampling of vegetation along trail edges. These improvements would increase visitor use but not at the expense of the natural environment. Opportunities for wildlife observation and photography should benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would complement that market.

to store fat reserves necessary both for migration and breeding;

- disrupt pair and family bonds and contribute to increased hunting mortality.

Environmental Education and Interpretation

Under this Alternative the Refuge would provide increased opportunities for these activities. Visitor use would increase somewhat over current conditions, which would have some impact on wildlife and habitat. However, all of these efforts would be done in such a manner as to minimize negative impacts. Impacts attributed to environmental education activities would be mitigated by the benefits of educating the public about Refuge resources and the environment. This action would benefit the local economy by increasing eco-tourism.

Wilderness Management

There is no designated Wilderness at Cape May Refuge. A Wilderness Review of all Refuge lands, including the Two Mile Beach Unit, would be conducted by 2010.

Land Protection

This Alternative would result in the Service acquiring 3,600 acres of land within the focus areas, in addition to 7,600 acres of land within the current, approved Refuge acquisition boundaries.

Because of development pressure in Cape May County, public meeting participants heavily emphasized the need for continued land acquisition and protection. The focus areas would protect the watershed areas upstream from lands already owned, several additional sites with rare species, and corridors connecting Refuge lands with nearby conservation areas.

Lands acquired under this Alternative would provide better protection for entire watersheds and their processes, ensure water quality and quantity for wetlands, and provide more contiguous habitat for migrating birds and genetic exchange between populations of non-migrating species.

Additional land acquisition would enable improved management and water quality protection for waters feeding into the Refuge and the Delaware Bay ecosystem. Land acquisition boundaries would be modified periodically to protect threatened and

endangered species and watershed areas. Sustaining the output of ecosystem goods and services is the key to sustainable wildlife resources, sustainable economic activities, and a healthy human population.

Increased land protection through planning and acquisition would result in a variety of economic Refuge Revenue Sharing payments to municipalities within which the Service acquires property would increase as the Service acquires the 3,600 acres of lands within the focus areas. If all of this land were acquired, the full payment value of Refuge Revenue Sharing payments to the municipalities would increase by \$64,800 per year. It should also be noted that Refuge lands require very few local services.

This Alternative would:

- increase revenues from expanded visitor use;
- increase Service expenditures for equipment and supplies;
- increase Service expenditures for expanding Refuge staffing.

Resource Protection and Visitor Safety

Of the three Alternatives, Alternative B would provide the greatest level of resource protection and visitor safety. Wildlife and their habitats, and archaeological and historical sites would be afforded the maximum protection. The Refuge is located in the most densely populated State in the nation and hosts over 10,000 visitors annually. Commercial and residential development is evident and increasing immediately adjacent to current boundaries. Increasing law enforcement efforts can pro-actively deal with resource protection and visitor safety issues before they become violations. Also, increasing the Refuge law enforcement staffing level conveys to our neighbors, visitors and local communities, the Services dedication to protection of natural resources and improved visitor safety.

Refuge Buildings and Facilities

New enlarged office and visitor contact facilities and storage and maintenance facilities proposed in this Alternative would directly impact an additional two to four acres. The impacts are related to building-created impervious area, graveled entrance roads, parking lots, and lawn areas. Landscaping for wildlife using native plant species would reduce the overall impact of developed facilities.

benefits to townships, boroughs, and counties. The avoidance of sprawl and smart growth would reduce the amount of direct and indirect expenses related to development. Acquisition of potentially developable lands would increase the value of remaining developable lands by increasing demand and preserving local ecosystem values.

A new larger office and visitor contact facility at the Cape May Refuge headquarters would boost the local economy in the long-term by increasing visitation to the area. We estimate that the visitor contact facility would attract about 5,000 to 10,000 visitors per year. We estimate that most of this increase would be during the spring and fall seasons.

The increased visitor use would increase the amount of traffic in the vicinity of the Refuge headquarters area, which may impact local air quality. The Refuge would consult with the local jurisdiction during planning and construction.

Alternative B - The Service's Proposed Action

Two Mile Beach Unit

Habitat and Wildlife Populations

Under this Alternative we would have an active and comprehensive biological program providing benefits to migratory birds, beach nesting birds, endangered species, and the native plant communities. Native flora and fauna would benefit from management and enhancements. Numerous surveys would provide valuable data for planning and decision making. We would draft a strategy for management and begin implementation. One area of emphasis would be to develop a management plan for beach nesting birds. These efforts would require significant commitments of staff time and funding.

Under this Alternative furbearer trapping by the public would not be permitted. Trapping would be done by contract for predator control only, to benefit beach-nesting birds. This action provides no public use opportunities or benefits to the local economy. The abundance of these species would be seasonally and locally reduced consistent with Refuge management objectives. It is unlikely that there would be any negative impact to their overall populations.

Invasive and Overabundant Species

This Alternative includes greater monitoring and control of invasive species utilizing an Integrated Pest Management (IPM) plan, providing benefits to rare and endangered species and to the native habitat types. Without this action, there may be negative impacts to the native flora and fauna.

Pesticide Use

Under this Alternative an Integrated Pest Management (IPM) plan would be developed which places greater emphasis on alternative means of pest control such as Open Marsh Water Management (OMWM), mechanical cutting, biological control, burning, etc. This Alternative would reduce the amounts of chemicals applied to the local environment. Any Service activities dealing with mosquito control would be subject to the results of our NEPA compliance efforts. (See **Mosquito control** on page I-17.)

Beach Access

This Alternative would open the beach to fishing and wildlife observation and photography from October to March. Access would be by foot only. From April to September the beach would be closed to all public use, and the area would remain available for undisturbed migratory bird breeding, nesting, feeding, preening, and loafing. There would be direct benefits for these birds as they are provided a rare stretch of barrier island beach free from human disturbance. While there would be wildlife benefits during this period, the public would lose access to the beach. A consequence would be the seasonal disruption of some previous public uses of the beach, as mentioned under Alternative A.

This action would likely reduce economic benefits to the local area during the summer as visitors may look elsewhere for these opportunities. Access to the Cold Spring Jetty would likely be lost also, as the Coast Guard does not permit public access off Ocean Drive or along the canal. These consequences, positive and negative, would be felt for the duration of the two-year closure. Should birds begin to nest on the beach, we would continue the seasonal closure, if not, we would re-evaluate the closure, taking into account other threatened and endangered species. If the closure were to be discontinued, there would be a loss of available, undisturbed beach habitat.

Beach access would be permitted from October 1 through March 31 of each year. As visitor numbers are relatively small at this time of year, negative impacts would be insignificant. This provides opportunities for public access and would benefit the local economy. No vehicles would be permitted at any time, which would benefit a variety of plants, wildlife, including invertebrates, and beach dynamics.

Hunting

The consequences of implementing this Alternative would be the same as Alternative A.

Fishing

Under this Alternative, surf fishing would be allowed from October 1 through March 31. This action provides fishing opportunities not previously available, with some benefits to the local economy. Trash and litter are often a problem where fishing is allowed, however, as visitor numbers are relatively

small at this time of year, negative impacts would be insignificant.

Under this Alternative the area would be open for wildlife observation and photography. There would be improvements to accommodate public access and insure a quality experience to the visitor. All such uses would occur on existing service roads, trails, and parking lots. There would be no new habitat alteration or disturbance as additional roads, trails or parking lots would not be provided. This Alternative proposes an observation platform, which would impact a small area. Increased opportunities for wildlife observation and photography would impact physical and biological resources in varying degrees, depending on the number of visitors and the season. Impacts would include temporary disturbance to wildlife in the immediate area and trampling of vegetation along trail edges. These improvements would increase visitor use but not at the expense of the natural environment. Sensitive areas, such as the dunes, would be closed to guard against negative impacts. Opportunities for wildlife observation and photography would benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would complement that market.

Environmental Education and Interpretation

Under this Alternative we would be actively involved in environmental education and interpretation by providing a new visitor center, trails, kiosk, signs, regular programs, and guided walks. Visitor use would increase, which would have some impacts on wildlife and habitat. However, all of these efforts would be done in such a manner as to minimize negative impacts as much as possible. This action would benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would compliment that market.

Refuge Buildings and Facilities

We would utilize buildings A-14 and B-6 and other improvements as needed for management purposes, including establishment of a visitor center in building A-14. The removal of non-essential buildings and other facilities, and actively vegetating with native plants would substantially improve the site as a coastal dune community. Breeding and stopover habitat for migratory birds would increase. The removal of impervious surfaces would also benefit the surface and groundwater hydrology. The utilization of buildings A-14 and B-6 for Refuge purposes would reduce the potential

Wildlife Observation and Photography

maximum habitat gains. The use of buildings for management and interpretation/education needs would benefit the local economy.

Alternative B - The Service's Proposed Action

Unavoidable Adverse Impacts of the Service's Proposed Action

Unavoidable adverse impacts are projected from the changes in levels of management activities as described in the Service's Proposed Action, relative to the No-Action Alternative.

Construction of visitor facilities and increased visitation would affect local air and water quality and natural vegetation, through vehicle emissions, localized damage to vegetation, soil compaction, and erosion. Enhanced visitation would also mean additional disturbances to both resident and migratory wildlife. Increased visitation for wildlife-dependent recreation and educational and interpretative programs may mean less Refuge acreage for hunting, or, potentially, more restrictions for public safety purposes.

Phasing out non-wildlife-dependent uses will substantially reduce or eliminate their negative impacts on the experiences of other Refuge visitors and the environment. This will likely result in more conflicts between the Service and local user groups and commercial establishments.

Enforcement of the Wilderness Act at the Holgate Unit would adversely impact surf fishermen and motorized vehicle operations above mean high tide line. Some bait and tackle shops in Long Beach Township would also lose revenues due to the closure. Over time, ecotourist attraction to a wilderness experience may be expected to offset any monetary loss from surf fishing.

Additional hunting or trapping could result in increased conflicts with other user groups opposed to those activities. Wildlife harvest through hunting and trapping will reduce certain species population numbers, so that other species of management concern may increase or recover. Such management actions are necessary to carry out our wildlife resource protection mandates.

All impacts on biological resources are expected to be long-term and beneficial. Threatened and endangered species occurrence sites would receive highest priority for protection. Important stopover, feeding and breeding habitat for migrant birds,

The development potential of the protected land would be precluded. Thus, the local economy could be adversely affected from increased monetary gain from development that is not exploited. Also, local governments would not receive the fiscal benefits of increased property tax receipts. However, this type of impact is expected to be minor. (See **Short-Term Use Versus Long-Term Productivity** below.) The Service is committed to working only with willing sellers. People would not be willing to forego rewards from future development potential if the value of the property, adjusted to account for risk and inflation, is greater than the value they receive by forfeiting their development rights. Therefore, it can be assumed that property owners who give up their development rights do not expect the development potential of their lands to increase greatly, or are simply more interested in land conservation than any monetary gains.

Short-Term Use Versus Long-Term Productivity

Short-term and long-term effects describe the relationship between local short-term uses of the human environment and maintenance of long-term productivity of the environment.

Short-term economic effects would be felt in the immediate impact from land purchases. There would be short-term impacts on tax collections for the year in which a property is acquired. In the long-term however, land protection would reduce municipal services cost, i.e., the infrastructure development of roads, sewers, schools, police and fire protection, and utilities, while providing essential habitat for wildlife and outdoor recreation. Loss in taxes would be at least partially offset by the annual Refuge Revenue Sharing payments.

In the long-run, local economies would be impacted positively by increased spending on environmental programs. The programs would attract visitors and positively impact tourism and wildlife-dependent recreation in the coastal region. In the long-term, most of the adverse effects would be mitigated or offset by the positive impact from increased open space, and an increase in quality habitat for plants and animals.

identified by Service and private conservation organization studies, would be targeted for acquisition. Aquatic species, wide-ranging species and species which require active management would benefit from habitat improvements, restoration and

land protection actions outlined in this plan. Technical assistance, environmental education, Partners-In-Flight grants and Challenge Cost Share Program grants would enhance area sensitive species on dedicated open space, privately owned lands and Refuge lands. Additional invasive species control would occur over a significant area of the Refuges allowing native species to reclaim habitat. Interjurisdictional fish populations would, in the long-term, hopefully stabilize and begin recovery as a result of quantity and quality of habitat as well as water quality improvements from protection and restoration of riparian habitat.

The development of visitor center facilities, trails, observation platforms or kiosks, visitor and educational facilities, and wetland restoration projects would result in both short-term and long-term physical impacts on soil and vegetation. These impacts would be localized and confined to the immediate construction sites. Increased attention to environmental education and recreation programs would result in more audiences being involved with environmental education and wildlife-dependent recreation, and a more positive land ethic of stewardship within the coastal communities and those immediately adjacent.

Long-term beneficial effects include the increased productivity of threatened and endangered species, waterfowl, shorebirds, and songbirds, and a myriad of other species dependent upon Refuge habitat. The public would also gain long-term opportunities for wildlife-dependent recreation and education on some Refuge tracts.

Short-term use of Refuge lands includes wetlands restoration and enhancement, hunting, trapping, fishing, exotic plants control, management for selected species, wildlife inventories, fish stocking, water quality monitoring, forest regeneration, prescribed burning, and the construction of administration and public use facilities. These activities would be implemented with the primary goal of assuring the sustained productivity of Refuge resources.

Irreversible and Irretrievable Commitments of Resources to the Service's Proposed Action

Irreversible commitments of resources are those which cannot be reversed. For example, the use of non-renewable resources is irreversible: mineral and

fossil fuel consumption are not renewable and therefore not available for future use. The depletion of old-growth forests is also irreversible. An irreversible commitment of resources results when an area is altered in such a way that it cannot be returned to its natural condition for an extended period of time.

Irretrievable commitments of resources occur when a renewable resource is allocated to a given use and cannot be recovered without significant effort.

The cost associated with land acquisition for the Refuges would be irreversible. Refuge land acquisition removes acreage from private ownership, and any potential development benefits associated with it. However, such land, once placed in public ownership under the National Wildlife Refuge System, provides a new set of wildlife-dependent recreational uses which benefits a much broader group of people. The concept of "public lands" precludes individual freedom to use those lands according to individual desires. Traditional public uses may change, since public uses on a Refuge must be shown to be compatible with the purposes for which land is acquired. Structural improvements that are purchased with any land may be declared surplus to Government needs, and sold or demolished on site. Federal ownership may affect surrounding land-use patterns, local economies, and municipal tax revenues. Generally, these changes are positive: residential homes and property located adjacent to Refuge lands increases in value, landscapes are protected, revenue to local service businesses increases, and costs to municipalities for services decreases.

Management of the Refuges and lands acquired would result in an irreversible and irretrievable commitment of funding for operations, administration, and management. Funding and personnel commitments by the Service to purchasing and managing Refuge lands and facilities render those resources unavailable for other Service programs and projects. The more public use activities and facilities provided, the greater the operating and maintenance cost involved.

Any wetland restoration projects would be considered irreversible. Following restoration, the Clean Water Act and, in some cases, State statutes would make it very difficult to reconvert wetlands on a National Wildlife Refuge to a drained condition.

Irreversible loss of Refuge habitat, as part of the Service's Proposed Action, would occur at

construction sites of new facilities. These irreversible impacts of visitor use facilities and improvements would be mitigated somewhat by their function in confining the major impacts of visitors to relatively few, selected areas.

Animal and plant populations are renewable in different degrees. Construction sites, and some habitat management practices, may irretrievably Areas with new visitor and office centers, trails, and those providing wildlife observation opportunities may not be available for hunting, trapping, and fishing. Opportunities for these public uses would be irretrievably lost for as long as those areas are designated for wildlife observation or other public educational and recreational activities.

Cumulative Impacts of the Service's Proposed Action

Cumulative impacts are those effects on the environment, including socioeconomic, resulting from one or more actions or the incremental consequences of an alternative when added to other past, present, and reasonably foreseeable future actions.

For purposes of this discussion, these other actions may be generated by various entities, including other Federal or State agencies, county or town governmental entities, non-government organizations, and private individuals. Each of these major groups will continue to undertake actions relating to land use and fish and wildlife resources independent of Refuge operations that will affect these natural resources through the decades ahead. Some actions may result in beneficial effects upon our natural resources, and some may bring about negative impacts. Many types of recreational opportunities exist at the Refuges. We anticipate that the demand and popularity of these programs will continue to grow in the coming years.

Coastal populations are said to be increasing at a rate three times the national average with corresponding population growth estimated at 1.3 million per year. In 1960, it was estimated that 90 million people lived in the coastal zone. By 1991, the coastal zone population had attained 115 million people, and in the year 2010, the number of people living near the coast is projected to reach 130 million. Over the next 25 years, coastal stresses will increase precipitously due to human modifications of the environment. Although restoration and protection are also expected to

damage natural communities, at least for a period of time. Wildlife taken through hunting, trapping, fishing, and species control, or for research programs, would no longer be available for wildlife observation and photography. These activities, however, would be managed in such a way that the health and viability of wildlife populations would not be threatened.

increase, combined human influences upon the land, atmosphere, and sea will probably outrace our coastal preservation.

As New Jersey coastal communities continue to expand, they will exert increasing pressures and demands on the Refuges, Barnegat Bay, Delaware Bay, and coastal natural resources. The coastal zone environment is heavily influenced by air and water inputs from both near shore and inland sources. As a result essential resources are failing not only nationally, but throughout the world and the quality of our food sources, water and air is being eroded. These changes are cumulative and are occurring in coastal regions throughout the United States. Pollution sources include septic systems, animal waste, urban runoff, construction, agricultural chemicals, logging, mining, hazardous material spills, sand and gravel extractions, junk yards, landfills, litter and debris. These pollution sources are generated by human populations and are cumulative over time. Threats to the Refuges' fish and wildlife resources will come primarily from outside the Refuges' boundaries, through increased boating, nonpoint source pollution runoff, nutrient loading, and habitat fragmentation.

In order to ensure that the quality of the Refuges environment is maintained, and people experience a quality visit, it will be necessary to adjust visit rates and numbers on a frequent basis, or seasonally, as the situation dictates. Visits may be restricted to specific sites and well marked trails. Old or abandoned cartroads and footpaths would be upgraded, in place of new construction, where possible.

The Barnegat Bay and Delaware Bay watersheds have numerous State, local and private organizations active in the protection of wildlife and habitats. Service actions as part of the Proposed Action would add significantly to the positive impacts on biological resources by others, and would at least help to offset the continuing large-scale land losses.

Existing environmental education providers would continue to undertake actions relating to environmental education independent of the Services'

operations that would affect these resources over the life of this plan. These groups may coordinate their efforts with the Service through cooperative programs, technical assistance, or grants from the Challenge Cost Share Program.

Fishing and hunter education are annually supported in part by Federal grant money administered by the Service under the "Pittman-Robinson" and "Dingell-Johnson" laws. New Jersey would continue to receive annual funding for these activities.

Alternative C

Forsythe National Wildlife Refuge

Habitat and Wildlife Populations

This Alternative would result in the development and implementation of an ecological community/species based habitat management plan for the Refuge. Much greater attention would be given to plant species composition and ecological gradients in describing, targeting, and implementing habitat types (equivalent to community and association levels under the National Vegetation Classification System - NVCS). Meeting habitat needs of other trust resources (e.g., migrating birds) would not be sacrificed in emphasizing habitat management at such a detailed level. We would also provide assistance on habitat planning and restoration to nearby landowners, both within and outside the Refuge, to improve environmental quality locally, and slow degradation of the landscape. Off-Refuge assistance would also be conducted at an NVCS community level.

This Alternative would further assist the Refuge in achieving the Service's ecosystem approach to resource management. The meaning of ecosystem management and what this approach would accomplish are articulated by many Federal agencies in relation to their mission. Variation in the definition of ecosystems among the agencies has led, in some cases, to considerably different interpretations of ecological units. A standard community classification system provides a consistent basis for the characterization of the biological components of different ecosystem units across the physical and administrative landscape. Thus a standard classification system contributes to the formation of more precisely defined and less variable ecosystem units. It also allows for the comparison of units that are defined and managed by different land management agencies within and between regions.

Implementation of this Alternative would be very costly in terms of additional staff and monies. The Refuge would work closely with partners including the Federal Geographic Data Committee to develop standards for future refinements of the classifications.

Other aspects of this Alternative would be the same as Alternative B.

All Refuge lands would be opened to furbearer trapping under Refuge special use permit. Only selected State-regulated trapping species would be legal for harvest. Not all of New Jersey's trapping species occur, or should occur, on the Refuge. By increasing trapping opportunities, the annual number of licenses and the amount of supplies purchased would increase. Additional opportunities would also be provided for trappers to harvest a renewable resource. A negative aspect of the increased trapping opportunities may be disturbance to other wildlife species caused by an increase in the number of trappers and the time they are allowed within the Refuge. Some non-target species would also likely be taken.

Invasive and Overabundant Species

The consequences of implementing this Alternative would be the same as Alternative B.

Pesticide Use

The consequences of implementing this Alternative would be the same as Alternative B.

Big Game Hunting

In addition to the initiation of the universally accessible hunt mentioned in Alternative B, we would open all Refuge lands within the Statewide deer management zones to big game hunting.

Opening new areas to deer hunting would help keep deer populations within the carrying capacity of their habitat. Deer would be managed to minimize the potential for serious habitat alteration or degradation and density dependent diseases. Opening additional areas to deer hunting would increase the recreational opportunity, economic benefit, and provide greater flexibility in managing deer populations.

An aspect to be considered before opening the entire Refuge to big game hunting under the lengthy Statewide season is the negative impacts to other non-target species of wildlife and their habitats. In general, human activity causes disturbance to wildlife and wildlife habitat at varying degrees depending on the type of human activity, intensity of activity, timing of the activity, number of activities occurring simultaneously and wildlife species impacted. This Alternative would provide no area on the Refuge for use by wildlife as a sanctuary, would impose undue stress on all wildlife species inhabiting the Refuge, and increase the potential for conflicts between deer hunters and other Refuge users.

Upland Game Hunting

This Alternative provides greater opportunities for upland game hunting by increasing the amount of

Refuge land open for those activities. Conflicts between user groups of deer hunters and upland game hunters would be eliminated by spatially scheduling the times each user group can access the areas. This Alternative would provide an even greater increase in recreational opportunity and economic benefit as well as increase the number of hunting licenses and hunting supplies purchased. Increased hunting opportunities also provide additional wildlife dependent recreational opportunities for sport hunters to harvest a renewable natural resource.

An aspect to be considered before opening the entire Refuge to upland game hunting, under the lengthy Statewide season, is the negative impacts to other non-target species of wildlife and their habitats. In general, human activity causes disturbance to wildlife and wildlife habitat at varying degrees depending on the type, intensity and timing of the activity, the number of activities occurring simultaneously, and the wildlife species impacted. This Alternative provides no area of the Refuge for use by wildlife as a sanctuary and would impose undue stress on all wildlife species inhabiting the Refuge.

Migratory Game Bird Hunting

This Alternative would open the entire Refuge to migratory game bird hunting. Because it would exceed the 40% rule, it would violate the stipulations of the Migratory Bird Conservation Act.

The Act specifies that lands purchased for the purpose of providing an inviolate sanctuary for migrating birds are limited to only 40% of those lands open to hunting. Although the Fish and Wildlife Improvement Act of 1978 (amendment to section 6 of the National Wildlife Refuge System Administration Act of 1966) provides for opening more than 40% of refuge lands to hunting for a given species, it must be determined that hunting will be beneficial for that species. It is unlikely that hunting would be found to be beneficial to waterfowl, except for resident Canada and snow geese (addressed under separate initiatives). Consequently, this Alternative would violate Federal law.

Increased migratory game bird hunting across the entire Refuge would increase short-term disturbance to birds and other wildlife found in the hunted areas. A recent literature review conducted by Stillwater National Wildlife Refuge personnel (USFWS, 1998) has shown that disturbance caused by hunting can:

- modify the distribution and use of various habitats by birds;
- affect their activity budget and reduce their foraging time and consequently their ability to store fat reserves necessary both for migration and breeding;
- disrupt pair and family bonds and contribute to increased hunting mortality.

Depending on the extent and distribution of hunting pressure, it would virtually eliminate the ability of the Refuge to serve as stopover or wintering habitat to migrating waterbirds, not just waterfowl. It may cause migratory birds to leave the Refuge prematurely, undermining the intent of providing stopover habitat and viewing opportunities for wildlife observation, photography, and hunting.

There is also the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

Providing increased hunting opportunities on the Refuge would increase the number of licenses and duck stamps sold, as well as increase the amount of locally purchased hunting supplies.

Fishing

This Alternative would open all the Refuge's freshwater and saltwater shoreline to fishing. The physical environmental consequences would include soil compaction, shoreline erosion, with associated water turbidity, and littering. Biological environmental consequences would include reduced productivity of plants in near shore water, due to the increased turbidity, and reduced use by certain migratory bird species. Over time, Refuge shorelines may become littered with fishing debris, such as hooks and fishing line. These items are hazardous to wildlife. Although we could calculate the increased amount of shoreline that would be directly impacted by this Alternative, it is very difficult to estimate what the physical, biological, and socioeconomic impact in the additional areas would be. Also, it would be difficult to estimate the amount of increased public use that would result from this Alternative. There are so many tidal creeks and ditches in the salt marsh, that much of the saltwater shore line is only accessible by boat.

Wildlife Observation and Photography

This Alternative would allow Refuge-wide opportunities for wildlife observation and photography. Such a policy would negatively impact the wildlife which depend on the Refuge, and While wildlife observation and photography are appropriate and welcome activities on the Refuge, wildlife observers and photographers can have negative impacts on wildlife and habitat. In order to minimize such impacts, careful public use planning must occur.

Refuge-wide visitor access would seriously limit the Refuge's capability to properly plan for those impacts, as follows:

- Refuge-wide visitor access would eliminate the possibility of the selecting/designing wildlife observation sites/trails to minimize impacts on wildlife or habitat (see also Alternative B);
- Assessment of visitor impacts would be hampered because there would be no defined public use areas to monitor. Without monitoring, any negative visitor impacts, which might occur, would go undetected and therefore would continue to the detriment of wildlife and habitat;
- With no limits on visitor access, the Refuge would be unable to provide sanctuary from human disturbance to the wildlife within its borders. This becomes especially important in seasons when wildlife is already at risk, such as during nesting, migration, or hostile winter conditions;
- Unlimited access for wildlife observation would put wildlife observers/photographers in conflict with other Refuge user groups, such as hunters.

Wildlife observation and photography activities can negatively impact wildlife by altering wildlife behavior, reproduction, distribution and habitat (Purdy et al. 1987, Knight and Cole 1995). Wildlife observers actively seek out wildlife, which may result in encounters that are more frequent and longer in duration than non-wildlife dependent activities.

Knight and Cole (1995) point out some of the problems which wildlife observers inadvertently create for wildlife. "Nature viewing by its very definition has great potential to negatively affect wildlife. Avid wildlife viewers intentionally seek out

would also reduce the quality of the visitor experience.

rare or spectacular species. Some ... strive for the most viewing opportunities in the least amount of time. ... 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, the potential for negative effects is large". Boyle and Samson (1985) concluded that human visits to passerine and waterfowl nests could increase the chances of nest losses through predation, as adults are flushed away from the nest (Dwernychuk and Boag 1972, Bart 1977, Lenington 1979).

Research has shown that colonial nesting birds are particularly susceptible to human disturbance, since breeding populations concentrate in small areas. Trampling has been recorded (Johnson and Sloan 1976), as has nest abandonment (Hunt 1972, Ellison and Cleary 1978), and nesting water bird relocation to less preferred habitat, in response to human disturbance (Erwin 1980).

Glinski (1976) notes that human visits to active raptor nests cause adults to waste energy circling the nest tree and calling at the intruders. He indicates that use of taped vocalizations used by some wildlife observers can "disrupt the circadian rhythms that dictate performance of territorial calling and displaying during certain times of the day," thus prompting abnormal responses which not only waste the birds' energy, but also increase susceptibility of both nestlings and adults to predation.

Approach by people can cause water birds such as sanderlings to avoid critical foraging habitat, reduce the birds' foraging time as they seek to avoid the approaching humans, or even switch to feeding at night (Burger and Gochfield 1991).

Klein (1993) in a study at Ding Darling National Wildlife Refuge, noted that approaching wildlife on foot was the most disruptive aspect of all of the Refuge's usual public uses, which included nature observation, photography, fishing, crabbing, shell collecting, boating, fitness, or driving.

As noted above, expansion of wildlife observation and photography opportunities on Forsythe National Wildlife Refuge is welcome. The Refuge is surrounded by growing communities, and is also

well known for the wildlife viewing opportunities available at its Wildlife Drive. As new areas are opened for wildlife observation and photography, an increase in visitation is anticipated. In order to make this change work for the wildlife, which depend on the Refuge and which we are mandated to conserve for future generations, such expansion must be carefully planned, executed, and monitored.

Environmental Education and Interpretation

Environmental education opportunities on the Refuge would be greatly enhanced by expanded interpretive efforts of Refuge staff and volunteers, development of new partnerships with the education community, creation of new on-site outdoor classrooms, and increases in Refuge and wildlife educational media for both adults and children.

The other consequences of implementing this Alternative would be the same as Alternative B.

Wilderness Management

This Alternative does not affect the current spring and summer closure of the Holgate Unit and Little Beach Island to all public use to protect piping plover breeding areas.

It would result in the least negative impact to the physical and biological environment of Holgate due to the complete absence of motor vehicles. Experimental restoration of the northeastern beach tiger beetle would become a viable option. The opportunities for the public to experience solitude in a primitive, unconfined Wilderness Area would be greatly enhanced.

This Alternative would have no archaeological and historical resource consequences at the Holgate Unit, because there are no archaeological and historical resources in the area. It would also have no archaeological and historical resource consequences at the Little Beach Island, because the site of the former Coast Guard Station would remain closed to the public.

At the Holgate Unit, it would eliminate the violation of the Wilderness Act of 1964 and Executive Order 11644, which prohibit the use of motorized vehicles in Wilderness Areas. If successful, it would also eliminate the use of motorized vehicles in the State-owned riparian land (land below mean high tide) below the Wilderness Area boundary. These two actions would stop all motor vehicle access on the Holgate Peninsula. This restriction would substantially reduce the number of anglers and other wildlife-dependent visitors that use the area.

As noted earlier, such planning, execution, and monitoring cannot occur under Alternative C.

A boat taxi concession to ferry surf anglers and others on the bayside of Long Beach Island to the southern tip of the Holgate Peninsula would compensate for some of this reduction. Surf angling via foot or boat access would allow for a nature-oriented experience in a more remote setting. The prohibition of motorized vehicle use in the Wilderness would increase the probability of providing a "...community of life ... untrammelled by man..." and "... outstanding opportunities for solitude or primitive ... recreation;" which are wilderness characteristics defined by Section 2(c) of the Wilderness Act of 1964.

At Little Beach Island, this Alternative would allow surf fishing and other wildlife-dependent recreation during the fall and winter under Refuge special use permit. This opportunity would partially compensate for eliminating motor vehicle access for surf anglers and other wildlife dependent visitors at the Holgate Unit.

The socioeconomic consequences of closing Holgate beach to motor vehicles would be the same as Alternative B.

Land Protection

The consequences of implementing this Alternative would be the same as Alternative B.

Resource Protection and Visitor Safety

Additional law enforcement personnel would result in increased protection to Refuge visitors and trust resources. Refuge visitors and adjoining private landowners would receive a benefit from additional law enforcement staff because of reduced response time to complaints, which would help improve the Service's public image.

Refuge Buildings and Facilities

The consequences of implementing this Alternative would be the same as Alternative B.

Alternative C

Cape May National Wildlife Refuge

Habitat and Wildlife Populations

This Alternative would result in the development and implementation of an ecological community/species based habitat management plan for the Refuge. Much greater attention would be given to plant species composition and ecological gradients in describing, targeting, and implementing habitat types (equivalent to community and association levels under the National Vegetation Classification System - NVCS).

Meeting habitat needs of other trust resources (e.g., migrating birds) would not be sacrificed in emphasizing habitat management at such a detailed level. The Refuge would also provide assistance on habitat planning and restoration to nearby landowners, both within and outside the Refuge, to improve environmental quality locally, and slow degradation of the landscape. Off-Refuge assistance would also be conducted at an NVCS community level.

This Alternative would also assist in the Refuge achieving the Service's adopted ecosystem approach to resource management.

Implementation of this Alternative would be very costly in terms of additional staff and monies. The Refuge would work closely with partners including the Federal Geographic Data Committee to develop standards for future refinements of the classifications.

Under this Alternative the entire Refuge would be open to trapping. This would provide the maximum level of new trapping opportunities, a means for harvest of a renewable resource, and local economic benefits. There is the potential for this activity to cause some disturbance to other wildlife species and also the potential for conflicts between user groups.

Other consequences would be the same as those listed under Alternative B.

Invasive and Overabundant Species

The consequences of implementing this Alternative would be the same as Alternative B.

Pesticide Use

The consequences of implementing this Alternative would be the same as Alternative B.

Big Game Hunting

The consequences of implementing this Alternative would be the same as Alternative A.

Upland Game Hunting

Under this Alternative, the entire Refuge would be open to upland game hunting. This would provide the maximum level of new upland game hunting opportunities, a means for harvest of a renewable resource, and local economic benefits. Under this action there is the potential for increased conflicts between user groups, as the Refuge would remain open for other activities during the hunting seasons.

There is also the potential for these activities to cause some disturbance to other wildlife species, especially migratory birds. Existing sanctuary areas established for waterfowl and other wildlife would be lost.

Migratory Game Bird Hunting

This Alternative would open the entire Refuge to migratory game bird hunting. It would not violate the Migratory Bird Conservation Act (section 5 amendment, the Fish and Wildlife Improvement Act of 1978). Because the Refuge was established in 1989, and setup "... as an inviolate sanctuary, or for any other management purpose,...", it is not subject to the 40% restriction in migratory game bird hunting that is required of Forsythe Refuge. However, the implementation of hunting is subject to a compatibility determination, as are all public uses.

Increased migratory game bird hunting across the entire Refuge would increase short-term disturbance to birds and other wildlife found in the hunted areas. A recent literature review conducted by Stillwater National Wildlife Refuge personnel (USFWS, 1998) has shown that disturbance caused by hunting can:

- modify the distribution and use of various habitats by birds;
- affect their activity budget and reduce their foraging time and consequently their ability to store fat reserves necessary both for migration and breeding;

- disrupt pair and family bonds and contribute to increased hunting mortality.

Depending on the extent and distribution of hunting pressure, it could virtually eliminate the ability of the Refuge to serve as stopover or wintering habitat to migrating waterbirds, not just waterfowl. It may cause migratory birds to leave the Refuge prematurely, undermining the intent of providing stopover habitat and viewing opportunities for wildlife observation, photography, and hunting.

There is also the potential for occasional conflicts between Refuge activities, including management actions and wildlife-related recreation on Refuge lands or navigable waterways.

Providing increased hunting opportunities on the Refuge would increase the number of licenses and duck stamps sold, as well as increase the amount of locally purchased hunting supplies.

Fishing

The consequences of implementing this Alternative would be the same as Alternative B.

Wildlife Observation and Photography

Under this Alternative the Refuge would make considerably fewer improvements to existing trails to facilitate public use. There would be some increase in opportunities for wildlife observation and photography, which may have some impact to the physical and biological resources, depending on the number of visitors and the season. Impacts may include temporary disturbance to wildlife in the immediate area and trampling of vegetation along trail edges. These improvements would increase visitor use but not at the expense of the natural environment. These opportunities for wildlife observation and photography would benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would compliment that market.

Environmental Education and Interpretation

Under this Alternative the Refuge would take a less active role in these activities, resulting in fewer opportunities for the public. Visitors would rely more on self-guiding trails and signs, and on occasional programs provided by partners. The Refuge would attract fewer visitors than under Alternative B. There would be some increase in visitor use over current conditions, which would have some impact to the wildlife and the habitat. However, all of these efforts would be done in such a

manner as to minimize negative impacts as much as possible. Any impacts attributed to environmental education activities would be mitigated by the benefits of educating the public about Refuge resources and the environment. This action would benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would compliment that market.

Wilderness Management

The consequences of implementing this Alternative would be the same as Alternative A.

Land Protection

The consequences of implementing this Alternative would be the same as Alternative B.

Resource Protection and Visitor Safety

The consequences of implementing this Alternative would be the same as Alternative B.

Refuge Buildings and Facilities

Enlarging and renovating the existing office and visitor contact facility and constructing the new storage and maintenance facilities proposed in this Alternative would directly impact the existing headquarters site and an additional two acres. The impacts are related to building-created impervious area, graveled entrance roads, parking lots, and lawn areas.

A new ly remodeled and larger office and visitor contact facility at the Cape May Refuge headquarters site would boost the local economy in the long-term by increasing visitation to the area. We estimate that the visitor contact facility would attract about 3,000 to 7,000 visitors per year, most of which would be during the spring and fall seasons.

The increased visitor use would increase the amount of traffic in the vicinity of the Refuge headquarters area, which may impact local air quality. The Service would mitigate impacts on biological resources that could not be avoided. The Refuge would consult with the local jurisdiction during planning and construction.

Alternative C

Two Mile Beach Unit

Habitat and Wildlife Populations

Under this Alternative we would have a less active biological program as compared to Alternative B. While there would still be benefits to the flora and fauna, the Unit would not reach its full potential regarding restoration and management of coastal habitats. Fewer wildlife surveys would result in a poorer understanding of the areas wildlife and plant communities. Predators would be controlled to benefit beach-nesting birds, and public trapping would be permitted under Refuge special use permit. Disturbance to wildlife and conflicts between user groups would be potential impacts.

Invasive and Overabundant Species

The consequences of implementing this Alternative would be the same as Alternative B.

Pesticide Use

The consequences of implementing this Alternative would be the same as Alternative B.

Beach Access

Under this Alternative the beach would be open to year-round pedestrian access, including surf fishing. This would provide maximum opportunities for the public to walk on the beach. It would also disturb migratory birds that utilize the beach and would eliminate a sanctuary area during the busy summer tourist season when thousands of people are on local beaches. Continued heavy pedestrian traffic on the beach would likely preclude the threatened piping plover or least tern from once again nesting in the Unit. Maximum public access would benefit the local economy.

Hunting

The consequences of implementing this Alternative would be the same as Alternative A.

Fishing

Under this Alternative surf fishing and fishing/crabbing would be allowed year-round on both the beach and in the back bay wetlands. This

would provide maximum opportunities to the public for the pursuit of these activities. It would also disturb migratory birds and eliminate a sanctuary area during the busy summer tourist season when thousands of people are on local beaches. Fishing/crabbing in the back bay wetlands would disturb an area frequented by waterfowl, wading birds, shorebirds, and osprey. Visitor use of this wetland would create new footpaths and increase litter. Maximum fishing access would benefit the local economy.

Wildlife Observation and Photography

Under this Alternative fewer improvements would be provided and maintained for wildlife observation and photography uses. All such uses would occur on existing service roads, trails, and parking lots without improvements. There would be no new habitat alteration or disturbance as additional roads, trails or parking lots would not be created. The Unit would attract fewer visitors than under Alternative B. The increased opportunities for wildlife observation and photography would impact the physical and biological resources in varying degrees, depending on the number of visitors and the season. Impacts would include temporary disturbance to wildlife in the immediate area and trampling of vegetation along trail edges. These improvements would increase visitor use but not at the expense of the natural environment. Sensitive areas, such as the dunes, would be closed to guard against negative impacts. Opportunities for wildlife observation and photography would benefit the local economy. Eco-tourism is already a significant factor in Cape May County and this effort would compliment that market.

Environmental Education and Interpretation

Under this Alternative would provide few new opportunities for the public. Visitors would rely more on self-guiding trails and signs, and on occasional programs provided by partners. The Unit would attract fewer visitors than under Alternative B. Visitor use would increase over current conditions, which would have some impacts to the wildlife and the habitat. However, all of these efforts would be done in such a manner as to minimize negative impacts as much as possible.

Any impacts attributed to environmental education activities would be mitigated by the benefits of educating the public about Refuge resources. This action would benefit the local economy. Eco-tourism

is already a significant factor in Cape May County and this effort would compliment that market.

Refuge Buildings and Facilities

Under this Alternative the Service would utilize fewer buildings and improvements for management purposes. We would only use building B-6 and any other improvements needed for management purposes, and one or two buildings would likely be made available to our partners. The removal of non-essential buildings and other facilities would improve the site as a coastal dune community. Breeding and stopover habitat for migratory birds would increase. The removal of impervious surfaces would also benefit the surface and groundwater hydrology. The utilization of some buildings would reduce the potential maximum habitat gains. Use of selected buildings for management purposes and by our partners would benefit the local economy.

Consultation and Coordination with Others

In November and December 1996 the U.S. Fish and Wildlife Service (Service) held a series of 11 public meetings in:

- Ocean County, the Townships of Brick, Dover, Lacey, Stafford, and the Boroughs of Long Beach and Tuckerton;
- Atlantic County, the Township of Galloway;
- Cape May County, the Townships of Upper, Dennis, Middle, and Lower.

We announced the location, dates, and times for these meetings in local newspapers and through special mailings. We also briefed local members of Congress on the upcoming meetings. More than 280 people attended the meetings, which were held to let people know what the Service was doing to manage the Jersey Coast Refuges, and to elicit their input on topics of interest to them.

We also distributed an "Issues Workbook" (see **Appendix C**) to help collect the public's ideas, concerns, and suggestions on important issues associated with managing the Jersey Coast Refuges. We distributed the workbook to everyone on our mailing list, those who attended the public meetings, and anyone who subsequently requested one. Nearly 1,000 copies were distributed. Through the workbook, we asked for public input on the issues and possible action options, the things people valued most about the New Jersey coast, their vision for the future, and the Service's role in helping to conserve, protect, and enhance fish and wildlife and their habitats. More than 150 copies of the workbook were completed and returned.

In February 1997 we distributed a "Planning Update" (see **Appendix D**) which summarized the responses received in the "Issues Workbook". Responses from the workbooks and meetings were influential in helping us formulate the issues related to resource protection and public use.

In April 1997 we also held an Alternatives Workshop. Twenty-five individuals, representing local and State conservation agencies and organizations, participated in the daylong workshop. The participants reviewed and discussed the issues and concerns identified in the "Issues Workbook" and were asked to answer three questions:

- 1) What should be done?
- 2) Where should it be done?
- 3) Who should help the Service do it?

Input obtained from the public meetings, workbooks and workshop was used to prepare a Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA). This Draft CCP/EA was released for 45 days of public review and comment in May 1999. Over 200 people attended the three public meetings held in July at the following locations: Middle Township Building in Cape May County; Galloway Township Library in Atlantic County; and Stafford Township Municipal Building in Ocean County.

We also received over 1,600 individual comment letters. There were a great many duplicate comments received, since many people sent copies to both the Forsythe Refuge headquarters in Oceanville, New Jersey and our Regional Office in Hadley, Massachusetts. A summary of the public comments received and the disposition of the concerns expressed in those comments can be found in **Appendix E**. This summary also notes where we have changed the Draft CCP/EA or why we did not make such changes.

This Revised Draft CCP/EA is being released for 30 days of public review and comment. The Service will also hold a formal public hearing at 7:00 PM on July 19, 2000. The hearing will provide an opportunity for all interested parties to present oral or written testimony on the Revised Draft before a hearing officer and court reporter. Those wishing to do so will be able to sign up to speak when they enter the hearing room. This formal public hearing will be held at:

Absegami High School
201 South Wrangleboro Road
Galloway Township, Atlantic County, New Jersey

The location, date, and time for this hearing will also be noted in the cover letter accompanying this Revised Draft CCP/EA when it is distributed to the public, announced in local newspapers, and in a formal Notice of Availability printed in the Federal Register.

This Revised Draft CCP/EA has been made available for your review and comments. Comments and ideas received during the review period will be taken into consideration when preparing our final document. All written comments should be sent by either traditional or electronic mail no later than August 4, 2000 to:

The Jersey Coast Refuges Planning Team
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
FW5RW_CCP@fws.gov

List of Preparers

Members of the Jersey Coast Refuges Planning Team

Mr. William Archambault
NEPA Coordinator
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589

Mr. Stephen Atzert
Refuge Manager
Edwin B. Forsythe and Cape May NWR
Great Creek Road
Oceanville, New Jersey 08231

Ms. Allison Banks
Wildlife Biologist
U.S. Fish and Wildlife Service (RE)
134 Union Boulevard
Lakewood, Colorado 80228

Mr. Tracy Casselman
Deputy Refuge Manager
Edwin B. Forsythe and Cape May NWR
Great Creek Road
Oceanville, New Jersey 08231

Mr. Gilbert Chase
Wildlife Biologist
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589

Mr. Kevin Gormley
Law Enforcement Officer
Edwin B. Forsythe NWR
70 Collinstown Road
Barnegat, New Jersey 08005

Mr. Jeffrey King
Barnegat Division Manager
Edwin B. Forsythe NWR
PO Box 544, 70 Collinstown Rd.
Barnegat, New Jersey 08005

Mr. Leon Latino
Assistant Planner
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589

Mr. Bruce Luebke
Assistant Refuge Manager
Cape May NWR
Kimble Beach Road
Cape May Court House, New Jersey 08210

Mr. Norman Olson
Chief, Planning, Visitor Services, and Cultural Resources
U.S. Fish and Wildlife Service
300 Westgate Center Drive

Hadley, Massachusetts 01035-9589

Mr. Anthony Petrongolo
Chief, Bureau of Land Management
New Jersey Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625-0400

Ms. Linda Rubenstein
Outdoor Recreation Planner
Edwin B. Forsythe NWR
Great Creek Road
Oceanville, New Jersey 08231

Mr. Paul Steblein
Wildlife Biologist
Edwin B. Forsythe NWR
Great Creek Road
Oceanville, New Jersey 08231

Mr. Vincent Turner
Wildlife Biologist
Edwin B. Forsythe NWR
70 Collinstown Road
Barnegat, New Jersey 08005

Ms. Mary Varteresian
Wildlife Biologist
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589

Principles of Wilderness Management

This set of guiding principles is based on Wilderness Act direction and the wilderness management policies of the Bureau of Land Management, Forest Service, National park Service, and U.S. Fish and Wildlife Service.

1. Manage Wilderness as a distinct resource with inseparable parts.
2. Manage activities within Wilderness, including special provisions, with minimum impact on the Wilderness resource.
3. Allow natural processes to operate freely within Wilderness.
4. Attain the highest level of primeval character.
5. Provide for human values and benefits while preserving wilderness character.
6. Reduce physical and social impacts of human use in Wilderness through education, minimum regulation, and by favoring wilderness-dependent activities.
7. Restore wilderness character by removing existing structures and terminating uses and activities not compatible with Wilderness.
8. Accomplish necessary wilderness management work with the minimum tool, resorting to mechanized or motorized equipment only when its use clearly is the least damaging to the Wilderness resource.
9. Plan and manage Wilderness with public involvement and interdisciplinary science.
10. Harmonize land management activities adjacent to Wilderness to provide a transition from pavement to primeval.

**National Advanced Wilderness Management Training for Line Officers
Arthur Carhart National Wilderness Training Center**

Appendix B: Relevant Legal Mandates and Land Acquisition Legislation

Emergency Wetland Resources Act of 1986

This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended

Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 act had amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through Federal action and by encouraging the establishment of State programs. The Act:

- Authorizes the determination and listing of species as endangered and threatened;
- Prohibits unauthorized taking, possession, sale, and transport of endangered species;
- Provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- Authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;
- Authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and
- Authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act of any regulation issued thereunder.

Environmental Education Act of 1990 (20 U.S.C. 5501-5510; 104 Stat. 3325)

Public Law 101-619, signed November 16, 1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program.

Archaeological Resources Protection Act (16 U.S.C. 470aa

Responsibilities of the Office include developing and supporting programs to improve understanding of the natural and developed environment, and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a Federal grant program; and administering an environmental internship and fellowship program. The Office is required to develop and support environmental programs in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service.

Executive Order 11988, Floodplain Management

The purpose of this Executive Order, signed May 24, 1977, is to prevent Federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, Federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Fish and Wildlife Improvement Act of 1978

This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.

Historic Preservation Acts

There are various laws for the preservation of historic sites and objects.

Antiquities Act (16 U.S.C. 431 - 433): The Act of June 8, 1906, (34 Stat. 225) authorizes the President to designate as National Monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

- 470ll): Public Law 96-95, approved October 31, 1979, (93

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Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items.

This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal or Indian land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any State or local law.

Public Law 100-588, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from \$5,000 to \$500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the Nation.

Archeological and Historic Preservation Act (16 U.S.C. 469-469c): Public Law 86-523, approved June 27, 1960, (74 Stat. 220) as amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174) to carry out the policy established by the Historic Sites Act (see below), directed Federal agencies to notify the Secretary of the Interior whenever they find a Federal or Federally assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such data.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467): The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971) declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January, 1989, 31 national wildlife refuges contained such sites.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n): Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid
National and Community Service Act of 1990 (42 U.S.C. 12401; 104 Stat. 3127)

program to the States. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 2, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or structures listed or eligible for listing in the National Register.

As of January, 1989, 91 historic sites on national wildlife refuges have been placed on the National Register.

Land and Water Conservation Fund Act of 1948

This act provides funding through receipts from the surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including Fish and Wildlife Service.

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715d, 715e, 715f-715r)

This Act established the Migratory Bird Conservation Commission which consists of the Secretaries of the Interior (chairman), Agriculture, and Transportation and two members from the House of Representatives, and an ex officio member from the state in which a project is located. The Commission approves acquisition of land and water or interests therein, and sets the priorities for acquisition of lands by the Secretary for sanctuaries or for other management purposes. Under this Act, to acquire land or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718j, 48 Stat. 452), as amended

The "Duck Stamp Act," as this March 16, 1934, act is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to other appropriations.

Public Law 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the United States in full- and/or part-time projects designed to combat

Appendix B: Relevant Legal Mandates and Land Acquisition Legislation

illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the U.S. Fish and Wildlife Service.

American Conservation and Youth Service Corps – As a Federal grant program established under Subtitle C of the law, the Corps offers an opportunity for young adults between the ages of 16-25, or in the case of summer programs, 15-21, to engage in approved human and natural resources projects which benefit the public or are carried out on Federal or Indian lands.

To be eligible for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control and similar projects. A stipend of not more than 100 percent of the poverty level will be paid to participants. A Commission established to administer the Youth Service Corps will make grants to States, the Secretaries of Agriculture and Interior and the Director of ACTION to carry out these responsibilities.

National and Community Service Act – Will make grants to States for the creation of full-time and/or part-time programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive post-employment benefits of up to \$1000 per year for part-time and \$2500 for full-time participants.

Thousand Points of Light – Creates a non-profit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer in order to solve critical social issues, and to discover new leaders and develop institutions committed to serving others.

National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by P.L. 94-52, July 3, 1975, 89 Stat. 258, and P.L. 94-83, August 9, 1975, 89 Stat. 424).

Title I of the 1969 National Environmental Policy Act (NEPA) requires that all Federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment."

The Act establishes priorities for recreational uses of the Refuge System. Six wildlife-dependent uses are specifically named in the Act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These activities are to be promoted on the Refuge System, while all non-wildlife dependant uses are subject to compatibility

The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended

This Act defines the National Wildlife Refuge System as including wildlife refuges, areas for protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. The Secretary is authorized to permit any use of an area provided such use is compatible with the major purposes for which such area was established. The purchase consideration for rights-of-way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40% of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40% of such area would be beneficial to the species. The Act requires an Act of Congress for the divestiture of lands in the system, except (1) lands acquired with Migratory Bird Conservation Commission funds, and (2) lands can be removed from the system by land exchange, or if brought into the system by a cooperative agreement, then pursuant to the terms of the agreement.

National Wildlife Refuge System Improvement Act of 1997

Public Law 105-57, amends the National Wildlife System Act of 1966 (16 U.S.C. 668dd-ee), providing guidance for management and public use of the Refuge System. The Act mandates that the Refuge System be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management.

determinations. A compatible use is one which, in the sound professional judgement of the Refuge Manger, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s).

As stated in the Act, "The mission of the System is to administer a national network of lands and waters for the

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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.”

The Act also requires development of a comprehensive conservation plan for each refuge and management of each refuge consistent with the plan. When writing CCP, planning for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other Federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination or developing a CCP.

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401-4412)

Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, U.S. and Mexico.

The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the Act, along with an authorization for annual appropriation of \$15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act.

Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

Public Law 98-293 - approved May 22, 1984 (98. Stat. 207)

Renamed the Brigantine National Wildlife Refuge and Barnegat National Wildlife Refuge, collectively, as the Edwin B. Forsythe National Wildlife Refuge, in memory of the late Congressman Forsythe of New Jersey, ranking member of the House Merchant Marine and Fisheries Committee for many years.

This amendment also authorized appropriations to make up any difference between the amount in the Fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within

Refuge Recreation Act of 1962

This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Refuge Revenue Sharing Act (16 U.S.C. 715s)

Section 401 of the Act of June 15, 1935, (49 Stat. 38) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges.

Public Law 88-523, approved August 30, 1964, (78 Stat. 701) made major revisions by requiring that all revenues received from refuge products, such as animals, timber, and minerals, or from leases or other privileges, be deposited in a special Treasury account and net revenues distributed to counties for public schools and roads.

Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as:

- 1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and
- 2) on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662), payment in lieu of taxes on public lands.

the county which suffer losses in revenues due to the establishment of Service areas.

Rehabilitation Act of 1973 (29 U.S.C. 794)as amended

Title 5 of P.L. 93-112 (87 Stat. 355), signed October

Appendix B: Relevant Legal Mandates and Land Acquisition Legislation

1973, prohibits discrimination on the basis of handicap under any program or activity receiving Federal financial assistance.

Transfer of Certain Real Property for Wildlife Conservation purposes Act of 1948

This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Wilderness Act of 1964

Public Law 88-577, approved September 3, 1964, directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems for inclusion in the National Wilderness Preservation System.

Summary of public comments received on the draft CCP/EA and their disposition

The draft CCP/EA was released for 45 days of public review and comment in June 1999. Over 170 people attended the three public meetings held in July at the following location: Middle Township Building in Cape May County; Galloway Township Library in Atlantic County; and Stafford Township Municipal Building in Ocean County. We also received over 1,600 individual comment letters. There were a great many duplicate comments received, since many people sent copies to both the Forsythe Refuge headquarters in Oceanville, New Jersey and our Regional Office in Hadley, Massachusetts. A summary of the public comments received and the disposition of the concerns expressed in those comments follows.

Comment: Most commenters thought that the proposed closure of Holgate beach to motorized vehicles was outside our authority. They questioned whether we had the authority to close the beach based upon the States ownership and jurisdiction of riparian lands below the mean high tide line.

Response: The Holgate Peninsula above mean high tide has been owned by the Service since June 30, 1960, and was designated part of the Brigantine Wilderness Area under Public Law 93-632 on January 3, 1975. We not only have the authority to close Holgate beach above mean high tide to motorized vehicles, but are specifically directed to do so by the Wilderness Act of 1964.

The land below mean high tide in New Jersey is owned by the State. In the Draft CCP/EA, we proposed coordinating the closure with the New Jersey Tidelands Council. During the three public meetings held on the Draft document, we specifically stated that it was our intent to request a license from the Tidelands Council to close Holgate beach below the mean high tide line as well. This request has been dropped from Alternative B, our Proposed Action in the Revised Draft CCP/EA.

Comment: Several commenters questioned whether we had the authority to close Holgate beach to motorized vehicles under the provisions of the Wilderness Act. Others stated that the original designation of Holgate as a Wilderness Area was inconsistent with the mandate and intent of the Act. They believed the high volume of boat traffic and

close proximity of Holgate to a major urban area like Atlantic City would make it difficult, if not impossible, for Refuge visitors to obtain a "wilderness experience," as defined by the Act.

Response: We not only have the authority to close the Wilderness Area at Holgate, including all the land above mean high tide, to motorized vehicles, but we are specifically directed to do so by the Wilderness Act of 1964. When Congress designated our lands on Holgate Peninsula as part of the Brigantine Wilderness Area, they determined that this designation was consistent with the mandate and intent of the Wilderness Act of 1964. While circumstances in the vicinity may make it difficult, if not impossible, for Refuge visitors to obtain a "wilderness experience," as defined by the Act, this does not give us the authority to disregard the Act's specific prohibition against motorized vehicle use within wilderness areas.

Comment: Many commenters also noted that closing Holgate beach to motorized vehicles would significantly reduce fishing opportunities on Forsythe Refuge. They felt this action would be inconsistent with our mandates under the National Wildlife Refuge System Improvement Act of 1997, which identifies fishing as one of six wildlife-dependent priority public uses of the Refuge System that should be given priority consideration over other uses of refuges.

Response: While closing the area above mean high tide to motorized vehicles will reduce the fishing opportunities currently available on the Holgate Peninsula, it will not close the area to fishing. Those interested in fishing the Peninsula would still be able to do so on foot or by driving and parking their motorized vehicles below the mean high tide line. In fact, the potential introduction of a water ferry to the tip of the Peninsula, as included in Alternative B, our Proposed Action in the Revised Draft CCP/EA, would provide new opportunities to fish the Holgate for those who do not own suitable motorized vehicles or boats.

Comment: Other commenters supported the closure of Holgate beach to motorized vehicles. They were primarily concerned that the current vehicular use of the beach caused water, air and noise pollution. Furthermore, they believed that motorized uses were not appropriate in designated Wilderness Areas.

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Response: We agree, and have included the proposed year-round closure of the Holgate Peninsula above mean high tide to motorized vehicles in Alternative

Comment: Many commenters requested that both Forsythe and Cape May Refuges provide more environmental education opportunities and improve public access by providing additional interpretive trails. They also requested that additional user-friendly maps and signs be placed throughout the Refuges.

Response: We agree. In Alternative B, our Proposed Action in the Revised Draft CCP/EA, we have substantially expanded our environmental education offerings and increased the amount of interpretation that we would provide, including additional interpretative trails and signage.

Comment: Several commenters were concerned that the proposed location of the new Barnegat Division office and visitor contact station would not provide the public with a suitable wildlife-oriented experience because of the commercial nature of the area.

Response: While we concur with those commenter's observations regarding the commercial nature of the area in question, we selected this site along U.S. Route 9 because we own the land and wished to keep our new structure within an area that was already developed and had good access to a major traffic corridor. This will allow us to protect the habitats within the Refuge from further fragmentation, while allowing us better access to a larger segment of the public. From this location we will be able to direct our visitors to the many trails and other facilities found in more remote parts of the Refuge.

Comment: Many commenters requested that at-large or Refuge-wide hunting be allowed at both Forsythe and Cape May Refuges in all areas deemed appropriate. They were concerned about the diminishing number of areas around the Refuges that provided hunting opportunities for the public. In particular, several people requested that upland game hunting opportunities be provided. They referenced the National Wildlife Refuge System Improvement Act of 1997, which includes hunting as one of six wildlife-dependent priority public uses of the Refuge System that should be given priority consideration over other uses of the refuges. A few people commented that hunting was not an appropriate use on a National Wildlife Refuge.

B, our Proposed Action in the revised Draft CCP/EA.

Response: In response to the concerns of these commenters, we added a third alternative, Alternative C, in the Revised Draft CCP/EA. This Alternative would provide opportunities for Refuge-wide hunting at both Refuges. At Forsythe we would expand deer hunting opportunities by including the State fall and winter bow and regular six-day firearms seasons, and open most of the Refuge to both upland game and migratory game bird hunting. At Cape May we would provide opportunities for upland game and migratory game bird hunting Refuge-wide. The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

Alternative B, our Proposed Action in the revised Draft CCP/EA, while not providing Refuge-wide hunting, would significantly increase hunting opportunities at both Refuges. At Forsythe we would expand the area currently opened to permit deer hunting and initiate a universally accessible permit deer hunt, initiate upland game hunting in the Oak Island Unit of the Brigantine Division, and expand the area open to migratory game bird hunting. At Cape May we would open about 45% of the Refuge to upland game hunting and expand the current migratory game bird hunting area into that same 45% of the Refuge. The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

While hunting must be given priority consideration over other public uses, it does not take priority over the other five wildlife-dependent priority public uses (fishing, wildlife observation and photography, environmental education and interpretation) identified in the Improvement Act. We believe that Alternative B, our Proposed Action in the Revised Draft CCP/EA, would help us best achieve Refuge purposes, vision and goals; fulfill the Refuge System mission; maintain and, where appropriate, restore the biological integrity, diversity and environmental health of both Refuges and the System; address the key issues and mandates; and is consistent with the principles of sound fish and wildlife management.

Comment: The State of New Jersey, Division of Fish and Wildlife, requested that additional acreage within both Forsythe and Cape May Refuges be opened up to provide opportunities for hunting.

Appendix E: Summarized Public Comments

They believed the Service's safety concerns could be addressed by requiring that all hunters be in

Response: Alternative B, our Proposed Action in the Revised Draft CCP/EA, would significantly increase hunting opportunities at both Refuges. At Forsythe we would expand the area currently opened to permit deer hunting and initiate a universally accessible permit deer hunt, initiate upland game hunting in the Oak Island Unit of the Brigantine Division, and expand the area open to migratory game bird hunting. At Cape May we would open about 45% of the Refuge to upland game hunting and expand the current migratory game bird hunting area into that same 45% of the Refuge. The entire Refuge is already open for deer hunting. Additional opportunities for hunting would also be provided on newly acquired lands at both Refuges.

Comment: Other commenters requested additional trapping opportunities at both Forsythe and Cape May Refuges. They identified trapping as a necessary and important wildlife management tool.

Response: We agree that trapping is an important wildlife management tool. It is often used on refuges to control predators and to manage populations of small mammals that impact refuge habitats and facilities such as dikes. Alternative B, our Proposed Action in the Revised Draft CCP/EA, includes additional opportunities for trapping at both Forsythe and Cape May Refuges. At Forsythe we would expand the areas open to trapping and at Cape May we would open about 25% of the Refuge to trapping of muskrat, raccoon and fox.

Comment: Many commenters supported our land protection proposals and wanted us to continue to acquire additional properties located near or around both Forsythe and Cape May Refuges. They supported our efforts to both increase habitat protection and provide additional public use opportunities.

Response: Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would acquire 12,300 acres of privately owned lands within our currently approved acquisition boundaries at Forsythe Refuge, and 7,600 acres of privately owned lands within our currently approved acquisition boundaries at Cape May Refuge. We also have identified 17,000 acres of focus areas at Forsythe Refuge, 11,500 acres of which we are proposing to acquire, and 4,900 acres of focus areas at Cape May Refuge, 3,600 acres of which we are proposing to

compliance with State fish and game regulations.

acquire. These lands are located outside our current approved Refuge acquisition boundaries and represent lands with habitats that are important to a number of federal trust species. They also encompass watersheds that are important to protect from future development to ensure that we have adequate water quantity and quality for Refuge wetlands and provide habitat corridors for the movement of wildlife between various state, local and federal conservation lands.

Comment: Several commenters thought that the proposed two-year beach closure during the nesting season at the new Two Mile Beach Unit was unnecessary. They were concerned that the closure threatened their long-standing use of the beach, including being able to walk the beach to reach Cape May Inlet. Several suggested that fencing could be placed above the mean high tide line as a protective measure and that the proposed beach closure should only be enforced if birds actually began to nest at the site.

Response: In light of our mandates as a Federal Land Management Agency, we believe it is important that the beach be available for undisturbed breeding, nesting, feeding, preening, and loafing by an assortment of migratory birds. Under the provisions of the National Wildlife Refuge System Improvement Act of 1997, compatible wildlife-dependent recreational use and all other compatible uses are secondary to the "... conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitat..." We do not believe that placing fencing above the mean high tide line will adequately protect these birds, as the adults and young do much of their feeding at the wrack, or daily high tide line. Nor do we believe that closing the beach only if birds actually began to nest at the site is adequate.

The U.S. Coast Guard LORAN Support Unit is prepared to follow our lead on closing that portion of the beach still under their jurisdiction. They also are prepared to close public access to the jetty on the north side of the Cape May Inlet.

Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would allow pedestrian access to the beach from about October 1 through March 31 each year. No vehicles would be allowed on the beach at any time. We would also allow

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pedestrian access to other parts of the Two Mile Beach Unit all year.

Comment: Several commenters expressed a desire to see the existing buildings at the new Two Mile
Response: Under Alternative B, our Proposed Action in the Revised Draft CCP/EA, we would maintain two existing buildings for Refuge office, storage and maintenance purposes, and one for use as a visitor center with displays, exhibits, and regular programs. We would remove all other buildings on the site, all of which are located within the one hundred year floodplain, in compliance with the directives of Executive Order 11988, Floodplain Management. This will allow us to restore the heart of the upland habitat at the Two Mile Beach Unit, in compliance with our mandate under the National Wildlife Refuge System Improvement Act of 1997, which calls for the "... conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitat..."

Beach Unit used for a variety of purposes such as housing for researchers or as a fishing clubhouse. Others commented that we should demolish all the existing buildings and then restore the land to native vegetation.

Appendix F: Ecosystem Values

Ecosystem services and functions (Costanza, *et al.* 1997)

Number	Ecosystem Service*	Ecosystem Functions	Examples
1	Gas regulation	Regulation of atmospheric chemical composition.	CO ₂ /O ₂ balance, O ₃ for UVB protection, and SO _x levels
2	Climate regulation	Regulation of global temperature, precipitation, and other biological mediated climatic processes at global or local levels.	Greenhouse gas regulations, DMS production affecting cloud formation.
3	Disturbance regulation	Capacitance, damping and integrity of ecosystem response to environmental fluctuations.	Storm protection, flood control, drought recovery and other aspects of habitat response to environment variability mainly controlled by vegetation structure.
4	Water regulation	Regulation of hydrological flows.	Provisioning of water for agricultural (such as irrigation) or industrial (such as milling) processes or transportation.
5	Water supply	Storage and retention of water.	Provisioning of water by watersheds, reservoirs, and aquifers.
6	Erosion control & sediment retention	Retention of soil within an ecosystem.	Prevention of loss of soil by wind, runoff, or other removal processes, storage of silt in lakes and wetlands.
7	Soil formation	Soil formation processes.	Weathering of rock and the accumulation of organic material.
8	Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients.	Nitrogen fixation, N.P. and other elemental or nutrient cycles.
9	Waste treatment	Recovery of mobile nutrients & removal or breakdown of excess or xenic nutrients & compounds.	Waste treatment, pollution control, detoxification.
10	Pollination	Movement of floral gametes.	Provisioning of pollinators for the reproduction of plant populations.
11	Biological control	Trophic-dynamic regulations of populations.	Keystone predator control of prey species, reduction of herbivory by top predators.
12	Refugia	Habitat for resident and transient populations.	Nurseries, habitat for migratory species, regional habitats for locally harvested species or overwintering grounds.
13	Food production	That portion of gross primary production extractable as food.	Production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing.
14	Raw materials	That portion of gross primary production extractable as raw materials.	The production of lumber, fuel or fodder.
15	Genetic resources	Sources of unique biological materials and products.	Medicine, products for materials science, genes of resistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants).
16	Recreation	Providing opportunities for recreational activities.	Ecotourism, sport fishing, and other outdoor recreational activities.
17	Cultural	Providing opportunities for non-commercial uses.	Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.

Background

The Holgate Unit of the Edwin B. Forsythe National Wildlife Refuge comprises 2.75 miles of Long Beach Island, including long expanses of undeveloped barrier beach. One of the most popular recreational activities occurring at Holgate beach is marine recreational surf fishing. Because there is no road access in the Holgate Unit, surf fishing along the beach has primarily been undertaken with the use of off-road vehicles (ORVs). Recreational surf fishing with ORVs is a popular pastime along the New Jersey coast and many ORV surf fishermen have formed private organizations to support their cause. ORV fishermen invest a substantial amount of resources in their recreational activity and frequently custom outfit their vehicles and purchase expensive fishing gear. For many participants, surf fishing with the use of an ORV is considered their most important recreational activity. Surf fishing at Holgate is particularly good at the southern point of the Unit where the waters of Great Bay and Egg Harbor meet the Atlantic. Stripe bass and bluefish are the most targeted species in the spring and fall, and in the summer flounders inhabit the shallow waters found around the bay. Surf fishing activity at Holgate beach typically peaks in the fall when large schools of bluefish and striped bass pass by the beach migrating south for the winter.

The total value placed on ORV beach access at Holgate can be divided into actual expenditures incurred by ORV anglers and non-monetary benefits associated with angler satisfaction. While ORV anglers will incur expenditures when fishing at Holgate beach, they do not pay for the actual fish they catch, nor do they incur a specific cost for the enjoyment of fishing itself, which may include experiences such as socializing with fellow fishermen and being able to enjoy solitude while fishing on a remote beach. The non-monetary benefits associated with ORV surf fishing make estimating the specific economic value of fishing at Holgate a difficult task. Furthermore, the willingness to pay for a surf fishing excursion with an ORV will vary between fisherman, based on each anglers gratification with the experience.

Many ORV anglers who surf fish along Holgate beach may consider the overall fishing experience to contribute to their general well being by affording them the opportunity for relaxation, experiencing nature, and gathering with friends. In a marine recreational fishing survey funded by the National The seasonal closure particularly affected summer surf anglers as most of Long Beach Island's beaches

Marine Fisheries Service (NMFS), anglers were asked to rate the primary reasons they spend time fishing. In the Mid-Atlantic region which includes the New Jersey coast, anglers in the survey rated the opportunity to enjoy nature and the outdoors as their principal reason for fishing, followed by the opportunity to relax and escape from their daily routine, to spend quality time with friends and family, and to experience the excitement or challenge of sport fishing. While catching fish to eat was rated somewhat important to anglers, findings from the survey generally concur with previous studies that found non-catch reasons are rated significantly higher by almost all respondents. Catch was rated very important to only about a third of the anglers surveyed. Putting a specific economic value on these non-monetary traits is extremely difficult, and will not be attempted in this analysis.

Typical angler expenditures associated with an ORV surf fishing trip to Holgate beach would include the purchases of bait, gear, ice, and meals. Furthermore, travel expenses incurred from the trip would include costs like fuel, tolls, travel fares and parking fees. A percentage of nonlocal ORV anglers fishing at Holgate beach may need overnight accommodations and would incur the additional costs associated with lodging. All of these expenditures can be assumed to have positive impacts on the local Long Beach Island community, in particular those businesses found along the route ORV users travel to reach Holgate beach.

Impacts from the 1988 Seasonal Closure

In 1988, the Holgate Unit was closed from early April to September to both pedestrian and ORV traffic to protect piping plovers, a listed species under the Endangered Species Act. An economic analysis completed in 1998, concluded that the seasonal beach closure had negligible impact on the overall economy of the island, which amounts to about \$500 million a year (Industrial Economics, 1998). However, the seasonal closure appears to have affected the beach usage patterns of some residents and visitors with consequent effects on the Islands economic welfare including potential losses in municipal revenues from beach buggy licenses, and lost revenues to some businesses, especially at the south end of the island near the entrance to the Holgate Unit.

were already closed to ORV traffic between May and September to accommodate seasonal beach use for

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swimming and sunbathing. In response to the seasonal closure it is assumed that some anglers sought alternative fishing sites off-island which resulted in negative economic effects on businesses that catered to these ORV surf fishing anglers. Furthermore, the seasonal closure prevented recreational fishing opportunities at Holgate for popular species like summer flounder, which are primarily targeted in the months of July and August and thus the closure reduced fishing opportunities for some anglers. Bait and tackle shops throughout the island appeared to have suffered some loss in revenues from the seasonal closure, and one shop nearest to the entrance to the Holgate Unit reported losing 30 percent or more of its overall revenues in the first few years after the closure. In addition, several other motels and restaurants which specifically catered to anglers also reported a loss in revenues. However, the report concluded that all these businesses survived the seasonal closure and remained viable.

Impacts from Alternative B, the Service's Proposed Action

The proposed year-round Holgate Unit closure (i.e., those lands above mean high tide) to ORVs, under the directives and principles of the Wilderness Act, can be expected to cause localized negative economic impacts to the Long Beach community. This Alternative would eliminate all motorized traffic year-round above mean high tide (the designated Wilderness Area known as the Holgate Unit) on the Holgate Peninsula. Although the closure is not expected to negatively impact the overall Long Beach Island economy, individual businesses such as bait and tackle shops will most likely suffer additional economic losses under a year-round ORV beach closure at Holgate. Along with bait and tackle shops it is anticipated that ORV surf fishing anglers will be the most directly impacted user group under the proposed closure. As stated above, many of the impacts ORV anglers incur will be non-monetary social impacts and putting a specific value on those losses or estimating the extent of the impact is a difficult task.

As with the 1988 seasonal closure, the direct negative economic impacts associated with the year-round ORV beach closure above mean high tide will most likely be localized to the communities in Long Beach Island, in particular those nearest the entrance to the Holgate Unit, such as Long Beach Township. To reach the Holgate Unit with an ORV, anglers must cross Long Beach Township lands. In

order to do this, they must purchase a Township beach buggy permit. In 1999, permit data collected from the Township identified that a total of 734 beach buggy permits were issued that year. Permits were issued under two categories, either for the full season or for limited use during the fall fishing tournaments. Full season permits cost \$50.00, and a limited use permit sold for \$25.00. In 1999, the Township issued 630 full season permits and 104 fall permits. Overall, beach buggy permit sales brought around \$34,000 in direct revenues to Long Beach Township in 1999.

Given that the majority of ORV beach buggy permits were issued to anglers specifically to access the Holgate Unit, it is likely that the Township's revenue from beach buggy sales would decrease under the Proposed Action. While Long Beach Township will see a reduction in overall ORV permit revenues, other Long Beach Island communities, such as Harvey Cedars and Surf City may see increases in their permit sales. It is also assumed that other New Jersey beachfront communities that offer ORV access for surf fishing may experience a slight increase in revenues from angler expenditures on beach buggy permits.

To identify the areas from which ORV anglers were traveling, the beach buggy permits were divided into local and non-local categories. Non-local was determined to be any ORV permittee that listed their primary residence as a location more than two hours from Long Beach Island using an average vehicle travel time. Using that criteria, it was determined that 466 of the 734 ORV permits issued by the Township in 1999 were for non-local anglers, while 268 of the permits were for local anglers. Although some local ORV anglers may have been identified as non-local by this criteria, it is difficult to determine whether an individual's fishing trip would originate from Long Beach Island, or their primary residence. Many anglers identified as non-local may own or rent seasonal housing on Long Beach Island changing their travel patterns and travel expenditures.

Impacts to Bait and Tackle Shops

As an industry directly dependent upon recreational fishing, bait and tackle shops located on Long Beach Island can be expected to incur economic losses from the proposed year-round beach closure to ORVs. Bait and Tackle shops located closest to the entrance to the Holgate Unit will most likely suffer the largest losses, with impacts being reduced as time

Appendix G: Socioeconomic Analysis of ORV Use at Holgate

and distance from the Unit increases. A typical surf fishing excursion requires a significant amount of gear and supplies such as rods, tackle, ice, and bait, and without the assistance of an ORV, it is. Some bait and tackle shops reported an overall revenue decline of up to 30% under the seasonal beach closure of 1988. The economic impacts of the proposed year-round ORV beach closure are expected to be greater. This is especially true given that it restricts ORV fishing access at the Holgate Unit to the area of the beach below mean high tide during the peak fall surf fishing period of September, October and November when anglers target large schools of migrating bluefish and striped bass. Most anglers acquire bait, ice and limited fishing tackle the day of the actual fishing excursion. It is expected that many anglers frequenting these businesses on Long Beach Island, particularly those near the entrance to the Holgate Unit, will use alternative bait and tackle shops once the closure is implemented.

The full extent of the economic impact on bait and tackle shops from the Proposed Action will really depend on how many ORV anglers seek alternative fishing sites off the Island, and whether the closure impacts participation in the annual Fall Long Beach Island Fishing Tournament. While it is anticipated that fishing effort at Holgate beach will be reduced under this Alternative, the majority of ORV anglers currently using Holgate beach are expected to continue fishing at alternative fishing sites. Predicting what level of fishing effort will actually shift off the Island is not possible at this time. Because it will still be possible for ORV anglers to access nearly 16 miles of beachfront along the Island, many anglers may continue to fish other sites on the Island and continue to frequent local bait and tackle businesses.

Given that most anglers choose their fishing sites based upon criteria such as better catch rates and convenience, predicting which coastal communities may see a shift in fishing effort is difficult to predict.

Also, many anglers and fishing tournament participants who use ORVs may change their fishing practices and continue to fish on the Island without accessing the beach with an ORV. Barnegat Light, found at the far north end of the Island, is a good example of a very popular fishing site where all ORV access above the mean high tide line is already prohibited. While some ORV anglers may decide to give up recreational surf fishing overall, that percentage is expected to be small and most anglers directly impacted by the ORV beach closure will continue to fish.

anticipated many surf fishing anglers will seek alternative fishing sites and forgo a trip to Holgate beach.

Overall, the reduction in income at a few Long Beach Island bait and tackle shops may be substantial under this Alternative. It is possible that businesses catering primarily to surf fishermen may suffer unsustainable economic losses to their operations.

Fall Fishing Tournament

On Long Beach Island, the Southern Ocean County Chamber of Commerce sponsors an annual six week fall surf fishing tournament, typically running from October 2-November 14. The tournament is promoted by both the Chamber of Commerce and local media and the event brings in anglers and spectators from within and outside of the Long Beach Island area. The tournament encompasses all of Long Beach Island, including the Holgate Peninsula located at the southern end of the Island.

Holgate beach currently provides ORV anglers with access to some of the best fishing sites along the Island, and without ORV access to Holgate it is possible that participation in the fall tournament may decline. Local businesses, like bait and tackle shops, depend on revenues generated from the fall tournament, and any impact on the tournaments level of participation would impact these business's overall revenues. The fall tournament is structured to maintain fishing activity during the entire six week tournament, and a variety of cash prizes for the largest bluefish and striped bass landed are presented daily. Both local and nonlocal anglers participate in the event, with around 600 anglers annually entering the tournament and paying the \$25 registration fee, in addition to any ORV beach access permit fees.

Predicting what percentage of ORV anglers may choose not to enter the tournament or fish elsewhere is difficult because Long Beach Island does offer alternative fishing sites, almost all with ORV beach access. A slight decline in angler participation in the tournament will likely occur under the ORV beach closure at Holgate. A reduction in angler participation would also slightly reduce Chamber of Commerce revenues associated with the entrance fees. It is expected that the tournament will continue and anglers will shift their fishing effort

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elsewhere or access the Holgate Peninsula either on foot or by driving their ORVs down the beach below the mean high tide line. Many other coastal communities along the New Jersey coast also sponsor fall surf fishing tournaments offering anglers alternative tournament options. Because other communities offer tournament options, it is expected that a certain percentage of the revenues and expenditures brought into Long Beach Island by One of the most difficult impacts to predict under the year-round ORV closure are non-monetary social impacts to ORV surf fishing anglers. As discussed above, recreational fishing provides anglers with social benefits such as quality time with friends and relaxation opportunities. Putting a monetary value on these types of experiences is hard to calculate. Some anglers consider the best fishing on the island to be located within the Holgate Unit, and prior to the 1988 summer closure for piping plovers, a large number of ORV fishermen fished the waters near the tip of the island during the summer months (Industrial Economics, 1998). When the 1988 seasonal closure was implemented, it was determined that a significant number of serious anglers abandoned the Island to fish at sites such as Brigantine Island and Island Beach State Park. The year-round ORV closure will further limit fishing opportunities on the Island for ORV anglers. In particular, the closure will impact ORV anglers who primarily focused their fishing activity at Holgate beach. Under the proposed ORV closure, anglers choosing to continue fishing on Long Beach Island with ORVs would still be able to access long stretches of the beach on the Island. Current Long Beach Island ORV regulations would allow fishermen to access 16 miles of beach from the entrance to the Holgate Unit north to Loveladies, if they secure the proper beach access permits. Although ORV anglers may still be able to access the Holgate beach during low tide under the proposed closure, most will likely choose not to use the Holgate Peninsula and forgo the opportunity to experience driving their ORVs along an undeveloped wilderness beachfront.

ORV fishermen who only occasionally fished at Holgate and who have easy access to alternative fishing sites will incur fewer impacts under this Alternative. Anglers who have primarily fished Holgate beach, will experience a more significant disruption and loss of quality fishing time. The unique physical nature of Holgate beach offers miles of undeveloped beachfront along the New Jersey coast and finding an alternative site which offers ORV anglers the same wilderness fishing experience will be extremely difficult, if not impossible. The

the fall fishing tournament will be shifted to other bait and tackle shops located in those communities.

Social Impacts to ORV Surf Fishing Anglers

heavy residential and commercial development along the New Jersey's coast has greatly reduced the opportunity for ORV fishermen to access areas lacking significant beachfront development. While areas such as Chicoteague National Wildlife Refuge in Virginia and the Outer Banks of North Carolina may still afford such remote fishing opportunities with ORVs, closing Holgate beach to ORVs will greatly reduce such fishing opportunities for ORV anglers in New Jersey. Overall, it is expected that ORV anglers will suffer some negative social impacts through reductions in fishing opportunities.

The size and scope of such impacts will really be dependent on the availability of alternative ORV fishing sites and the willingness of ORV fishermen to travel to those sites.

Impacts to Restaurants and Lodging

Long Beach Island is a seasonal based economy totally dependent upon summer tourism. Long Beach Island has a permanent population of about 8,600 which swells to over 50,000 on peak weekends in the summer months. The island supports 31 hotels and motels plus seven bed and breakfast inns and about 5,000 condominiums and other rental units. In addition, the guide for "Places to Eat" on the Island lists 39 restaurants and other eating establishments on the island (Southern Ocean County Chamber of Commerce, 1997).

According to a recent economic study, the summer season, which runs from late May to Labor Day weekend, accounts for nearly 80 percent or more of the annual revenues for most hotels and motels located on the Island (Industrial Economics, 1998). Because the Island community is a seasonal based economy, many businesses will have already closed for the season by the time fall surf fishing begins. Furthermore, many ORV anglers do not begin fishing at Holgate until later in the fall depending on when migrating schools of bluefish and striped bass arrive.

In 1988, the seasonal closure of Holgate beach for piping plovers appeared to have little effect on the

Appendix G: Socioeconomic Analysis of ORV Use at Holgate

overall lodging business. Assuming that most revenues are collected during the summer season, it is expected that closing the Holgate Unit year-round to ORVs will have only minor negative economic impacts on these businesses. Because a summer closure of Holgate beach was already in place, only those businesses which remained open after the summer season can be expected to incur any impacts from the year-round closure. Furthermore, the loss Long Beach Island restaurants also depend upon the summer season for their primary revenues. However, some restaurants on the Island do remain open longer during the fall season and a limited amount of restaurants remain open year-round. Under the proposed ORV closure these businesses can be expected to see some slight decrease in overall revenues if ORV fishermen choose alternative fishing sites off the Island. Because the Island still offers ORV access and fishing will continue during the fall, the impacts are expected to be minor. Furthermore, many ORV fishermen bring their meals with them on fishing trips and this tendency further reduces their dependence and impact on local businesses.

Although the overall economic impact of the year-round closure is expected to be minimal, localized impacts may be more severe. The 1998 economic study did identify that some businesses which rented primarily to anglers suffered up to a 10% overall revenue reduction under the seasonal closure (Industrial Economics, 1998). Assuming these businesses also rented to ORV anglers in the fall, it is expected that they will see some further decline in their annual revenues under the Proposed Action. Furthermore, it is possible that some businesses which were kept open after the Labor Day weekend primarily to cater to ORV anglers will now close operations earlier. As with the bait and tackle shops, the extent of the impact will be reduced as the motels and restaurants are located farther from the entrance to the Holgate Unit. Overall, while some businesses may experience minor reductions in revenues, only off season businesses focused primarily of capturing the surf fishing expenditures should see any noticeable declines.

Impacts from Boat Ferry Service

Under the Service's Proposed Action, alternative access to the Holgate Unit may be allowed through a boat operated ferry system. Originating out of Long Beach Island, a boat ferry system would be expected to bring positive economic returns to the local economy. Ferry system concessionaires are

in revenues is expected to be minor as only a limited number of ORV anglers actually seek overnight lodging. The lighter traffic conditions during the fall fishing season and the willingness of ORV anglers to drive long distances also reduces the impact on lodging as many anglers will commute rather than seek overnight accommodations.

currently in use at several National Wildlife Refuges nationwide to access Wilderness Areas, including Cape Romain Refuge in South Carolina and Monomoy Refuge in Massachusetts. A boat ferry system would allow surf anglers to continue to access the best fishing sites on Holgate beach for a fixed cost. Many anglers may choose to use the ferry system to fish in a Wilderness Area without crowds and noise from motorized vehicles. The ferry system would also allow that segment of the public who do not have suitable motor vehicles the opportunity to access a remote beach environment.

A boat ferry operation may also help promote an ecotourism business on the Island as birders and naturalists seek remote areas to experience nature. The Holgate Unit is an ideal place to view fall migrations of shore birds and marine life, and the Service encourages wildlife viewing on the Refuge System. Interest in ecotourism is growing and access to Holgate beach would provide an excellent opportunity to create a Long Beach Island ecotourism business. It is difficult to predict the level of revenues that would be associated with establishing ecotourist based business, but with promotions from organizations like the local Chamber of Commerce the returns could be significant.

Appendix H: Species and Habitats of Special Concern

Species and communities of special emphasis in the Jersey Coast landscape from *Significant Habitats and Habitat Complexes of the New York Bight Watershed* (USFWS, 1997)

The list is not all-inclusive; it includes species found in the watersheds during part of their life cycle, and selected under the following criteria:

1. Federally listed as threatened or endangered;
2. migratory bird, especially declining species, Neotropical migrants, colonial waterbirds, shorebirds, or waterfowl;
3. marine mammal;
4. Sea turtle;
5. interjurisdictional fish;
6. State-listed as threatened, endangered, or special concern.

Complete species lists are being compiled by staff at the Refuge, and are available for review for vertebrates. They will be published in one or more of the step-down plans.

Codes used in lists of species of special emphasis

Global Element Ranks (from The Nature Conservancy)

- G1- Critically imperiled globally because of extreme rarity (typically 5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2 - Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3 - Rare or uncommon but not imperiled. Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
- G4 - Not rare and apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery; cause for long-term concern. (Usually more than 100 occurrences.)
- G5 - Demonstrably secure globally; widespread and abundant, though it may be quite rare in parts of its range, especially at the periphery.
- GH - Of historical occurrence throughout its range, - possibly extinct i.e., formerly part of the established biota with the expectation that it may be rediscovered (e.g., Bachman's warbler).

- GU - Possibly in peril range-wide, but status uncertain; need more information.
- GX - Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.
- G#G# Range of ranks; insufficient information to rank more precisely.
- G?- Not yet ranked.
- G#T# For infraspecific taxa; the G rank applies to the full species and the T rank applies to the infraspecific taxon.
- G#Q Taxonomic status is questionable.

State Element Ranks (from Nature Conservancy and/or State Heritage Programs)

Numeric Rank: Based primarily on the number of occurrences of the species in the state.

- S1 - Critically imperiled in state (usually 5 or fewer occurrences); especially vulnerable to extirpation in the state.
- S2 - Imperiled in state (usually 6 to 20 occurrences).
- S3 - Rare or uncommon in state (usually 21 to 100 occurrences).
- S4 - Widespread, abundant, and apparently secure in the state, but with cause for long-term concern (usually more than 100 occurrences).
- S5 - Widespread, abundant and demonstrably secure in state.
- S? - Not yet ranked in the state.
- SU - Unrankable or uncertain status due to lack of information; possibly in peril
- SE - Exotic: an exotic established in the state.
- SA - Accidental or casual in state (infrequent and far outside usual range).
- SH - Historical: species occurred historically in the state (with the expectation that it may be extant and rediscovered), generally not having been verified in the past 20 years.
- SX - Apparently extirpated from state.
- SN or SZN - Regularly occurring, usually migratory and typically non-breeding, species for which no significant or effective habitat conservation measures can be taken in the state; no definable

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occurrences.

Appendix H: Species and Habitats of Special Concern

For species with distinct breeding (B) and non-breeding (N) populations, a breeding status SRANK can be coupled with its complementary non-breeding SRANK, separated by a comma, e.g., S2B, S3N or S1B, SHN.

- SR - Reported from state, but without persuasive documentation; species may be misidentified.
- SRF - Reported falsely; erroneously reported as occurring in the state and error has persisted in the literature.
- SP - Potentially occurs in the state, but no occurrences reported.

.1 Species documented from a single location.

Federal Status or Authority

- E - Formally listed as Endangered under the Endangered Species Act of 1973.
- T - Formally listed as Threatened under the Endangered Species Act of 1973.
- PE - Proposed Endangered.
- PT - Proposed Threatened.
- C1 - Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.
- C1* - Taxa which may be possibly extinct (although persuasive documentation of extinction has not been made).

Species of Concern

Federal species of concern includes those species formerly considered C2 candidates as described below. Although these C2 and C3 candidates are no longer officially considered for listing under the Endangered Species Act, the former candidate status is important historical information and is retained for this report.

- C2 - Taxa for which the information now in the possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules.
- C3 - Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three subcategories, depending on the reason(s) for removal from consideration.

Species and Community Presence in geographic macrosites that comprise Edwin B. Forsythe and Cape May National Wildlife Refuges. The Refuge lands are partitioned into six macrosites or

- 3A - Taxa for which the Service has persuasive evidence of extinction.
- 3B - Names that, on the basis of current taxonomic understanding, do not represent taxa meeting the Act's definition of "species."
- 3C - Taxa that have proven to be more abundant or widespread than was previously believed.
- SA - Similarity of appearance of species.

Other Federal Authorities

- I - Interjurisdictional Fish - Move between state and local jurisdictions (e.g., anadromous)
- MB - Migratory Bird Treaty Act

New Jersey Legal Status

- D - Declining species: a species that has exhibited a continued decline in population numbers over the years.
- E - Endangered species: an species whose prospects for survival within the state are in immediate danger due to one or many factors - loss of habitat, over-exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.
- T - Threatened species: a species that may become endangered if conditions surrounding the species begin or continue to deteriorate.
- EX - Extirpated species: a species that formerly occurred in New Jersey, but is not now known to exist within the state.
- I - Introduced species: a species not native to New Jersey that could not have established itself here without the assistance of man.
- INC - Increasing species: a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long time period.
- P - Peripheral: a species whose occurrence in New Jersey is at the extreme edge of its present natural range.
- S - Stable species: a species whose population is not undergoing any long-term increase or decrease within its natural cycle.
- U - Undetermined species: a species about which there is not enough information available to determine the status.
- LP - Pinelands: a species listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. geographically distinct ecosystems. They include: pine barrens; Barnegat Bay, Great Bay and Mullica River, Brigantine Bay, Great Egg Harbor Bay and River, Cape May Peninsula.

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Detailed descriptions of these habitat macrosites can be found in *Significant Habitats and Habitat Complexes of the New York Bight Watershed* (USFWS Coastal Ecosystem Program, 1997). Presence is marked with the following codes:

- + - Known to be present
- H - Occurred prior to 1970, not known to be present now
- ? - Status unsure

						Jersey Coast Refuges Macrosites						
Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
ANIMALS												
INVERTEBRATES												
MOLLUSCA												
Argopecten irradians	bay scallop						+	+	+		+	
Crassostrea virginica	eastern oyster						+	+	+	+		
Mercenaria mercenaria	northern quahog						+	+	+	+	+	
Mulinia lateralis	dwarf surfclam						+	+	+			
Mya arenaria	softshell clam						+	+	+		+	
Mytilus edulis	blue mussel						+	+	+		+	
Spisula solidissima	Atlantic surfclam										+	
Illex illecebrosus	northern shortfin squid										+	
Loligo pealei	longfin squid										+	
ARTHROPODA												
INSECTA												
ODONATA (Dragonflies and Damselflies):												
Aeshna clepsydra	mottled darner	G4		S?		+						
Anax longipes	comet darner	G5		S2?		+					+	
Celithemis martha	Martha spotted skimmer	G4		S3S4		+					+	
Celithemis verna	double-ringed pennant	G5		S1?		+					+	
Enallagma pictum	painted bluet	G4		S3?		+					+	
Enallagma recurvatum	barrens bluet damselfly	G3	3C	S3		+					+	
Libellula axilena	dark-bordered skimmer	G5		S1?		+					+	
Nehalennia intergricollis	round-necked damselfly	G5				+					+	
Somatochlora provocans	treetop emerald skimmer	G3G4		S2S4		+					+	
Sympetrum ambiguum	blue-faced meadowfly	G5		S1?		+					+	
COLEOPTERA (Beetles):												
Cicindela d. dorsalis	northeastern beach tiger beetle	G4T1T2	T	SH	E		H					
Cicindela dorsalis media	white tiger beetle	G4T4		S1S2				+				
LEPIDOPTERA (Butterflies and Moths):												
Asterocampa clyton	tawny emperor	G5		S4							+	
Atrytonopsis hianna	dusted skipper	G4		S4							+	
Boloria selene myrina	silver-bordered fritillary	G5T5		S2S3							+	
Euphyes conspicua	black dash	G4		C?							+	
Fixsenia favonius ontario	northern hairstreak	G4T4		NA?							?	

Appendix H: Species and Habitats of Special Concern

Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Jersey Coast Refuges Macrosites						
						Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
<i>Hesperia attalus slossonae</i>	seminole skipper	G4T3		S2S3		+						
<i>Incisalia henrici</i>	Henry's elfin	G5		S3S4								+
<i>Incisalia irus</i>	frosted elfin	G4		SU		+						+
<i>Mitoura hesseli</i>	Hessel's hairstreak	G3G4	3C	S3S4		+						+
<i>Neonympha areolata septentrionalis</i>	Lakehurst satyr	G5T3T4Q		S3		+						
<i>Panoquina panoquin</i>	salt marsh skipper	G5		S5								+
<i>Parrhasius m-album</i>	white m hairstreak	G5		C?								+
<i>Pieris protodice</i>	checkered white	G5		SH								+
<i>Problema bulenta</i>	rare skipper	G2G3	C2	S2		+		+		+		+
<i>Agrotis buchholzi</i>	Buchholz's dart	G2G3	C2	S2		+						
<i>Apharetra purpurea</i>	a noctuid moth	G4Q		S?		+						
<i>Callopietria granitosa</i>	granitosa fern moth	G4G5		S2S3		+						
<i>Catocala herodias gerhardi</i>	pine barrens underwing	G3T3		S3		+						
<i>Catocala jair ssp. 2</i>	jair underwing	G4T4		S3	U	+						
<i>Catocala p. pretiosa</i>	precious underwing	G4T2T3	C2	S2S3				+		+		+
<i>Chytonix sensilis</i>	a noctuid moth	G4		S1S3		+						
<i>Crambus daeckellus</i>	Daecke's pyralid moth	G1G3	C2	S1S3		+						
<i>Datana ranaceps</i>	a hand-maid moth	G4		S3S4		+						
<i>Faronta rubripennis</i>	pink streak	G3G4		SU		+						
<i>Heterocampa varia</i>	a notodontid moth	G3G4		S3		+						
<i>Hypomecis buchholzaria</i>	Buchholz's gray	G3G4		S3		+						
<i>Idaea violacearia</i>	a geometrid moth	G4		S1S3		+						
<i>Itame sp. 1</i>	spanworm (geometrid moth)	G3Q		S3		+						
<i>Lithophane lemmeri</i>	Lemmer's pinion moth	G3G4	C2	S2		+		+				
<i>Merolonche dolli</i>	Doll's merolonche	G3	C2	S1S3		+						
<i>Meropleon cosmion</i>	a noctuid moth	G4		S1S2		+						
<i>Metarranthis pilosaria</i>	coastal swamp metarranthis	G3G4		S3S4		+						
<i>Papaipema appassionata</i>	pitcher plant borer moth	G4		S2S3		+						
<i>Papaipema stenocelis</i>	chain fern borer moth	G4		S3		+						
<i>Ptichodis bistrigata</i>	southern ptichodis	GU		S1S3		+						
<i>Spartiniphaga carterae</i>	Carter's noctuid moth	G2G3	C2	S2		+						
<i>Zale sp. 1</i>	pine barrens zale	G3Q		S3		+						
<i>Zanclognatha sp.1</i>	a noctuid moth	GUQ		S3		+						
CRUSTACEA												
<i>Callinectes sapidus</i>	blue crab						+	+	+	+		+
MEROSTOMATA												
<i>Limulus polyphemus</i>	horseshoe crab						+	+	+	+		+
VERTEBRATES												
FISH												
ELASMOBRANCHIOMORPHI (Cartilaginous Fishes):												
<i>Mustelus canis</i>	smooth dogfish	G?					+		+			
<i>Raja eglanteria</i>	clearnose skate						+			+		
<i>Raja erinacea</i>	little skate						+			+		
<i>Raja ocellata</i>	winter skate						+			+		
OSTEICHTHYES (Bony Fishes):												
<i>Ammodytes americanus</i>	American sandlance	G?					+		+	+		+
<i>Anquilla rostrata</i>	American eel	G5	I	S5		+	+	+	+	+		+

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Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Jersey Coast Refuges Macrosites					
						Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May
<i>Aphredoderus sayanus</i>	pirate perch	G5		S4		+					
<i>Menidia beryllina</i>	inland silverside	G5		S4S5			+	+			+
<i>Menidia menidia</i>	Atlantic silverside	G5					+	+	+	+	+
<i>Opsanus tau</i>	oyster toadfish						+	+		+	+
<i>Strongylura marina</i>	Atlantic needlefish	G5	I				+			+	
<i>Paralichthys dentatus</i>	summer flounder	G?					+			+	+
<i>Scophthalmus aquosus</i>	windowpane	G?					+		+	+	+
<i>Acantharchus pomotis</i>	mud sunfish	G5		S4		+					
<i>Enneacanthus obesus</i>	banded sunfish	G5		S4		+					
<i>Alosa aestivalis</i>	blueback herring	G5	I	S5			+	+		+	+
<i>Alosa mediocris</i>	hickory shad	G5	I	S3	W			+		+	
<i>Alosa pseudoharengus</i>	alewife	G5	I	S5			+	+		+	+
<i>Alosa sapidissima</i>	American shad	G5	I	S3S4	W		+				?
<i>Brevoortia tyrannus</i>	Atlantic menhaden	G?	I				+	+	+	+	+
<i>Clupea harengus</i>	Atlantic herring	G?	I				+	+		+	+
<i>Myoxcephalus aeneus</i>	grubby sculpin	G?					+				
<i>Notemigonus crysoleucas</i>	golden shiner	G5		S5				+		+	
<i>Notropis hudsonius</i>	spottail shiner	G5		S5				+		+	
<i>Fundulus diaphanus</i>	banded killifish	G5		S5			+	+		+	+
<i>Fundulus heteroclitus</i>	mummichog	G5		S5			+	+	+	+	+
<i>Fundulus luciae</i>	spotfin killifish	G3G4		S3			+				+
<i>Anchoa hepsetus</i>	striped anchovy						+	+		+	
<i>Anchoa mitchilli</i>	bay anchovy	G5	I				+	+	+	+	+
<i>Esox americanus americanus</i>	redfin pickerel	G5		S5		+	+				
<i>Merluccius bilinearis</i>	silver hake	G?	I				+				
<i>Pollachius virens</i>	pollack	G?					+			+	+
<i>Urophycis chuss</i>	red hake	G?	I				+				+
<i>Apeltes quadracus</i>	fourspine stickleback	G5		S4			+	+		+	+
<i>Gobiosoma boscii</i>	naked goby	G5					+			+	+
<i>Gobiosoma ginsburgi</i>	seaboard goby	G?					+			+	+
<i>Ameiurus catus</i>	white catfish	G5		S5			+			+	
<i>Ameiurus natalis</i>	yellow bullhead	G5		S5		+					
<i>Ameiurus nebulosus</i>	brown bullhead	G5		S5			+			+	
<i>Tautoga onitis</i>	tautog	G?					+			+	+
<i>Tautoglabrus adspersus</i>	cunner	G?					+			+	+
<i>Mugil cephalus</i>	striped mullet	G5	I				+		+		+
<i>Morone americana</i>	white perch	G5		S5			+	+		+	+
<i>Morone saxatilis</i>	striped bass	G5	I	S4	W		+			+	+
<i>Perca flavescens</i>	yellow perch	G5		S5			+			+	+
<i>Pleuronectes americanus</i>	winter flounder	G5?	I				+	+	+	+	+
<i>Pomatomus saltatrix</i>	bluefish	G?	I				+	+	+	+	+
<i>Salvelinus fontinalis</i>	brook trout	G5		S3		+					
<i>Cynoscion regalis</i>	weakfish	G?	I				+	+	+	+	+
<i>Leiostomas xanthurus</i>	spot	G5	I				+	+	+	+	+
<i>Menticirrhus saxatilis</i>	northern kingfish	G?	I				+			+	+
<i>Micropogonias undulatus</i>	Atlantic croaker	G5					+			+	+
<i>Scomber scombrus</i>	Atlantic mackerel	G?					+				+
<i>Centropristis striata</i>	black sea bass	G?	I				+				+
<i>Trinectes maculatus</i>	hogchoker	G5					+			+	+
<i>Stenotomus chrysops</i>	scup	G?					+			+	+
<i>Peprilus triacanthus</i>	butterfish	G?					+			+	+
<i>Syngnathus fuscus</i>	northern pipefish	G?					+		+	+	+
<i>Prionotus carolinus</i>	northern searobin	G?	I				+			+	+
<i>Prionotus evolans</i>	striped searobin	G?	I				+			+	
<i>Umbra pygmaea</i>	eastern mudminnow	G5		S5		+					

Appendix H: Species and Habitats of Special Concern

						Jersey Coast Refuges Macrosites						
Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
AMPHIBIANS												
<i>Acris c. crepitans</i>	northern cricket frog	G5		S3	U	+						
<i>Hyla andersonii</i>	pine barrens treefrog	G4	3C	S3	E	+			+		+	
<i>Hyla chrysoscelis</i>	Cope's gray treefrog	G5		S2	E	+						
<i>Rana sphenocephala</i>	southern leopard frog	G5		S5	S	+						
<i>Scaphiopus h. holbrookii</i>	eastern spadefoot	G5		S4	D	+						
<i>Ambystoma maculatum</i>	spotted salamander	G5		S3	D	+						
<i>Ambystoma t. tigrinum</i>	eastern tiger salamander	G5		S2	E	+	+	+			+	
<i>Hemidactylum scutatum</i>	four-toed salamander	G5		S3	D	+						
<i>Pseudotriton m. montanus</i>	eastern mud salamander	G5		S1	T	+				?		
REPTILES												
<i>Eumeces fasciatus</i>	five-lined skink	G5		S3	U	+						
<i>Crotalus horridus</i>	timber rattlesnake	G5		S2	E	+						
<i>Elaphe guttata</i>	corn snake	G5		S1	E	+						
<i>Heterodon platirhinos</i>	eastern hognose snake	G5		S5	D	+						
<i>Pituophis m. melanoleucus</i>	northern pine snake	G5T4	C2	S3	T	+	+	+	+	+	+	
<i>Caretta caretta</i>	loggerhead sea turtle	G3	T	SN	E						+	
<i>Clemmys guttata</i>	spotted turtle	G5		S5		+						
<i>Clemmys insculpta</i>	wood turtle	G4		S3	T	+						
<i>Clemmys muhlenbergii</i>	bog turtle	G3	C1	S2	E	+						
<i>Malaclemys t. terrapin</i>	northern diamondback terrapin	G5T5	C2	SU			+	+	+	+	+	
<i>Terrapene c. carolina</i>	eastern box turtle	G5		S5	S	+						
BIRDS												
<i>Gavia immer</i>	common loon	G5	MB	SN	S						M	
<i>Gavia stellata</i>	red-throated loon	G5	MB	SN	S						M/W	
<i>Podiceps auritus</i>	horned grebe	G5	MB	SN	S						M/W	
<i>Podilymbus podiceps</i>	pied-billed grebe	G5	MB	S1	E/S	+			B?/M		B/W	
<i>Pelicanus occidentalis</i>	brown pelican	G4	MB	S1	INC		B?				S	
<i>Phalacrocorax auritus</i>	double-crested cormorant	G5	MB	SN	INC				M		S/M	
<i>Ardea herodias</i>	great blue heron	G5	MB	S2	T/S	B	M		S/M		B?/M/ W	
<i>Botaurus lentiginosus</i>	American bittern	G4	MB	S3	T/S	B			S/M	?		
<i>Bubulcus ibis</i>	cattle egret	G5	MB	S3	INC/I NC			B	B/M	B/M	B/M	
<i>Casmerodius albus</i>	great egret	G5	MB	S3	S/S		B	B	B/M	B/M	B/M	
<i>Egretta caerulea</i>	little blue heron	G5	MB	S3	T/S		B		B/M	B/M	B/M	
<i>Egretta thula</i>	snowy egret	G5	MB	S3	S/S		B	B	B/M	B/M	B/M	
<i>Egretta tricolor</i>	tricolored heron	G5	MB	S3	INC/S		B		B/M	B/M	B/M	
<i>Ixobrychus exilis</i>	least bittern	G5	MB	S3	D/S	B?			B?/M	?	B/M	
<i>Nycticorax violaceus</i>	yellow-crowned night-heron	G5	MB	S2	T/T		B?	B?	B/M	B/M	B/M	
<i>Nycticorax nycticorax</i>	black-crowned night-heron	G5	MB	S3	D/S		B	B	B/M	B/M	B/M	
<i>Plegadis falcinellus</i>	glossy ibis	G5	MB	S3	D/S		B	B	B/M	B/M	B/M	
<i>Cygnus columbianus</i>	tundra swan	G5	MB	SN	S	M/W		M/W	M	M/W	M	
<i>Branta canadensis</i>	Canada goose	G5	MB	S5		B/M/W	B/M/ W	B/M/W	B/M/ W	B/M/ W	B/M/ W	
<i>Branta bernicla</i>	brant	G5	MB	SN			M/W	M/W	M/W	M/W	M/W	
<i>Chen caerulescens</i>	snow goose	G5	MB	SN			M/W		M/W	M/W	M/W	
<i>Aix sponsa</i>	wood duck	G5	MB	S5		B			B/M		B/M	
<i>Anas acuta</i>	northern pintail	G5	MB	SN			M/W	M/W	B/M/	M/W	M/W	

Appendix H

Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Jersey Coast Refuges Macrosites					
						Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May
<i>Anas americana</i>	American wigeon	G5	MB	SN			M/W	M/W	B/M/W	M/W	M/W
<i>Anas clypeata</i>	northern shoveler	G5	MB	SN			M/W	M/W	B/M/W	M/W	M/W
<i>Anas crecca</i>	green-winged teal	G5	MB	SN		B?	M/W	M/W	B/M/W	M/W	M/W
<i>Anas discors</i>	blue-winged teal	G5	MB	S5		B	B?/M		B/M	M/W	M
<i>Anas platyrhynchos</i>	mallard	G5	MB	S5		B	B/M/W	B/M/W	B/M/W	B/M/W	B/M/W
<i>Anas rubripes</i>	American black duck	G4	MB	S4		B	B/M/W	B/M/W	B/M/W	B/M/W	B/M/W
<i>Anas strepera</i>	gadwall	G5	MB	S5			B/M	B	B/M/W	B?/M/W	B/M/W
<i>Aythya valisineria</i>	canvasback	G5	MB	SN			M/W	M/W	M/W	M/W	M/W
<i>Aythya americana</i>	redhead	G5	MB	SN			M/W				
<i>Aythya collaris</i>	ring-necked duck	G5	MB	SN		M/W	M/W				
<i>Aythya marila</i>	greater scaup	G5	MB	SN			M/W	M/W	M/W	M/W	M/W
<i>Aythya affinis</i>	lesser scaup	G5	MB	SN			M/W?			M/W	M/W
<i>Bucephala clangula</i>	common goldeneye	G5	MB	SN			M/W		M/W		
<i>Bucephala albeola</i>	bufflehead	G5	MB	SN			M/W	M/W	M/W	M/W	
<i>Clangula hyemalis</i>	oldsquaw	G5	MB	SN			M/W	M/W	M/W	M/W	M/W
<i>Lophodytes cucullatus</i>	hooded merganser	G5	MB	SN			M/W		M	M/W	M/W
<i>Melanitta nigra</i>	black scoter	G5	MB	SN				M/W		M/W	M/W
<i>Melanitta fusca</i>	white-winged scoter	G5	MB	SN						M/W	M/W
<i>Melanitta perspicillata</i>	surf scoter	G5	MB	SN				M/W		M/W	M/W
<i>Mergus merganser</i>	common merganser	G5	MB	S4			M/W			M/W	
<i>Mergus serrator</i>	red-breasted merganser	G5	MB	SN			M/W	M/W	M/W	M/W	M/W
<i>Oxyura jamaicensis</i>	ruddy duck	G5	MB	SN			M/W		B/M/W		
<i>Accipiter cooperii</i>	Cooper's hawk	G4	MB	S2	E	+					M
<i>Accipiter striatus</i>	sharp-shinned hawk	G5	MB	S1	U/U		M				M
<i>Buteo lineatus</i>	red-shouldered hawk	G5	MB	S2	E/T						B/M
<i>Buteo platypterus</i>	broad-winged hawk	G5	MB	S4	S/S	B		B	B/M		B/M
<i>Circus cyaneus</i>	northern harrier	G5	MB	S2	E/U		B/M/W	B/M/W	S/W	B/M/W	B/M/W
<i>Falco columbarius</i>	merlin	G4	MB	SN	S		M	W			M
<i>Falco peregrinus</i>	peregrine falcon	G3	MB	S1	E		B/M	B/M/W	B/W	B/W	B/M
<i>Haliaeetus leucocephalus</i>	bald eagle	G3G4	MB	S1	E	M/W?		W		S/W	B?/M/W
<i>Pandion haliaetus</i>	osprey	G5	MB	S3	T/T		B/W	B/W	B/W	B/W	B/W
<i>Fulica americana</i>	American coot	G5	MB	S1	D		M/W		B?/M/W		W
<i>Gallinula chloropus</i>	common moorhen	G5	MB	S4		B?					B
<i>Laterallus jamaicensis</i>	black rail	G4?	MB	S3	T		B		B?	?	B
<i>Porzana carolina</i>	sora	G5	MB	S4		B		B	B?	?	M
<i>Rallus elegans</i>	king rail	G4G5	MB	S3	U/U					?	
<i>Rallus limicola</i>	Virginia rail	G5	MB	S4		B	B	B	B?	?	B
<i>Rallus longirostris</i>	clapper rail	G5	MB	S5			B/M	B/M	B/M	B/M	B/M
<i>Charadrius melodus</i>	pipin plover	G3	MB	S1	E		B/M	B?/M	B/M	B?	B/M
<i>Charadrius semipalmatus</i>	semipalmated plover	G5	MB	S?	S		M		M	M	M
<i>Pluvialis dominica</i>	lesser golden-plover	G5	MB	SN	S/S				M		
<i>Pluvialis squatarola</i>	black-bellied plover	G5	MB	SN	S/S		M		M	M	M
<i>Haematopus palliatus</i>	American oystercatcher	G5	MB	S4	INC/S		B?		M	M	M
<i>Arenaria interpres</i>	ruddy turnstone	G5	MB	SN	S				M	M	M
<i>Bartramia longicauda</i>	upland sandpiper	G5	MB	S1	E	B					
<i>Calidris alba</i>	sanderling	G5	MB	SN	D				M	M	M/W
<i>Calidris alpina</i>	dunlin	G5	MB	SN	INC				M	M	M/W

Appendix H: Species and Habitats of Special Concern

						Jersey Coast Refuges Macrosites						
Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
<i>Calidris canutus</i>	red knot	G5	MB	SN	D				M	M	M	
<i>Calidris fuscicollis</i>	white-rumped sandpiper	G5	MB	SN	S				M		M	
<i>Calidris himantopus</i>	stilt sandpiper	G5	MB	SN	INC				M			
<i>Calidris maritima</i>	purple sandpiper	G5	MB	SN	INC				W		W	
<i>Calidris maura</i>	western sandpiper	G5	MB	SN	S				M			
<i>Calidris minutilla</i>	least sandpiper	G5	MB	SN	S				M			
<i>Calidris pusilla</i>	semipalmated sandpiper	G5	MB	SN	S	M			M	M	M	
<i>Catoptrophorus semipalmatus</i>	willet	G5	MB	S4	INC/S		B/M		B/M	B/M	B/M	
<i>Limnodromus griseus</i>	short-billed dowitcher	G5	MB	SN	S					M		
<i>Limosa fedoa</i>	marbled godwit	G5	MB	SN	D				M			
<i>Limosa haemastica</i>	Hudsonian godwit	G5	MB	SN	D				M			
<i>Numenius phaeopus</i>	whimbrel	G5	MB	SN	S				M		M	
<i>Scolopax minor</i>	American woodcock	G5	MB	S5							B/W	
<i>Tringa flavipes</i>	lesser yellowlegs	G5	MB	SN	S		B/M	B/M	B/M	B/M	B/M	
<i>Tringa melanoleuca</i>	greater yellowlegs	G5	MB	SN	S		M	M	M	M	M	
<i>Larus philadelphia</i>	Bonaparte's gull	G5	MB	SN	S						M	
<i>Rynchops niger</i>	black skimmer	G5	MB	S2	E		B/M	B	B/M		B/M	
<i>Sterna antillarum</i>	least tern	G4	MB	S2	E	+	B/M	B?/M	B/M	B?/M	B/M	
<i>Sterna dougallii</i>	roseate tern	G5	MB	S1	E		B?					
<i>Sterna forsteri</i>	Forster's tern	G5	MB	S3	INC/S		B		B/M	B	B/M	
<i>Sterna hirundo</i>	common tern	G5	MB	S3	D/S		B	B	B/M	B/M	B/M	
<i>Sterna nilotica</i>	gull-billed tern	G5	MB	S3	S		B	B?	B/M		B/M	
<i>Coccyzus americanus</i>	yellow-billed cuckoo	G5	MB	S4	S/S	B		B	B	B	B	
<i>Coccyzus erythrophthalmus</i>	black-billed cuckoo	G5	MB	S4	S/S	B			B	B	B	
<i>Asio flammeus</i>	short-eared owl	G5	MB	S1	E/U			W			W	
<i>Strix varia</i>	barred owl	G5	MB	S3	T/T	B	B		B?	S/W	B/W	
<i>Tyto alba</i>	common barn-owl	G5	MB	S4	S/S				B		B/M/W	
<i>Caprimulgus carolinensis</i>	chuck-will's-widow	G5	MB	S4	INC/S	B	B				B	
<i>Caprimulgus vociferus</i>	whip-poor-will	G5	MB	S4	D/S	B	B	B	B	B	B/M	
<i>Chordeiles minor</i>	common nighthawk	G5	MB	S4	S/S	B	B				M	
<i>Archilochus colubris</i>	ruby-throated hummingbird	G5	MB	S4	D/S	B		B		B	B/M	
<i>Chaetura pelagica</i>	chimney swift	G5	MB	S5	S/S	B?	B	B		B	B	
<i>Dryocopus pileatus</i>	pileated woodpecker	G5	MB	S4	S/S	B?						
<i>Melanerpes erythrocephalus</i>	red-headed woodpecker	G5	MB	S3	T/T	B					B	
<i>Sphyrapicus varius</i>	yellow-bellied sapsucker	G5	MB	SN	S	M					M	
<i>Contopus virens</i>	eastern wood-pewee	G5	MB	S4	S/S	B	B	B		B	B/M	
<i>Empidonax minimus</i>	least flycatcher	G5	MB	S4	S/S						M	
<i>Empidonax traillii</i>	willow flycatcher	G5	MB	S4	INC/S	B	B				B	
<i>Empidonax virescens</i>	acadian flycatcher	G5	MB	S4	INC/S		B	B		B	B	
<i>Myiarchus crinitus</i>	great crested flycatcher	G5	MB	S4	S/S		B	B		B	B/M	
<i>Tyrannus tyrannus</i>	eastern kingbird	G5	MB	S5	D/D	B	B	B		B	B/M	
<i>Eremophila alpestris</i>	horned lark	G5	MB	S3	D/S	B		B	B		B	
<i>Hirundo pyrrhonota</i>	cliff swallow	G5	MB	S2	T/S						M	
<i>Progne subis</i>	purple martin	G5	MB	S4	D/S	B		B	B	B	B/M	
<i>Riparia riparia</i>	bank swallow	G5	MB	S4	S/S						M	
<i>Steldidopteryx serripennis</i>	northern rough-winged swallow	G5	MB	S4	S/S	B?					B	
<i>Certhia americana</i>	brown creeper	G5	MB	S4	S/S	B					M/W	
<i>Cistothorus platensis</i>	sedge wren	G5	MB	S1	E				B?		B?	
<i>Cistothorus palustris</i>	marsh wren	G5	MB	S4	D/S		B	B	B/M	B/M	B/W	
<i>Catharus fuscescens</i>	veery	G5	MB	S4	S/S						M	
<i>Catharus guttatus</i>	hermit thrush	G5	MB	S4	S/S	B					M/W	

Appendix H

						Jersey Coast Refuges Macrosites					
Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May
<i>Catharus ustulatus</i>	Swainson's thrush	G5	MB	SN	S						M
<i>Hylocichla mustelina</i>	wood thrush	G5	MB	S5	S/S	B	B	B	B	B	B
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	G5	MB	S4	INC/S	B?	B	B			B/M
<i>Sialia sialis</i>	eastern bluebird	G5	MB	S4	S	B		B		B	B/M
<i>Dumetella carolinensis</i>	gray catbird	G5	MB	S5	S/S		B	B		B	B/M
<i>Vireo flavifrons</i>	yellow-throated vireo	G5	MB	S4	S/S	B?					M
<i>Vireo griseus</i>	white-eyed vireo	G5	MB	S4	D/S	B	B	B	B	B	B
<i>Vireo solitarius</i>	solitary vireo	G5	MB	S3	S/S	M					
<i>Dendroica caerulescens</i>	black-throated blue warbler	G5	MB	S4	S/S	M					
<i>Dendroica cerulea</i>	cerulean warbler	G4	MB	S3	S/S	B?					
<i>Dendroica coronata</i>	yellow-rumped warbler	G5	MB	S4	S/S	M/W	M/W	M/W	M/W	M/W	M
<i>Dendroica discolor</i>	prairie warbler	G5	MB	S5	S/S			B	M	B	B/M
<i>Dendroica dominica</i>	yellow-throated warbler	G5	MB	S4	S/S	B?				B	B/M
<i>Dendroica fusca</i>	blackburnian warbler	G5	MB	S4	S/S						M
<i>Dendroica magnolia</i>	magnolia warbler	G5	MB	S4	S/S	M					M
<i>Dendroica palmarum</i>	palm warbler	G5	MB	SN	S						M
<i>Dendroica pensylvanica</i>	chestnut-sided warbler	G5	MB	S4	S/S						M
<i>Dendroica pinus</i>	pine warbler	G5	MB	S4	S/S		B	B		B	
<i>Dendroica striata</i>	blackpoll warbler	G5	MB	SN	S	M					M
<i>Dendroica virens</i>	black-throated green warbler	G5	MB	SN	S	B					M
<i>Helmitheros vermivorus</i>	worm-eating warbler	G5	MB	S4	S/S						B
<i>Icteria virens</i>	yellow-breasted chat	G5	MB	S4	D/S	B				B	B
<i>Mniotilta varia</i>	black-and-white warbler	G5	MB	S4	S/S	B	B	B	B/M		B/M
<i>Oporornis formosus</i>	Kentucky warbler	G5	MB	S4	S/S	B	B				B
<i>Parula americana</i>	northern parula	G5	MB	S3	P/S			B		B	B/M
<i>Protonotaria citrea</i>	prothonotary warbler	G5	MB	S3	INC/S	B		B		B	B
<i>Seiurus aurocapillus</i>	ovenbird	G5	MB	S5	S/S	B	B	B	B	B	B/M
<i>Seiurus motacilla</i>	Louisiana waterthrush	G5	MB	S4	S/S	B					B/M
<i>Seiurus noveboracensis</i>	northern waterthrush	G5	MB	S4	S/S	M					M
<i>Setophaga ruticilla</i>	American redstart	G5	MB	S5	S/S	B	B	B			B/M
<i>Vermivora pinus</i>	blue-winged warbler	G5	MB	S4	INC/S	B	B			B	B/M
<i>Vermivora ruficapilla</i>	Nashville warbler	G5	MB	S3	S/S						M
<i>Wilsonia canadensis</i>	Canada warbler	G5	MB	S4	S/S	M					M
<i>Wilsonia citrina</i>	hooded warbler	G5	MB	S4	D/S	B			B	B	B
<i>Piranga olivacea</i>	scarlet tanager	G5	MB	S4	S	B		B	B	B	B/M
<i>Piranga rubra</i>	summer tanager	G5	MB	S4	S	B?				B	B
<i>Pheucticus ludovicianus</i>	rose-breasted grosbeak	G5	MB	S4	S/S						M
<i>Ammodramus caudacutus</i>	sharp-tailed sparrow	G5	MB	S4	S/S		B	B	B/M	B	B/M
<i>Ammodramus maritimus</i>	seaside sparrow	G4	MB	S4	S/S		B	B	B/M	B	B/M
<i>Ammodramus savannarum</i>	grasshopper sparrow	G4	MB	S2	T/T	B	B		B		B?/M
<i>Junco hyemalis</i>	dark-eyed junco	G5	MB	S4	S/S	M/W	M/W	M/W	M/W	M/W	M/W
<i>Melospiza georgiana</i>	swamp sparrow	G5	MB	S4	S/S						M/W
<i>Passerculus sandwichensis</i>	savannah sparrow	G5	MB	S2	T/T	B		B			B/M/ W
<i>Pipilo erythrophthalmus</i>	rufous-sided towhee	G5	MB	S5	S/S			M/W			M/W
<i>Poocetes gramineus</i>	vesper sparrow	G5	MB	S2	E	B					M/W
<i>Zonotrichia albicollis</i>	white-throated sparrow	G5	MB	SN	S/S	M/W	M/W	M/W	M/W	M/W	M/W
<i>Dolichonyx oryzivorus</i>	bobolink	G5	MB	S2	T/T	+					M
<i>Icterus spurius</i>	northern oriole	G5	MB	S5	S/S	B	B	B		B	B/M
<i>Sturnella magna</i>	eastern meadowlark	G5	MB	S4	D/S	B	B	M/W			B/M/ W
<i>Carduelis pinus</i>	pine siskin	G5	MB	SN	S	W					M/W
<i>Carpodacus purpureus</i>	purple finch	G5	MB	S4	S/S						M

Appendix H: Species and Habitats of Special Concern

						Jersey Coast Refuges Macrosites					
Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May
MAMMALS											
<i>Synaptomys cooperi</i>	southern bog lemming	G5		S2	U	+					
<i>Balaenoptera physalus</i>	finback whale	G2	E	SN	E						+
<i>Delphinus delphis</i>	common dolphin	G5		SN	U						+
<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	G4									+
<i>Megaptera novaeangliae</i>	humpback whale	G3	E	SA	E						+
<i>Stenella coeruleoalba</i>	striped dolphin	G5		SN	U						+
<i>Tursiops truncatus</i>	bottle-nosed dolphin	G5		SN	S						+
<i>Lutra canadensis</i>	river otter	G5		S4		+		+			
VASCULAR PLANTS											
PTERIDOPHYTES (Ferns and Fern Allies)											
<i>Lygodium palmatum</i>	climbing fern	G4		S2	LP	+					
<i>Schizaea pusilla</i>	curly-grass fern	G3	3C	S3	LP	+	+	+	+		
GYMNOSPERMS (Cone-bearing Plants)											
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	G4		S5		+		+	+		+
ANGIOSPERMS (Flowering Plants):											
MONOCOTYLEDONEAE (Monocots):											
<i>Sagittaria australis</i>	southern arrowhead	G5		S1	E	H?					
<i>Sagittaria subulata</i>	strap-leaf arrowhead	G4		S2				+		+	
<i>Sagittaria teres</i>	quill-leaf arrowhead	G3		S1	E	+		+			
<i>Orontium aquaticum</i>	golden club	G5		S4				+			
<i>Carex barrattii</i>	Barratt's sedge	G4	3C	S4	LP	+					
<i>Carex mitchelliana</i>	Mitchell's sedge	G3G4		S2		+	+				+
<i>Carex polymorpha</i>	variable sedge	G2G3	C2	S1	E	H?					
<i>Carex rostrata</i>	beaked-sedge	G5		S2		H?					
<i>Cyperus lancastriensis</i>	Lancaster flatsedge	G5		S2	E	H?					
<i>Cyperus polystachyos</i> var. <i>texensis</i>	coast flatsedge	G5T5		S1	E	H?		+			+
<i>Cyperus schweinitzii</i>	Schweinitz's flatsedge	G5		SE		+					
<i>Eleocharis brittonii</i>	Britton's spikerush	G4G5		S1.1	E						+
<i>Eleocharis equisetoides</i>	knotted spikerush	G4		SH	E(LP)	+					
<i>Eleocharis melanocarpa</i>	black-fruited spikerush	G4		S1	E						+
<i>Eleocharis quadrangulata</i>	angled spikerush	G4		S2							+
<i>Eleocharis tortilis</i>	twisted spikerush	G5		S1	E						+
<i>Eriophorum tenellum</i>	rough cottongrass	G5		S1	E	H?					
<i>Fuirena squarrosa</i>	hairy umbrella-sedge	G4G5		S3			+				
<i>Rhynchospora filifolia</i>	thread-leaved beaked rush	G5		S1	E	H?					+
<i>Rhynchospora globularis</i>	grass-like beaked rush	G5		S1	E	H?					+
<i>Rhynchospora inundata</i>	horned beaked rush	G4		S2	LP	+					+
<i>Rhynchospora knieskernii</i>	Knieskern's beaked rush	G1	T	S1	E(LP)	+					
<i>Rhynchospora microcephala</i>	small-headed beaked rush	G?		S1	E	+		+		+	
<i>Rhynchospora pallida</i>	pale beaked rush	G3		S3		+					
<i>Rhynchospora rariflora</i>	rare-flowering beaked rush	G5		S1	E						+
<i>Rhynchospora scirpoides</i> (= <i>Psilocarya scirpoides</i>)	long-beaked bald-rush	G4		S2		+					
<i>Scirpus longii</i>	Long's bulrush	G2	C2	S2	E(LP)	+					
<i>Scleria minor</i>	slender nutrush	G4		S4	LP	+					
<i>Scleria pauciflora</i> var.	few-flowered nutrush	G5T4T5		S2		+					

Appendix H

Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Jersey Coast Refuges Macrosites						
						Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
<i>caroliniana</i>												
<i>Scleria reticularis</i> var. <i>pubescens</i>	nutrush	G5TU		S4		+'?'						
<i>Eriocaulon parkeri</i>	Parker's pipewort	G3	3C	S2		+		+		+		
<i>Juncus caesariensis</i>	New Jersey rush	G2	C2	S2	E (LP)	+		+				
<i>Juncus coriaceus</i>	leathery rush	G5		S1	E						+	
<i>Juncus torreyi</i>	Torrey's rush	G5		SU		H?					+	
<i>Helonias bullata</i>	swamp pink	G3	T	S3	E(LP)	+	+			+		
<i>Melanthium virginicum</i>	Virginia bunchflower	G5		S1	E	H?						
<i>Narthecium americanum</i>	bog asphodel	G2	C1	S2	E(LP)	+		+				
<i>Toffieldia racemosa</i>	false asphodel	G5		S1	E(LP)	+						
<i>Uvularia puberula</i> var. <i>nitida</i>	pine barren bellwort	G5T3		S2	E	+						
<i>Zigadenus leimanthoides</i>	death-camus	G4Q		S1	E	+						
<i>Arethusa bulbosa</i>	swamp pink	G4		S2					+		+	
<i>Listera australis</i>	southern twayblade	G4		S2	LP	+	+			+	+	
<i>Platanthera cristata</i>	crested yellow orchid	G5		S3	LP				+			
<i>Platanthera flava</i> var. <i>herbiola</i>	tubercled rein orchid	G4T4Q	3C	S2							+	
<i>Platanthera integra</i>	yellow fringeless orchid	G4	3C	S1	E(LP)	+						
<i>Platanthera nivea</i>	snowy orchid	G5		SH	E						+	
<i>Spiranthes laciniata</i>	lace-lip ladies'-tresses	G4G5		S1	E	+					+	
<i>Spiranthes odorata</i>	fragrant ladies'-tresses	G5		S2		H?	+		+		+	
<i>Tipularia discolor</i>	crane-fly orchid	G4G5		S3							+	
<i>Aristida basiramea</i> var. <i>curtissii</i>	Curtis' three-awned grass	G5T4T5		S2		+						
<i>Calamagrostis pickeringii</i>	Pickering's reedgrass	G4		S1	E	+						
<i>Calamovilfa brevipilis</i>	pine barren reedgrass	G4	3C	S4	LP	+		?				
<i>Coelorachis rugosa</i>	wrinkled jointgrass	G5		S1	E	+					+	
<i>Dichanthelium aciculare</i>	bristling witchgrass	G4G5		S1	E						+	
<i>Dichanthelium scabriusculum</i>	sheathed witchgrass	G4		S2		+						
<i>Dichanthelium wrightianum</i>	Wright's witchgrass	G4		S2		+						
<i>Gymnopogon brevifolius</i>	short-leaved skeleton grass	G5		S1	E						+	
<i>Muhlenbergia capillaris</i>	long-awned smoke grass	G5		S1	E	H?						
<i>Muhlenbergia torreyana</i>	pine barren smoke grass	G3	3C	S3	LP	+					+	
<i>Panicum hirtii</i>	Hirst's panic grass	G1	C2	S1	E(LP)	+						
<i>Sacciolepis striata</i>	American cupscale	G5		S1	E						+	
<i>Sphenopholis pensylvanica</i>	swamp oats	G4		S3							+	
<i>Xyris caroliniana</i>	sand yellow-eyed grass	G4G5		S1	E(LP)	+						
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	G5		S1	E	+						
<i>Xyris jupicai</i>	Richard's yellow-eyed grass	G5		SH							+	
<i>Xyris montana</i>	northern yellow-eyed grass	G4		S1	E	+						
DICOTYLEDONEAE (Dicots):												
<i>Sesuvium maritimum</i>	seabeach purslane	G5		S2			+		+			
<i>Amaranthus pumilus</i>	seabeach amaranth	G2	T	SH	E		H?	H?				
<i>Eryngium aquaticum</i>	marsh rattlesnake master	G4		S3				+				
<i>Hydrocotyle verticillata</i>	water-pennywort	G5		S2							+	
<i>Asclepias lanceolata</i>	smooth orange milkweed	G5		S2			+	+				
<i>Aster radula</i>	swamp or low rough aster	G5		S1	E	+			+			
<i>Boltonia asteroides</i> var.	boltonia	G5T?		S1	E	H?					+	

Appendix H: Species and Habitats of Special Concern

Scientific Name	Common Name(s)	Global	Federal	Jersey Coast Refuges Macrosites							
				NJ Rank	NJ Stat.	Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May
<i>glastifolia</i>											
<i>Cacalia atriplicifolia</i>	pale indian plantain	G4G5		S1	E	H?					
<i>Chrysopsis (=Pityopsis) falcata</i>	sickle-leaved golden aster	G3G4		S3	LP	+					
<i>Cirsium virginianum</i>	Virginia thistle	G3G4		S1	E			+			
<i>Coreopsis rosea</i>	pink or rose tickseed	G3		S2	LP	+					
<i>Eupatorium resinosum</i>	pine barren boneset	G3	C2	S2	E(LP)	+	+	?			
<i>Gnaphalium helleri</i>	Heller's everlasting	G4G5		SH	E	H?					
<i>Kuhnia eupatorioides</i>	false boneset	G5		S1	E	H?					
<i>Pluchea foetida</i>	stinking fleabane	G5		S1	E						+
<i>Solidago elliotii</i>	coastal goldenrod	G5		S3		+					
<i>Solidago tarda</i>	late goldenrod	G?		S3		+					
<i>Onosmodium virginianum</i>	Virginia false-gromwell	G4		S1	E	+					
<i>Lobelia boykinii</i>	Boykin's lobelia	G2	C2	S1	E(LP)	+					
<i>Lobelia canbyi</i>	Canby's lobelia	G4		S3	LP	+					
<i>Honckenya peploides</i>	seabeach sandwort	G5		S2			+		+		
<i>Chenopodium rubrum</i>	red goosefoot	G5		S1	E					+	
<i>Hypericum adpressum</i>	creeping St. John's-wort	G2G3	C2	S2	E						+
<i>Cuscuta cephalanthi</i>	button-bush dodder	G5		S1	E	H?					
<i>Cuscuta polygonorum</i>	smartweed dodder	G5		S2							+
<i>Stylisma pickeringii</i> var. <i>pickeringii</i>	Pickering's morning-glory	G4T2T3	C2	S1	E(LP)	+					
<i>Diospyros virginiana</i>	persimmon	G5		S5				+			
<i>Corema conradii</i>	broom crowberry	G4		S1	E(LP)	+					
<i>Crotonopsis elliptica</i>	elliptical rushfoil	G5		S2	LP	+					
<i>Euphorbia purpurea</i>	glade spurge	G3	C2	S1	E						+
<i>Aeschynomene virginica</i>	sensitive joint-vetch	G2	T	S1	E(LP)	+		+			
<i>Clitoria mariana</i>	butterfly pea	G5		S1	E	H?					+
<i>Desmodium sessilifolium</i>	sessile-leaved tick-trefoil	G5		S1	E	+					
<i>Desmodium strictum</i>	pineland tick-trefoil	G4		S2	LP	+					+
<i>Galactia volubilis</i>	downey milk-pea	G5		SH	E						+
<i>Stylosanthes biflora</i>	pencil flower	G5		S3		H?					
<i>Quercus nigra</i>	water oak	G5		S1	E						+
<i>Gentiana autumnalis</i>	pine barren gentian	G3	3C	S3	LP	+					+
<i>Myriophyllum tenellum</i>	slender water-milfoil	G5		S1	E	H?					
<i>Utricularia biflora</i>	two-flowered bladderwort	G5		S1	E	+					
<i>Utricularia olivacea</i>	dwarf white bladderwort	G4		S1	E(LP)	+					
<i>Utricularia purpurea</i>	purple bladderwort	G5		S3	LP	+			+		
<i>Utricularia resupinata</i>	reversed bladderwort	G4		S1	E(LP)	+					+
<i>Linum intercursum</i>	sandplain flax	G4G5		S1	E	+					+
<i>Ammannia latifolia</i>	Koehn's tooth-cup	G5		S1	E					+	
<i>Rotala ramosior</i>	tooth-cup	G5		S3							+
<i>Rhexia aristosa</i>	awned meadowbeauty	G3	C2	S1	E(LP)	+					+
<i>Nymphoides cordata</i>	floating heart	G5		S3	LP	+					
<i>Ludwigia hirtella</i>	hairy ludwigia	G5		S2	LP	+					+
<i>Oenothera humifusa</i>	sea-side evening-primrose	G5		S1	E		+		+		+
<i>Oenothera oakesiana</i>	Oakes' evening-primrose	G4?Q		S2							+
<i>Plantago maritima</i> ssp. <i>juncoides</i>	seaside plantain	G5T5		S2					+		
<i>Polygonum densiflorum</i>	stout smartweed	G5		S1	E						+
<i>Polygonum glaucum</i>	seabeach knotweed	G3		S1	E		+				
<i>Polygonum setaceum</i> var. <i>injectum</i>	swamp smartweed	G5T4		S2?							?
<i>Glaux maritima</i>	seabeach milkwort	G5		SH	E		+				
<i>Hottonia inflata</i>	featherfoil	G4		S1	E						+

Appendix H

Scientific Name	Common Name(s)	Global	Federal	NJ Rank	NJ Stat.	Jersey Coast Refuges Macrosites						
						Pine Barren	Barn. Bay	Gr. Bay Mullica R.	Brig. Bay	Gr. Egg	Cape May	
<i>Prunus angustifolia</i>	chickasaw plum	G5		S2	E	H?						
<i>Diodia virginiana</i>	larger buttonweed	G5		S1	E							+
<i>Galium hispidulum</i>	coast bedstraw	G5		S1	E							+
<i>Oldenlandia uniflora</i> (= <i>Hedyotis uniflora</i>)	clustered bluets	G5		S3						+		+
<i>Populus heterophylla</i>	swamp cottonwood	G5		S2								+
<i>Schwalbea americana</i>	chaffseed	G2	E	S1	E(LP)	+						
<i>Phoradendron serotinum</i>	mistletoe	G5		S2	LP	+	+					
COMMUNITIES and ECOSYSTEMS												
MARINE WETLAND COMMUNITIES												
Marine Subtidal Aquatic Bed		G5		SU			+	+	+	+		
Marine Intertidal Gravel/Sand Beach		G5		SU			+		+			
ESTUARINE WETLAND COMMUNITIES												
Freshwater Subtidal Aquatic Bed		G4		SU				+		+		
Tidal River		G4						+		+		+
Low Salt Marsh		G5		S5			+	+	+	+		+
High Salt Marsh		G5		S5			+	+	+	+		+
Salt Panne		G5		S5			+	+	+	+		+
Brackish Intertidal Shore		G3G4						+				
Brackish Intertidal Mudflats		G3G4						+				
Brackish Tidal Marsh		G4		S2?				+		+		+
Freshwater Intertidal Shore		G3G4						+				
Freshwater Intertidal Mudflats		G3G4						+				
Freshwater Tidal Marsh		G3G4		S3?		?		+		+		+
Freshwater Tidal Swamp		G2G3		S1S2				+				
Coastal Plain Pond (lacustrine)		G3G4						+				
PALUSTRINE WETLANDS												
Pine Barrens Shrub Swamp (palustrine)		G5		S5		+						
Coastal Plain Vernal Pond		G3?		S2S3		+						+
Pine Barren Savanna		G2		S2S3		+						
Pitch Pine Lowland Forest (palustrine)		G3		S3		+						
Cape May Lowland Swamp		G1		S1?								+
Coastal Plain Atlantic White Cedar Swamp		G3G4		S4?		+	+	+	+			+
Red Maple-Hardwood Swamp		G5		S5			+					+
TERRESTRIAL/UPLAND COMMUNITIES												
Maritime Dunes		G4					+	+				+
Coastal Dune Shrubland		G4		S2?			+		+			+
Coastal Dune Woodland		G2G3		S1			+					
Pine Plains		G1		S1		+						
Pitch Pine-Scrub Oak Barrens		G2				+						
Pitch Pine-Oak-Heath Woodland		G3G4				+						
ANIMAL CONCENTRATION AREAS												
Anadromous Fish Concentration								+		+		
Bald Eagle Wintering Site		G?		S?		+		+		+		+
Coastal Heron Rookery		GU		S3			+	+	+	+		+
Migratory Shorebird Concentration Site		G?		S?			+	+	+	+		+
Waterbird Nesting Colony							+	+	+	+		+
Raptor Concentration Area												+
Waterfowl Concentration Area							+	+	+	+		0

Appendix K, RONS Project List

Terms used in this appendix:

Startup cost: The project's estimated expenses for the first year (in year 2000 dollars X 1000)

Recurring cost: The project's estimated expenses for the second and following years (in year 2000 dollars X 1000)

15-year Total Cost: Estimated expenses for all projects over the 15-year duration of this CCP

Staff (FTEs): Full Time staffing Equivalent (one FTE is one person working full time for one year; seasonal staff are calculated as 0.5 FTE.)

Average FTE: The average additional FTEs required over the 15-year duration of this CCP, taking into to consideration that some projects have shorter durations (less than 15 years)

Table K-1. *Funding and staffing required for RONS projects under Alternative B, the Service's Proposed Action.*

	Startup Costs (\$000)	Recurring Costs (\$000)	15-year Total Cost (\$000)	Average FTE
Edwin B. Forsythe Subtotal	14,479	3,668	54,184	25.3
Cape May Subtotal	1,685	511	6,449	13.8
Jersey Coast Refuges Grand Total	16,165	4,179	60,633	39.1

Table K-2. *RONS projects for Forsythe Refuge under Alternative B, the Service's Proposed Action.*

Start Year	Project Title: E.B. Forsythe NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2001	Grassland Restoration and Management	84.7	6.1	169.5	0.3	15
2001	Restoration/Management of Early Succession Habitats	21.3	3.3	67.6	0.3	15
2001	Saltmarsh Restoration	1,222.0	1,222.0	18,330.6	1	15
2001	Upland Forest Restoration and Management	60.7	60.7	911.2	0.5	15
2001	Invasive Species Control	23.6	23.6	354.0	0.5	15
2001	Waterfowl Monitoring and Management	59.0	52.0	787.0	1	15
2001	Invasive/Native Plant Species Survey	114.0	94.0	208.0	1	2
2001	Develop Vegetation/Habitat Map	128.0	106.0	552.0	1	5
2001	Develop Wildlife/Refuge Database and Archive	132.0	126.0	1,896.0	1	15
2001	Conduct Technical Outreach on Land Protection/Management	114.0	104.0	1,570.0	1	15

Appendix K

Start Year	Project Title: E.B. Forsythe NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2001	Post & Patrol Newly Acquired Refuge Lands and Hunting Areas	107	82.0	1255.0	2	15
2001	Establish Holgate Boat Taxi Concessionaire	30	36.0	534.0	1.2	15
2001	Survey & Post Boundary of Holgate Wilderness Area	189	70.0	1169.0	2	15
2001	Assess Impact of Mosquito Control on Wildlife	50.0	30.0	470.0	0.5	15
2001	Conduct Endangered Species Survey, Restoration, & Management	100.0	70.0	1,080.0	1	15
2001	Expand Deer Management Zone 58	20.0	20.0	300.0	0.5	15
2001	Enhance & Maintain New Observation Platform at Barnegat Impoundment	20.0	2.5	55.0	0.1	15
2001	Develop Outreach and Public Education Program	65.7	55.7	845.5	1	15
2001	Open Fishing Area along Parkertown Road	15.0	3.7	66.8	0.1	15
2001	Develop <i>Brigantine Wilderness Area</i>	8.9	3.7	42.2	0.1	10
2001	Develop Holgate Wilderness Area brochure	8.9	3.7	42.2	0.1	10
2001	Reformat and print <i>Forsythe Bird List</i>	8.6	5.4	84.2	0.1	15
2001	Reformat and print <i>Forsythe Wildlife Drive</i>	8.6	5.4	84.2	0.1	15
2001	Reprint General <i>Forsythe NWR</i> Brochure	8.8	6.4	98.4	0.1	15
2002	Study on Barrier Island Ecology & Impact of Public Use	70.0	50.0	270.0	0	5
2002	Construct Univ. Accessible Observation Platform at Experimental Pool	30.0	7.5	127.5	0.1	14
2002	Develop <i>People's Impacts on Wildlife</i>	6.4	3.2	25.6	0.1	7
2003	Small Vertebrate Survey (Mammals, Reptiles, Amphibians)	108.0	91.0	472.0	1	5
2003	Construct Observation Boardwalk at Holgate	25	6.3	100.6	0.1	13
2003	Study Impact of Development on Water Quality/Quantity and Wetlands	70.0	50.0	670.0	1	13
2003	Construct Univ. Accessible Saltwater Fishing Pier, Mullica R.	38.0	9.5	152.0	0.2	13

Appendix K, RONS Project List

Start Year	Project Title: E.B. Forsythe NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2003	Construct New Office with Visitor Contact Facility at Barnegat	250.0	62.5	1,000.0	1.5	13
2003	Construct Trail and Kiosk at Four-Mile Branch Bog	35.0	8.8	140.0	0.2	13
2004	Nesting Bird Survey	95.0	89.0	451.0	1	5
2004	Complete second half of the DeCamp Trail	30.0	7.5	112.5	0.2	12
2004	Conduct nature tours & on-site support on the Wildlife Drive	30.0	26.0	316.0	0.7	12
2004	Conduct nature tours & on-site support at Holgate Wilderness	30.0	26.0	316.0	0.7	12
2005	Fish & Aquatic Invertebrate Survey	149.0	127.0	657.0	3	5
2005	Develop Holgate Observation Platform with Long Beach Township	10	2.5	35.0	0.1	11
2005	Construct Seasonal Observation Deck at Bonnet Island	25.0	6.2	87.0	0.1	11
2005	Develop Outdoor Classroom Sites	20.0	5.0	70.0	0.1	11
2005	Develop and Implement Teacher Training Workshops	22.2	8.0	102.2	0.3	11
2005	Purchase and Develop Wildlife Learning Materials for Children	23.1	7.0	93.1	0.2	11
2005	Construct New Office and Visitor Center at Brigantine (Construction Funds)	10,000.0	500.0	15,000.0	2	11
2006	Monitor Public Use Activity and Impact	50.0	30.0	320.0	0.5	10
2006	Develop Forsythe video	30.0		30.0		1
2007	Study Pre-Colonial Ecology of Southeast Jersey Landscape	70.0	50.0	270.0	0	5
2007	Implement changes in Migratory Game Bird Hunting	20.0	20.0	180.0	0.5	9
2007	Develop Universally Accessible Deer Hunt Sites in DMZ 56	5.0	0.2	7.0		9
2007	Conduct nature tours & on-site support at Reedy Creek	30.0	26.0	238.0	0.7	9
2007	Help teachers develop class wildlife and habitat projects	15.0	15.0	135.0	0.5	9
2007	Construct Office and Visitor Center at Reedy Creek	250.0	62.5	750.0	1	9
2008	Habitat Use by Migrating/Wintering Birds of Prey Study	149.0	127.0	657.0	1	5
2008	Refurbish existing Fire Lane Trails (done Start-up)	10.0	2.5	27.5	0.1	8

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Start Year	Project Title: E.B. Forsythe NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2008	Refurbish Primitive Trail at Murry Grove	25.0	6.2	68.8	0.1	8
2008	Develop Parking for Canoers/Kayakers on Westecunk Creek	17.5	4.4	48.3	0.1	8
2008	Develop <i>Forsythe Refuge Visitor Opportunities</i>	6.4	3.0	18.4	0.1	5
2008	Produce <i>Canoers/Kayakers Guide to Forsythe NWR</i>	10.0	3.0	13.0	0.1	2
2009	Construct Universally accessible Freshwater Fishing Site	36.0	9.0	90.0	0.2	7
2010	Refurbish Primitive Trail at Cedar Run Bog	40.0	10.0	90.0	0.2	6
2012	Develop Parking for Canoers/Kayakers on Cedar Run Creek	17.5	4.4	30.7	0.1	4
2012	Develop <i>Forsythe Amphibians and Reptiles</i>	6.4	3.0	9.4	0.1	2
2014	Refurbish Primitive Trail at Collinstown Road	25.0	6.2	31.2	0.1	2
2014	Develop <i>Forsythe Mammals</i>	6.4	3.0	9.4	0.1	2
	Forsythe Subtotal	\$14,479	\$3,668	\$54,184	34.5	

Table K-2. *RONS projects for Cape May Refuge under Alternative B, the Service's Proposed Action.*

Start Year	Project Title: Cape May NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2001	Grassland Restoration and Management	50.4	5.7	129.9	0.3	15
2001	Restoration/Management of Early Succession Habitats	9.7	1.8	35.3	0.3	15
2001	Saltmarsh Restoration	73.3	73.3	1100.2	1	15
2001	Upland Forest Restoration and Management	46.1	46.1	692.2	0.5	15
2001	Invasive Species Control	11.8	11.8	177.0	0.5	15
2001	Invasive/Native Plant Species Survey	51.0	48.0	99.0	1	2
2001	Develop & Maintain Wildlife/Refuge Database/Archive	50.0	46.0	694.0	1	15
2001	Conduct Endangered Species Survey, Restoration, & Management	70.0	60.0	910.0	1	15

Appendix K, RONS Project List

Start Year	Project Title: Cape May NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2001	Allow Upland Game hunting W of Rte 47 and N of Rte 550	20.0	20.0	300.0	0.3	15
2001	Develop Universally Accessible Trail at Headquarters	15.0	3.8	68.2	0.1	15
2001	Develop Interpretive Signage on Human Impacts to Wildlife	20.0		20.0	0.2	1
2001	Reprint General <i>Cape May NWR</i>	3.0	3.0	45.0		15
2001	Post & Patrol Newly Acquired Refuge Lands	83.0	58.0	895.0	1.5	15
2002	Nesting Bird Survey	53.0	49.0	249.0	1	5
2002	Develop Vegetation/Habitat Map	52.0	48.0	244.0	0.5	5
2002	Develop Parking and Kiosk for 35-mile State Trail	20.0	5.0	85.0	0.1	14
2002	Conduct Outreach and Education With Public	60.0	60.0	840.0	1	14
2002	Develop Teacher Training Workshops	22.0	22.0	308.0	0.2	14
2002	Enlarge Office Building and Develop a Visitor Contact Station	100.0	25.0	425.0	0.5	14
2003	Habitat Use by Migrating/Wintering Birds	90.0	57.0	318.0	1	5
2003	Conduct Technical Outreach on Land Protection & Management	52.0	48.0	628.0	1	13
2003	Monitor Migrating Shore, Song, and Sea Bird Populations	83.0	69.0	911.0	1	13
2003	Develop Interpretive Information on Shorebird Migration	10.0		10.0	0.2	1
2003	Print brochure <i>People's Impact on Wildlife</i>	1.1	1.1	14.3		13
2004	Small Vertebrate Survey (Mammals, Reptiles, Amphibians)	57.0	49.0	253.0	1	5
2004	Develop Schedule Nature Tours	30.0	30.0	360.0	0.7	12
2004	Construct Storage Building	100.0	25.0	375.0	0.5	12
2004	Produce <i>Birds of Cape May NWR</i>	4.2	3.3	40.5	0.1	12
2005	Produce trail map brochures for 5 new trails	6.0	3.0	36.0	0.1	11
2005	Remove seven buildings from Two-mile Beach Unit	625.0		625.0	1	1
2006	Monitor Public Use Activity and Impact	50.0	30.0	320.0	0.5	10
2006	Restore 60 acres of Barrier Island Habitat	120.0	20.0	160.0	0.3	3

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Start Year	Project Title: Cape May NWR	Startup Cost (\$000)	Recurring Cost (\$000)	15-year Total Cost (\$000)	Staffing (FTEs)	Duration (years)
2007	Develop Atlantic White Cedar Trail in Dennis Township	25.0	6.3	75.4	0.1	9
2007	Construct Maintenance Shop	250.0	62.5	750.0	1	9
2008	Construct Trail, Parking and Kiosk at Peach Orchard Rd	25.0	6.3	69.1	0.1	8
2009	Develop Parking Lot and Kiosk at Stocker Tract	25.0	6.3	62.8	0.1	7
2012	Initiate Permit Trapping North of Route 550	20.0	20.0	80.0	0.3	4
2012	Allow At-Large Fishing	40.0	40.0	160.0	0.3	4
2012	Develop New Trail, Parking Lot and Kiosk	25.0	6.3	43.9	0.1	4
2013	Develop Canoe Trail at Cedar Creek	25.0	6.3	37.6	0.1	3
	Cape May Subtotal	\$1,685.3	\$511.2	\$6,449.2	19.5	

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alternative – a reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2) [see also *management alternative* below].

amphidromous fish – fish that can migrate from fresh water to the sea, or vice versa, not for the purpose of breeding, but at other times during the life cycle of the fish.

anadromous – fish that spend a large proportion of their life cycle in the ocean and return to freshwater to breed.

aquatic barrier – any obstruction to fish passage.

aquatic – growing in, living in, or dependent upon water.

biological integrity – composition, structure, and function at the genetic, organism, and community levels consistent with natural conditions, and the biological processes that shape genomes, organisms, and communities.

biological or natural diversity – the abundance, variety, and genetic constitution of animals and plants in nature. Also referred to as “biodiversity.”

breeding habitat – habitat used by migratory birds or other animals during the breeding season.

buffer zones – protective land borders around critical habitats or water bodies that reduce runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals and plants and their habitats.

candidate species – those species for which the Service has on file sufficient information on biological vulnerability and threats to propose them for listing.

carrying capacity – the size of the population that can be sustained by a given environment.

catadromous fish – fish that spend most of their lives in fresh water but migrate to sea to reproduce.

Categorical Exclusion (CE, CX, CATEX, CATX) – 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 CFR 1508.4).

CFR – Code of Federal Regulations.

Challenge Cost Share Program – a grant program administered by the Fish and Wildlife Service providing matching funds for projects supporting natural resource education, management, restoration and protection on Service lands, other public lands and on private lands.

community – the area or locality in which a group of people resides and shares the same government.

community type – a particular assemblage of plants and animals, named for the characteristic plants.

compatible use – an allowed use that will not materially interfere with, or detract from, the purposes for which the unit was established (Service Manual 602 FW 1.4).

compatibility determination – a compatibility determination is required for a wildlife-dependant recreational use or any other public use of a refuge. A compatible use is one which, in the sound professional judgement of the Refuge Manager, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s)

Comprehensive Conservation Plan (CCP) – 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 purposes of the refuge, help fulfill the mission of the System, maintain and, where appropriate, restore the biological integrity, diversity, and environmental health of each refuge and the System, and meet other mandates.

concern – see *issue*.

conservation – the management of natural resources to prevent loss or waste. Management actions may include preservation, restoration, and enhancement.

conservation agreements – written agreements reached among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife and/or their habitats, or to achieve other specified conservation goals. Participants voluntarily commit to implementing specific actions that will remove or reduce the threats to these species.

conservation easement – a legal agreement between a landowner and a land trust (a private, nonprofit

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conservation organization) or government agency that permanently limits a property's uses in order to protect its conservation values.

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cooperative agreement – the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose authorized by Federal statute and substantial involvement between the Service and the recipient is anticipated.

cultural resources – evidence of historic or prehistoric human activity, such as buildings, artifacts, archaeological sites, documents, or oral or written history.

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 CFR 60.4 (Service Manual 614 FW 1.7).

cultural resource overview – a comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII. of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

database – a collection of data arranged for ease and speed of analysis and retrieval, usually computerized.

diadromous – fish that migrate from freshwater to saltwater or the reverse: a generic term that includes anadromous, catadromous and amphidromous fishes.

digitizing – the process of converting information from paper maps into geographically referenced electronic files for a geographic information system (GIS).

easement – an agreement by which a landowner

gives up or sells one of the rights on his/her property. For example, a landowner may donate a right of way across his/her property to allow community members access.

ecosystem – a biological community together with its environment, functioning as a unit. For administrative purposes, the Service has designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries and vary in their sizes and ecological complexity.

ecotourism – a type of tourism that maintains and preserves natural resources as a basis for promoting economic growth and development resulting from visitation to an area.

ecosystem approach – a way of looking at socio-economic and environmental information based on ecosystem boundaries, rather than town, city, or county boundaries.

ecosystem-based management – an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs. This concept takes into consideration interactions between the plants, animals, and physical characteristics of the environment when making decisions about land use or living resource issues.

ecosystem services – the benefits human populations derive, directly or indirectly, from ecosystem functions (e.g., gas regulation, disturbance regulation, soil formation, pollination, raw materials).

emergent wetland – wetlands dominated by erect, rooted, herbaceous plants.

endangered species – a federally protected species which is in danger of extinction throughout all or a significant portion of its range.

environmental education – education aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp et al. 1969).

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

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environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Environmental Impact Statement (EIS) – A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts 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 (40 CFR 1508.11).

estuaries – deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

estuarine wetlands – "The Estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land." (Cowardin et al. 1979)

exemplary community type – an outstanding example of a particular community type.

extirpated – no longer occurring in a given geographic area.

federal land – public land owned by the Federal government, including lands such as National Forests, National Parks and National Wildlife Refuges.

federally listed species – a species listed under the federal Endangered Species Act of 1973, as amended, either as endangered, threatened or species at risk (formerly candidate species).

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 CFR 1508.13).

forbs – A flowering plant, excluding grasses, sedges, and rushes, that does not have a woody stem and dies back to the ground at the end of the growing

season.

forested land – land dominated by trees. For the purposes of the impacts analysis in this document, all forested land was assumed to have the potential to be occasionally harvested, and forested land owned by timber companies was assumed to be harvested on a more intensive, regular schedule.

forested wetlands – wetlands dominated by trees.

geographic information system (GIS) – a computerized system used to compile, store, analyze and display geographically referenced information. Can be used to overlay information layers containing the distributions of a variety of biological and physical features.

goal – descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units.

grant agreement – the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose of support or stimulation authorized by Federal statute and substantial involvement between the Service and the recipient is not anticipated.

habitat fragmentation – breaking up of a specific habitat into smaller unconnected areas. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.

habitat conservation – the protection of an animal or plant's habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced.

habitat – the place where a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for life and should be free of harmful contaminants.

hydrologic or flow regime – characteristic fluctuations in river flows.

Integrated Pest Management (IPM) – sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.

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interjurisdictional fish – populations of fish that are managed by two or more states or national or tribal governments because of the scope of their geographic distributions or migrations.

interpretive facilities – structures that provides information about an event, place or thing by a variety of means including printed materials,
interpretive materials – any tool used to provide or clarify information, explain events or things, or serve to increase awareness and understanding of the events or things. Examples of these would be: (1) printed materials such as brochures, maps or curriculum materials; (2) audio/visual materials such as videotapes, films, slides, or audio tapes; and (3) interactive multimedia materials, such as cd-rom and other computer technology.

invasive exotic species – non-native species which have been introduced into an ecosystem, and, because of their aggressive growth habits and lack of natural predators, displace native species.

grassroots conservation organization – any group of concerned citizens who come together to actively address a conservation need.

habitat macrosites - an area important because of the presence of rare species, ecological communities, and functioning ecosystems.

issue – any unsettled matter that requires a management decision; e.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concerns, or the presence of an undesirable resource condition. Issues should be documented, described, and analyzed in the CCP even if resolution cannot be accomplished during the planning process (Service Manual 602 FW 1.4). See also: *key issue*.

key issue – an issue meeting the following three criteria:

1. Falls within the jurisdiction of the Service;
2. Can be addressed by a reasonable range of alternatives;
3. Influences the outcome of the project.

land trusts – organizations dedicated to conserving land by purchasing land, receiving donations of lands, or accepting conservation easements from landowners.

audiovisuals or multimedia materials. Examples of these would be kiosks which offer printed materials and audiovisuals, signs and trailheads.

limiting factor – an environmental limitation that prevents further population growth.

local agencies – generally referring to municipal governments, regional planning commissions or conservation groups.

long term protection – mechanisms such as fee title acquisition, conservation easements or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintenance of the species population at the site.

management alternative – a set of objectives and the strategies needed to accomplish each objective (Service Manual 602 FW 1.4).

management concern – see *issue*.

management opportunity – see *issue*.

management plan – a plan that guides future land management practices on a tract of land. In the context of this environmental impact statement, management plans would be designed to produce additional wildlife habitat along with the primary products, such as timber or agricultural crops. See cooperative agreement.

management strategy – a general approach to meet unit objectives. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (Service Manual 602 FW 1.4).

migratory game birds - birds regulated under the Migratory Bird Treaty Act and state laws, that are legally hunted, includes ducks, geese, woodcock, rails.

minimum tool rule - Apply only the minimum impact policy, device, force, regulation, or practice to bring about a desired result. Achieve results using the most "light-handed" approach (Hendee, 1990).

mission statement – succinct statement of the unit's purpose and reason for being (Region 7 Planning

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Staff).

mitigation – actions taken to compensate for the negative effects of a particular project. Wetland mitigation usually takes the form of restoration or enhancement of a previously damaged wetland or creation of a new wetland.

National Environmental Policy Act of 1969 (NEPA) – requires all 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

National Wildlife Refuge System (Refuge System) – all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction.

National Wildlife Refuge System Mission (mission) – “The mission of the 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.”

native plant – a plant that has grown in the region since the last glaciation and occurred before European settlement.

non-consumptive, wildlife-oriented recreation – photographing or observing plants, fish and other wildlife.

non-point source pollution – nutrients or toxic substances that enter water from dispersed and uncontrolled sites.

nonforested wetlands – wetlands dominated by shrubs or emergent vegetation.

Notice of Intent (NOI) – a notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the Federal Register.

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,

must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (from 40 CFR 1500).

National Wildlife Refuge (Refuge) – “A designated area of land, water, or an interest in land or water within the System, but does not include Coordination Areas.” Find a complete listing of all units of the System in the current *Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service*.

monitoring refuge accomplishments, and evaluating the success of strategies. Make objectives attainable, time-specific, and measurable.

occurrence site – a discrete area where a population of a rare species lives or a rare plant community type grows.

old field – an area that was formerly cultivated or grazed and where woody vegetation has begun to invade. If left undisturbed, it will eventually succeed into a forest. Many old fields occur at sites marginally suitable for crop production or pasturing. Old fields are highly variable in the Northeast, depending on soil, land use history, and management.

Open Marsh Water Management (OMWM) – a mosquito control technique that improves habitat conditions in salt marshes for mosquito-eating fish by creating ponds that will maintain the fish between lunar tides.

palustrine wetlands – “The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0%.” (Cowardin et al. 1979)

Partners for Wildlife Program – a voluntary habitat restoration program undertaken by the Fish and Wildlife Service in cooperation with other governmental agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private lands while leaving the land in private ownership.

partnership – a contract or agreement entered into by two or more individuals, groups of individuals, organizations or agencies in which each agrees to furnish a part of the capital or some in-kind service, i.e., labor, for a mutually beneficial enterprise.

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population monitoring – assessments of the characteristics of populations to ascertain their status and establish trends related to their abundance, condition, distribution, or other characteristics.

prescribed fire – the application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7), either from natural or intentional ignition.

priority public uses – see *wildlife-dependant recreational uses*.

Proposed Action – activities for which an Environmental Assessment is being written; the alternative containing the actions and strategies recommended by the planning team. The proposed action is, for all practical purposes, the draft CCP for the refuge.

protection – mechanisms such as fee title acquisition, conservation easements or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintenance of the species population at the site.

public – individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in the Service issues and those who do or do not realize that Service decisions may affect them.

public involvement – a process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

public involvement plan – broad long term guidance for involving the public in the comprehensive planning process.

public land – land that is owned by the local, state, or Federal government.

rare species – species identified in Appendix 3–6 as Species of Special Emphasis due to their uncommon

private land – land that is owned by a private individual, group of individuals, or non-governmental organization.

private landowner – any individual, group of individuals or non-governmental organization that owns land.

private organization – any non-governmental organization.

occurrence within the watershed.

rare community types – plant community types classified as rare by any of the four state Natural Heritage Programs. As used in this environmental impact statement, is inclusive of the exemplary community types. The types are listed in Appendix 3-4.

Record of Decision (ROD) – a concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation CFR 1505.2).

refuge goals – descriptive, open-ended and often broad statements of desired future conditions that convey a purpose but do not define measurable units (Writing Refuge Management Goals and Objectives: A Handbook).

refuge purposes – 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, a refuge unit, or refuge subunit, and any subsequent modification of the original establishing authority for additional conservation purposes (Service Manual 602 FW 1.4).

refuge lands – those lands in which the Service holds full interest in fee title, or partial interest such as easements.

Refuge Operating Needs System (RONS) – the Refuge Operating Needs System is a national

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database which contains the unfunded operational needs of each refuge. We include projects required to implement approved plans, and meet goals, objectives, and legal mandates.

restoration – the artificial manipulation of a habitat to restore it to something close to its natural state. Involves taking a degraded grassland and re-establishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and prescribed burning.

runoff – water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface into a water body.

Service presence – the existence of the Service through its programs and facilities which it directs or shares with other organizations; the public

5. interjurisdictional fish;

6. State-listed as threatened, endangered, or special concern..

state land – public land owned by a state such as state parks or state wildlife management areas.

step-down management plans – step-down management plans describe management strategies and implementation schedules. Step-down management plans are a series of plans dealing with specific management subjects (e.g., croplands, wilderness, and fire) (Service Manual 602 FW 1.4).

stopover habitat – habitat used during bird migration for rest and feeding.

strategy – a specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives.

threatened species – a federally protected species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

tributary – a stream or river that flows into a larger stream, river or lake.

trust resource – one that through law or administrative act is held in trust for the people by the government. A federal trust resource is one for which trust responsibility is given in part to the federal government through federal legislation or administrative act. Generally, federal trust

awareness of the Service as a sole or cooperative provider of programs and facilities.

species of concern – Species present in the watershed for whom the Refuge has a special management interest. The following criteria were used to identify “species of concern”:

1. Federally listed as threatened or endangered;
2. migratory bird, especially declining species, Neotropical migrants, colonial waterbirds, shorebirds, or waterfowl;
3. marine mammal;
4. sea turtle;

resources are those considered to be of national or international importance no matter where they occur, such as endangered species and species such as migratory birds and fish that regularly move across state lines. In addition to species, trust resources include cultural resources protected through federal historic preservation laws, nationally important and threatened habitats, notably wetlands, navigable waters, and public lands such as state parks and National Wildlife Refuges.

unfragmented habitat – large blocks of unbroken habitat of a particular type.

unit objective – desired conditions which must be accomplished to realize a desired outcome. Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring the success of the strategies. Objectives should be attainable and time-specific and may be stated quantitatively or qualitatively (Service Manual 602 FW 1.4).

universally accessible – a universally accessible recreation site is designed to accommodate people with physical disabilities. Interpretive materials at such a sight would be accessible to the visually impaired.

upland – dry ground; other than wetlands.

U.S. Fish and Wildlife Service Mission – our mission is to work with others to “conserve, protect, and enhance fish and wildlife, and their habitat for the continuing benefit of the American people.”

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vernal pool – depressions holding water for a temporary period in the spring and used by a variety of amphibians for egg laying.

vision statement – concise statement of what the unit could be in the next 10 to 15 years (Region 7 Planning Staff).

visitor center – a permanently staffed building offering exhibits and interpretive information to the visiting public. Some visitor centers are co-located with refuge offices, other include additional facilities such as classrooms or wildlife viewing areas.

visitor contact station – compared to a visitor center, a contact station is a smaller facility which may not be permanently staffed.

watchable wildlife – all wildlife is watchable. A watchable wildlife program is a strategy to help maintain viable populations of all native fish and

wetlands – The U.S. Fish and Wildlife Service's definition of wetlands states that "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." (Cowardin et al 1979)

wilderness - The legal definition is found in the Wilderness Act of 1964 Section 2c (P.L. 88-577): "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 untrammelled by man, where man himself is a visitor who does not remain." This legal definition places wilderness on the "untrammelled" or "primeval" end of the environmental modification spectrum. Wilderness is roadless lands, legally classified as component areas of the National Wilderness Preservation System, and managed so as to protect its qualities of naturalness, solitude and opportunity for primitive types of recreation (Hendee, 1990).

wilderness management - Government and citizen activity to identify-within the constraints of the Wilderness Act-goals and objectives for classified wildernesses and the planning, implementation, and administration of policies and management actions to achieve them. Involves the application of guidelines and principles to achieve established goals and objectives, including management of human use and influences to preserve naturalness and solitude (Hendee, 1990).

wildlife-dependent recreational use – "A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation." These are the six priority public uses of the System as established in

wildlife species by building an effective, well-informed constituency for conservation. Watchable wildlife programs are tools by which wildlife conservation goals can be met while at the same time fulfilling public demand for wildlife recreational activities (other than sport hunting, trapping or sport fishing).

watershed – the geographic area within which water drains into a particular river, stream or body of water. A watershed includes both the land and the body of water into which the land drains.

wet meadow – meadows located in moist low-lying areas, most often dominated by large colonies of reed canary grass. They are often created by collapsed beaver dams and exposed old pond bottoms. Salt marsh meadows are subject to daily coastal tides.

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. We also will consider these other uses in the preparation of refuge CCPs, however, the six priority public uses always will take precedence.

wildlife management – the practice of manipulating wildlife populations, either directly through regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

Appendix L

Appendix M: Works Cited

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**INTERIM
COMPATIBILITY DETERMINATION**

**EXISTING WILDLIFE-DEPENDENT USES OF REFUGE LANDS
WITHIN NEW REFUGE ACQUISITION AREAS**

STATION NAME: Edwin B. Forsythe National Wildlife Refuge

DATE(S) ESTABLISHED: Brigantine NWR - Jan. 24, 1939;
Barnegat NWR - June 21, 1967;
Edwin B. Forsythe NWR - May 22, 1984 - by combining the former
Brigantine and Barnegat NWR's.

ESTABLISHING AND ACQUISITION AUTHORITIES:

Edwin B. Forsythe National Wildlife Refuge was created on May 22, 1984 by combining the former Brigantine and Barnegat National Wildlife Refuges (98 Stat. 207). The Brigantine National Wildlife Refuge was established on January 24, 1939 by the Migratory Bird Conservation Commission under the authority of the Migratory Bird Conservation Act, to preserve estuarine habitats important to Atlantic brant (*Branta berniclia*) and to provide nesting habitats for black ducks (*Anas rubripes*) and rails. The Barnegat National Wildlife Refuge was established on June 21, 1967, under the authority of the Migratory Bird Conservation Act, for preservation of estuarine feeding and resting habitat for ducks and brant. The State of New Jersey enabling legislation is New Jersey Statutes, Annotated, Title 23, Chapter 4, Section 23:4-56.

PURPOSE(S) FOR WHICH ESTABLISHED:

For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. 715-715r), as amended, the purpose of the acquisition is "...for uses as an inviolate sanctuary, or for any other management purpose, for migratory birds." Migratory Bird Conservation Act (16 U.S.C. 715d).

For lands acquired under the Fish and Wildlife Act of 1956 (16 U.S.C. 742(a) 754), as amended, the purpose of the acquisition is "... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742 (a)(4)) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1)).

For lands acquired under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b)) "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b), 100 Stat. 3583). For lands within the Brigantine Wilderness Area, "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136, Wilderness Act of 1964).

OTHER APPLICABLE LAWS, REGULATIONS, AND POLICIES:

1. Antiquities Act of 1906 (34 STAT 225).
2. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 STAT 1222).
3. Refuge Recreation Act of 1962 (16 U.S.C. 460k 1-4; 76 STAT 653).
4. National Wildlife Refuge Administrative Act of 1966 (16 U.S.C. 668dd - 668ee; 80 STAT 927), as amended.
5. National Environmental Policy Act of 1969 (42 U.S.C. 4321, *et seq*; 83 STAT 852).
6. National Wildlife Refuge System Regulations in the Code of Federal Regulation (CFR)50 Subchapter C.

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7. The Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 STAT 884), as amended.
8. Executive Order 11990, Protection of Wetlands.
9. Wilderness Act of 1964 (16 U.S.C. 1121(note), 1131-1136).
10. Clean Air Act (42 U.S.C. 7401 *et seq*), as amended.
11. National Wildlife Refuge System Improvement Act of 1997 (P. L. 105-57).

DESCRIPTION OF PROPOSED USE:

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are defined as wildlife-dependent recreational uses by The National Wildlife Refuge System Improvement Act of 1997. This interim compatibility statement addresses only these uses.

ANTICIPATED IMPACTS OF THE USE:

The current levels of the six wildlife-dependent recreational uses defined in The National Wildlife Refuge System Improvement Act of 1997 (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) in the proposed refuge expansion areas do not appear to be having any negative impacts on the habitat or wildlife within the areas.

DETERMINATION:

This use is compatible X .

This use is not compatible .

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The parcel needs to be posted.

JUSTIFICATION:

See Anticipated Impacts of the Use:

NEPA COMPLIANCE:

CATEGORICAL EXCLUSION		
ENVIRONMENTAL ASSESSMENT	X	1994
ENVIRONMENTAL IMPACT STATEMENT		
FONSI	X	1994

The 1994 Environmental Assessment and Finding of No Significant Impacts (FONSI) are the most recently approved documents for expanding the Edwin B. Forsythe National Wildlife Refuge. The Environmental Assessment and FONSI being prepared for the Jersey Coastal Refuges, scheduled to be completed in 2000, will supercede the 1994 documents.

REFUGE MANAGER: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

**INTERIM
COMPATIBILITY DETERMINATION**

**EXISTING WILDLIFE-DEPENDENT USES OF REFUGE LANDS
WITHIN NEW REFUGE ACQUISITION AREAS**

STATION NAME: Cape May National Wildlife Refuge

DATE(S) ESTABLISHED: January 20, 1989

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Cape May National Wildlife Refuge was created on January 20, 1989 administratively under authority of the Fish and Wildlife Act of 1956, (16 U.S.C. 742a-742j; 70 stat 1119), as amended.

PURPOSE(S) FOR WHICH ESTABLISHED:

For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. 715-715r), as amended, the purpose of the acquisition is "...for uses as an inviolate sanctuary, or for any other management purpose, for migratory birds." Migratory Bird Conservation Act (16 U.S.C. 715d).

For lands acquired under the Fish and Wildlife Act of 1956 (16 U.S.C. 742(a) 754), as amended, the purpose of the acquisition is "... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742 (a)(4)) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1)).

For lands acquired under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b)) "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b), 100 Stat. 3583).

OTHER APPLICABLE LAWS, REGULATIONS, AND POLICIES:

1. Antiquities Act of 1906 (34 STAT 225).
2. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 STAT 1222).
3. Refuge Recreation Act of 1962 (16 U.S.C. 460k 1-4; 76 STAT 653).
4. National Wildlife Refuge Administrative Act of 1966 (16 U.S.C. 668dd - 668ee; 80 STAT 927), as amended.
5. National Environmental Policy Act of 1969 (42 U.S.C. 4321, *et seq*; 83 STAT 852).
6. National Wildlife Refuge System Regulations in the Code of Federal Regulation (CFR)50 Subchapter C.
7. The Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 STAT 884), as amended.
8. Executive Order 11990, Protection of Wetlands.
9. Wilderness Act of 1964 (16 U.S.C. 1121(note), 1131-1136).
10. Clean Air Act (42 U.S.C. 7401 *et seq*), as amended.
11. National Wildlife Refuge System Improvement Act of 1997 (P. L. 105-57).

DESCRIPTION OF PROPOSED USE:

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are defined as wildlife-dependent recreational uses by The National Wildlife Refuge System Improvement

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Act of 1997. This interim compatibility statement addresses only these uses.

ANTICIPATED IMPACTS OF THE USE:

The current levels of the six wildlife-dependent recreational uses defined in The National Wildlife Refuge System Improvement Act of 1997 (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) in the proposed refuge expansion areas do not appear to be having any negative impacts on the habitat or wildlife within the areas.

DETERMINATION:

This use is compatible X .

This use is not compatible ____ .

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The parcel needs to be posted.

JUSTIFICATION:

See Anticipated Impacts of the Use:

NEPA COMPLIANCE:

CATEGORICAL EXCLUSION		
ENVIRONMENTAL ASSESSMENT	X	1988
ENVIRONMENTAL IMPACT STATEMENT		
FONSI	X	1989

The above Environmental Assessment and Finding of No Significant Impacts (FONSI) are the most documents for establishing the Cape May National Wildlife Refuge. The Environmental Assessment and FONSI being prepared for the Jersey Coastal Refuges, scheduled to be completed in 2000, will supercede the above documents.

REFUGE MANAGER: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

The following Actions and Strategies Matrix compares management Alternatives for the key issues identified in Chapter I. Actions and strategies identified under each of the three Alternatives are **not** additive, Alternatives B & C **do not** include the actions in Alternative A, unless otherwise indicated.

Table 2-2. *Actions and Strategies Matrix for Forsythe Refuge.*

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitats and wildlife populations?</i>	Continue to protect & monitor piping plover & swamp pink (federally-listed species) Complete a step-down habitat management plan for the Refuge Continue maintaining Barnegat & Brigantine impoundments Continue current population baseline surveys Establish monitoring program for water quality & contaminants Continue providing minimal on-site support for current research projects Continue using trapping to control furbearer populations in problem areas	Same as Alternative A, except: Survey areas for potential threatened & endangered species; actively restore good candidates (e.g. sea beach amaranth) Implement physiographic/species based habitat management prescription on all Refuge lands Conduct prescribed burns in upland forests, upland brush & grasslands Develop & implement cooperative private lands habitat restoration & management plan Conduct baseline surveys & monitoring on: plants, invertebrates, mammals, amphibians, raptors, fish, & waterbirds Implement species monitoring before & after major projects; expand use of GIS to document & model species & habitat Increase on-site support for current research & initiate new research on: impact of mosquito control techniques on wildlife; impact of public use on wildlife; beach/shoreline dynamics; impact of water quality & quantity on wetland resources; & pre-colonial ecology of area Develop computer archive of data& publications for staff, public, & partners Provide technical assistance to local communities on contaminant spill planning & response & other wildlife-related activities Restore colonial nesting birds on barrier & bay islands	In addition to Alternative B: Develop community-level habitat map Develop & implement community/species-based habitat management plan Develop & implement cooperative private lands habitat restoration plan Through partnerships, increase nesting structures for peregrine falcon, osprey, & barn owls Evaluate stream/river blockages impeding spawning runs for interjurisdictional fish Open all Refuge lands to public trapping

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		Identify spawning & nursery habitat for anadromous & interjurisdictional fish Expand trapping areas to better manage furbearer populations	
<i>How would we manage invasive and overabundant species?</i>	Continue program to control approximately 150 acres of Phragmites/year Continue special public hunting program to control populations of snow geese & resident Canada geese Conduct nest disruption of resident Canada geese	Survey invasive/exotic species Implement Integrated Pest Management (IPM) program for Phragmites & six other invasive plant species Provide technical assistance to adjacent land owners on invasive species control Research alternative methods of controlling invasive species Use more aggressive control techniques for overabundant goose population	Same as Alternative B
<i>How would we manage pesticide use?</i>	Continue current levels of pesticide use for phragmites & mosquito control	Expand Integrated Pest Management (IPM) program, minimizing pesticide use	Same as Alternative B
<i>What big game hunting opportunities would we provide?</i>	Continue current hunting programs in Deer Management Zones (DMZ) 56, 57 & 58	In addition to Alternative A: Initiate a universally accessible hunt in DMZ 56 during the permit shotgun or muzzle loader seasons Expand deer hunting opportunities in DMZ 58 to include: Forked River Game Farm; former AT&T property; selected properties east of Route 9; Middle Branch of Forked River; & Cedar Run Creek	In addition to Alternative B: Open DMZ 57 & 58 to six-day firearm, fall & winter bow seasons
<i>What upland game hunting opportunities would we provide?</i>	Continue to keep Refuge closed to upland game hunting	Establish an upland game hunting area at Oak Island	In addition to Alternative B: Open all Refuge lands to upland game hunting
<i>What migratory game bird hunting opportunities would we provide?</i>	Continue current waterfowl, rail, & moorhen hunting in designated units	In addition to Alternative A: At the Brigantine Division allow foot access to Unit 5 At the Barnegat Division allow jump shooting from Jeremy Point to Cedar Run Creek in Unit A; eliminate foot access & jump shooting from Cedar	In addition to Alternative B: Open all Refuge lands to migratory game bird hunting

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		Run Creek to Beach Haven in Unit A; & allow jump shooting & eliminate site requirements in Unit C Designate new hunting areas at: Reedy Creek; Stouts Creek; Forked River Game Farm; AT&T tract; & Cedar Run Creek	
<i>What fishing opportunities would we provide?</i>	Continue to operate boat launching ramp & parking area at Scotts Landing Continue to provide fishing opportunities at: Lily Lake; Graveling Point; Holgate (seasonal); Scott's landing; Bridge to Nowhere; Dock Creek Road; Parkertown Road; Cedar Run Creek; Dock Road; & Stafford Avenue. Revise Refuge fishing plan	In addition to Alternative A: Develop a Refuge fishing guide By 2002, provide a universally accessible saltwater fishing & crabbing pier on the Mullica River By 2003, upgrade 3 saltwater fishing & crabbing sites: Parker Run, Cedar Run Creek, & Cedar Creek By 2004, provide a universally accessible freshwater fishing pier at Cedar Run Creek Fishing opportunities in the Brigantine Wilderness Area are discussed under <i>How would we manage the Brigantine Wilderness Area?</i>	In addition to Alternative B: Allow fishing from all shore locations outside of the Holgate Unit, Little Beach Island & the Wildlife Drive
<i>What wildlife observation and photography opportunities would we provide?</i>	Continue to provide opportunities at: Wildlife Drive, associated foot paths & observation tower; Reedy Creek Trail; Barnegat Impoundment observation deck; & Seasonal access at Holgate Beach. Monitor walking & bicycling activities on the Wildlife Drive Continue to maintain interpretive signs& provide brochures at existing Refuge public use sites	In addition to Alternative A: Create new foot trails, with appropriate parking areas, kiosks & interpretive signs at: Four Mile Branch Bogs by 2003; Stouts Creek by 2006; Cedar Run Bog by 2010; & Collinstown Rd by 2014 By 2004, complete Reedy Creek Trail & add observation platform Construct universally accessible observation platform at Bonnet Island by 2005 & off of Wildlife Drive, overlooking the experimental pool by 2007 Develop parking for canoers & kayakers, with appropriate kiosks, at Westecunk Creek by 2008 & Cedar Run Creek by 2012 Wildlife observation & photography opportunities in the Brigantine Wilderness Area are discussed under	In addition to Alternative B: Open all Refuge lands to wildlife observation & photography, except those involving endangered species recovery efforts

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		<i>How would we manage the Brigantine Wilderness Area?</i>	
<i>What environmental education and interpretation opportunities would we provide?</i>	Continue current programs & projects: New displays at the renovated auditorium; 5,000 students visit annually with teachers; Provide class visit planning & informational assistance as needed; Issue special use permits for class activities such as seining or collecting samples as requested; Upon request, show videos in auditorium for organized groups; Friends of Forsythe provide occasional interpretive tours of the Wildlife Drive; Distribute 3 Refuge brochures; & Continue to maintain interpretive signs& provide brochures at existing Refuge public use sites.	In addition to Alternative A: Conduct outreach related to environmental education opportunities at the newly renovated auditorium Reach out to local community groups, especially those that are not the Refuge's typical audience Increase interface with education community, including provision of teacher training, & help develop wildlife classroom projects Increase interpretive signs & available information Increase interpretive outreach to hunters & anglers Develop environmental education partnerships, introductory Refuge video for all age groups, wildlife learning materials for children, 5 new Refuge brochures, & 2 outdoor classroom sites Work with partners to address personal watercraft impacts through outreach & education Expand interpretive focus to include human impacts on wildlife Add scheduled seasonal nature tours on the Wildlife Drive, at Holgate & Reedy Creek with the help of partners & Friends of Forsythe	In addition to Alternative B: Participate in development of a watershed-wide, cooperative outreach group
<i>How would we manage the Brigantine Wilderness Area?</i>	Continue to seasonally allow motor vehicles to illegally drive & park above the mean high tide line at Holgate Continue to offer seasonal surf fishing opportunities at Holgate Continue to close all of the Holgate Peninsula	Prohibit motor vehicles use above the mean high tide line at Holgate year-round & post mean high tide line Continue offering seasonal surf fishing, wildlife observation & photography opportunities at Holgate from September thru March with access by foot only Initiate efforts to establish a boat concession to seasonally ferry anglers & other Refuge visitors to the	Same as Alternative B, except: Seek a license from the NJ Tidelands Council to close the State-owned intertidal zone at Holgate to motor vehicles, eliminating the need to post mean high tide line In cooperation with Town provide observation

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	to public access from April thru August during the piping plover breeding season Continue to keep Little Beach Island closed to all public access year-round Continue to allow migratory game bird hunting on designated salt marshes Continue to allow motor vehicles to assist in rescuing stranded marine mammals Continue to use motor vehicles for law enforcement at Holgate Beach Continue programs to monitor air quality & precipitation chemistry Conduct a Wilderness Review as part of the revision of the Refuge CCP in 2015	southern tip of the Holgate Peninsula Continue to close all of the Holgate Peninsula & Little Beach Island to public access from April through August during the piping plover breeding season Open Little Beach Island to surf fishing, wildlife observation & photography seasonally by Refuge special use permit Encourage seasonal use of less sensitive areas of the Wilderness through guided tours or Refuge special use permit Continue to allow migratory game bird hunting on designated salt marshes Apply "minimal tools" concept to management activities such as: invasive species control, boundary posting, assisting stranded marine mammals, etc. Continue current air quality monitoring programs & add mercury monitoring in partnership with NJ DEP Develop partnerships with NJ DEP, local chambers of commerce, & others emphasizing wilderness values Conduct outreach to increase awareness of the Wilderness Area, using TV, calendars, posters, presentations, etc. By 2005 develop a Wilderness Management Plan, & by 2010 conduct a Wilderness Review of all Refuge lands acquired since 1972 (Also see <i>How would we manage habitats and wildlife populations?</i> for other management activities)	platform immediately north of Holgate Unit Perform most beach maintenance & management activities by boat
<i>What would be our land protection strategy?</i>	Continue efforts to acquire 12,300 acres of privately owned lands within approved Refuge acquisition boundaries from willing sellers	In addition to Alternative A: Acquire 11,500 acres within designated Focus Areas outside existing approved Refuge acquisition boundaries	Same as Alternative B

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	Continue current level of land protection planning with government & private partners	Increase land protection planning efforts with partners Expand off Refuge habitat protection & restoration efforts with other public & private landowners	
<i>How would we ensure resource protection and visitor safety?</i>	Continue current law enforcement efforts with 1 seasonal & 2 full-time Park Rangers	In addition to Alternative A: Hire 3 new full-time Park Rangers	Same as Alternative B
<i>What buildings and facilities would be used or constructed for Refuge operations?</i>	Continue to use existing Refuge buildings	Conduct a Site Requirement Analysis Construct new headquarters & visitor center building(s) at the Brigantine Division to replace existing buildings Construct new Barnegat Division Office & visitor contact building(s) to replace existing field office Construct new Reedy Creek Unit office & visitor contact building(s)	Same as Alternative B
<i>What would be the future staffing needs at Forsythe Refuge?</i>	Current staffing level: 1 Project Leader 1 Deputy Project Leader 1 Supervisory Refuge Operations Specialist 1 Refuge Operations Specialist 2 Biologists 1 Outdoor Recreation Planner 2 Maintenance Workers 1 Lead Administrative Office Assistant 1 Office Automation Assistant 2 Park Rangers 1 Seasonal Park Ranger	In addition to Alternative A: 2 Safety Officers/Refuge Operations Specialists 2 Biologists 1 Forester/Fire Management Officer 4 Biological Technicians 6 Maintenance Workers 1 Office Automation Assistants 1 Outreach Specialist 1 Computer Specialist 3 Park Rangers 1 Outdoor Recreation Planners 2 Recreational Assistants 1 Secretary	In addition to Alternative A: 3 Safety Officers/Refuge Operations Specialists 5 Biologists 4 Biological Technicians 6 Maintenance Workers 3 Office Automation Assistants 3 Park Rangers 3 Outdoor Recreation Planners

II Alternatives

Actions and Strategies Matrix, Edwin B. Forsythe National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	1 Volunteer Coordinator 1 SCEP (Student Career Experience Program) 1 Crew Leader total FTEs = 17	total FTEs (A + B)= 42	total FTEs (A + C)= 44
<i>What would be the future funding needs at Forsythe Refuge for the next 15 years?</i>	Staffing & Projects: \$15.3 million Land Protection: \$19.7 million	Staffing & Projects: \$54.2 million Land Protection: \$57.7 million	Staffing & Projects: \$60 million Land Protection \$57.7 million

Table 2-3. Actions and Strategies Matrix for Cape May Refuge.

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitat and wildlife populations?</i>	Complete a step-down habitat management plan for the Refuge Maintain open land through cooperative mowing Continue current baseline population surveys Establish monitoring program for water quality & contaminants Continue providing minimal on-site support for current research projects The Refuge would remain closed to public trapping	Same as Alternative A, except: Survey all areas for potential threatened & endangered species & actively restore good candidates (e.g. sea beach amaranth) Implement physiographic/species based habitat management prescription on all Refuge lands Conduct prescribed burns in upland forests, upland brush & grasslands Develop & implement cooperative private lands habitat restoration plan Conduct comprehensive baseline flora & fauna surveys & long term monitoring Implement species monitoring before & after major projects; expand use of GIS to document & model species & habitat Initiate research on: impact of mosquito control techniques on wildlife; impact of public use on wildlife; beach/shoreline dynamics; impacts of water quality/quantity on wetland resources; & pre-colonial ecology of the area Develop computer archive of data & publications for staff, public, & partners Provide technical assistance to local communities on contaminant spill planning & response & other wildlife-related activities Open area north of Route 550 to trapping	In addition to Alternative B: Develop an ecological community-level habitat map Develop & implement community/species based habitat management plan Develop & implement cooperative private lands habitat restoration plan Through partnerships, increase nesting structures for osprey, barred & barn owls Open entire Refuge to trapping
<i>How would we manage invasive and overabundant species?</i>	No effort would be made to control invasive species	Survey invasive & exotic species on the Refuge Implement Integrated Pest Management (IPM) program, including long term monitoring, on phragmites & other exotic plant species Research alternative methods of controlling problematic species	Same as Alternative B
<i>How would we manage pesticide use?</i>	Continue current levels of pesticide use for mosquito control	Implement Integrated Pest Management (IPM) strategy minimizing pesticide use Provide technical assistance on IPM	Same as Alternative B

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		strategies to local communities to control common problem species	
<i>What big game hunting opportunities would we provide?</i>	Continue current Refuge-wide deer hunt program	Same as Alternative A.	Same as Alternative A
<i>What upland game hunting opportunities would we provide?</i>	Continue to keep Refuge closed to upland game hunting	In the Delaware Bay Unit open areas West of NJ Route 47 to upland game hunting In the Great Cedar Swamp Division open areas North of County Route 550 to upland game & turkey hunting	Open entire Refuge to upland game hunting
<i>What migratory game bird hunting opportunities would we provide?</i>	Continue current migratory game bird hunting program in the Delaware Bay Unit West of NJ Route 47	In addition to Alternative A: In the Great Cedar Swamp Division open areas North of County Route 550 to migratory game bird hunting	Open entire Refuge to migratory game bird hunting
<i>What fishing opportunities would we provide?</i>	The entire Refuge would remain closed to fishing	Open the entire Refuge to fishing & crabbing	Same as Alternative B
<i>What wildlife observation and photography opportunities would we provide?</i>	Continue to provide Refuge-wide opportunities for wildlife observation & photography Woodcock Trail would remain the only completed trail on the Refuge	In addition to Alternative A: Develop universally accessible trail at the Refuge Headquarters Provide a parking lot & kiosk in the area of Gracetown Road as part of the proposed 35 mile "Rails to Trails" project running from Cape May to Manumuskin in Cumberland County The "Rails to Trails" unimproved trail running through the Refuge would be open to hikers, bikers, & horses, with a side trail into the adjacent cedar swamp Develop parking lot, kiosk, & other trail improvements at Schellinger & Stocker tracts, & at Peach Orchard Road Establish a canoe landing & designated canoe route on Cedar Creek	Develop universally accessible trail at the Refuge headquarters Provide a parking lot & kiosk in the area of Gracetown Road as part of the proposed 35 mile "Rails to Trails" project running from Cape May to Manumuskin in Cumberland County The "Rails to Trails" unimproved trail running through the Refuge would be open to hikers, bikers, & horses, with a side trail into the adjacent cedar swamp
<i>What environmental education and interpretation opportunities would we provide?</i>	Occasional programs provided at the Refuge in cooperation with partners & at special events Continue distribution of Refuge brochure Continue to maintain	In addition to Alternative A: Increase Refuge participation in local events, focusing on non-traditional groups Increase interpretive signage on Refuge trails & kiosks Schedule regular nature walks, assisted	Provide more self-guiding opportunities on the Refuge Place interpretive signage on Refuge trails & in kiosks Produce new Refuge

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
	interpretive signs & provide brochures at existing Refuge public use sites	by partners Increase variety of Refuge brochures, maps, & handouts Develop teacher workshops & an outdoor classroom established Develop a Friends of Cape May Refuge group Develop web site for environmental education at Cape May Refuge	brochures, maps & fact sheets for distribution at kiosks & remote locations
<i>When would we conduct a Wilderness Review of the Refuge?</i>	Conduct a Wilderness Review for all Refuge lands as part of the revision of the CCP in 2015	By 2010, conduct a Wilderness Review for all Refuge lands	Same as Alternative A
<i>What would be our land protection strategy?</i>	Continue efforts to acquire 7,600 acres of inholdings within approved Refuge acquisition boundaries from willing sellers Continue current level of land protection planning with government & private partners	In addition to Alternative A: Acquire 3,600 within the 4,900 acre Focus Areas that have been identified Expand landscape level land protection planning efforts with partners Expand off Refuge habitat protection & restoration efforts with other public & private landowners Acquire the Coast Guard's LORAN Support Unit (adjacent to the Two Mile Beach Unit), should it become excess property	Same as Alternative B
<i>How would we ensure resource protection and visitor safety?</i>	Continue current law enforcement efforts with 1 full-time & 1 seasonal Park Rangers	In addition to Alternative A: Hire 1 new full-time & 1 new seasonal Park Rangers	Same as Alternative B
<i>What buildings and facilities would be used or constructed for Refuge operations?</i>	Continue to use existing Refuge buildings at the Kimbles Beach Road headquarters site	Construct a new, larger office & visitor contact building at the Kimbles Beach Road headquarters site, along with new maintenance & storage buildings	Enlarge & remodel existing Refuge office at the Kimbles Beach Road headquarters site & build new maintenance & storage buildings
<i>What would be the future staffing needs at Cape May Refuge (including the Two Mile Beach Unit)?</i>	Current staffing level: 1 Supervisory Refuge Operations Specialist 1 Park Ranger 1 Seasonal Park Ranger	In addition to Alternative A: 1 Project Leader 1 Deputy Project Leader 2 Biologists	In addition to Alternative A: 1 Project Leader 1 Deputy Project Leader 3 Biologists

Actions and Strategies Matrix, Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
		2 Biological Technicians 2 Outdoor Recreation Planners 1 Outdoor Recreational Assistant 2 Maintenance Workers 1 Lead Administrative Support Assistant 1 Park Ranger 1 Forester/Fire Management Officer 1 Secretary/Receptionist 1 Seasonal Park Ranger 1 SCEP (Student Career Experience Program) 1 Tractor Operator	2 Biological Technicians 2 Outdoor Recreation Planners 1 Outdoor Recreational Assistant 3 Maintenance Workers 1 Lead Administrative Support Assistant 1 Computer Specialist 1 Park Ranger 1 Forester/Fire Management Officer 1 Forestry Technician 1 Secretary - Receptionist 2 Seasonal Park Rangers 2 SCEPs (Student Career Experience Program) 1 Tractor Operator
	total FTEs = 3	total FTEs (A + B) = 21	total FTEs (A+C) = 27
<i>What would be the future funding needs at Cape May Refuge (including the Two Mile Beach Unit) for the next 15 years?</i>	Staffing & Projects: \$1.9 million Land protection: \$4.6 million	Staffing & Projects: \$6.5 million Land Protection: \$23.8 million	Staffing & Projects: \$6.9 million Land Protection: \$23.8 million

Table 2-4. *Actions and Strategies Matrix for the Two Mile Beach Unit of Cape May Refuge.*

Actions and Strategies Matrix, Two Mile Beach Unit at Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
<i>How would we manage habitat and wildlife populations?</i>	There would be no active management or restoration of habitats or wildlife populations No wildlife surveys would be conducted No public trapping of furbearers would be allowed	Restore disturbed areas using native vegetation Develop & implement a habitat management plan Develop & implement management plan for beach nesting birds & migrant shorebirds Conduct wildlife surveys Initiate comprehensive surveys of flora & fauna Study & monitor beach & sand dune dynamics Restore threatened & endangered species Develop agreement with Coast Guard for resource management at Loran Support Unit & Training Center to extend wildlife management program No public trapping of furbearers would be allowed	Allow natural succession of disturbed areas Conduct baseline surveys of migratory birds & beach nesting birds Conduct baseline vegetation surveys Public trapping to manage furbearer populations
<i>How would we manage invasive and overabundant species?</i>	There would be no active management of invasive species	Survey invasive species & implement an Integrated Pest Management (IPM) plan to control undesirable species	Same as Alternative B
<i>How would we manage pesticide use?</i>	No pesticides would be used	Implement IPM strategy, minimizing pesticide use	Same as Alternative B
<i>What access opportunities would we provide to the beach?</i>	No public access allowed	Public access from October thru March	Public access allowed year-round
<i>What hunting opportunities would we provide?</i>	No hunting would be allowed	Same as Alternative A	Same as Alternative A
<i>What fishing opportunities would we provide?</i>	No fishing would be allowed	Allow seasonal surf fishing on the beach from October thru March, foot access only	Allow year-round surf fishing on the beach, & fishing & crabbing in back bay wetlands, foot access only Allow commercial bait fishing by Refuge special

Actions and Strategies Matrix, Two Mile Beach Unit at Cape May National Wildlife Refuge			
Issue or concern	Alternative A (the No Action Alternative)	Alternative B (the Service's Proposed Action)	Alternative C
			use permit
<i>What wildlife observation and photography opportunities would we provide?</i>	Public access would be prohibited	Maintain selected trails & roads, with improvements such as signs, kiosks, platforms & universal accessibility Allow seasonal wildlife observation & photography on beach from October thru March Consider the possibility of utilizing the former radar platform for wildlife observation	Maintain selected trails & roads, with no improvements
<i>What environmental education and interpretation opportunities would we provide?</i>	Public access would be prohibited	Establish Refuge visitor center with displays, exhibits & regular programs in building A-14 Provide regular programs & guided nature walks, especially during peak bird migration periods Install signs & kiosks for self-guided interpretation	Install self-guiding interpretive signs & kiosks Occasional programs & guided nature walks provided by partners Establish visitor contact station, staffed by partners
<i>What buildings would we use?</i>	None of the existing buildings would be used or maintained Buildings & other improvements not needed by the Coast Guard would be removed as they become public safety hazards	Utilize buildings A-14, B-6, & any other improvements necessary for Refuge management Establish Refuge Visitor Center in building A-14 Remove all other buildings & improvements not needed by the Coast Guard	Utilize building B-6 & any other improvements necessary for Refuge management Provide selected buildings for use by mission-compatible partner(s) Establish Refuge visitor contact station, staffed by partners Remove all other buildings & improvements not needed by the Coast Guard

Appendix A

Principles of Wilderness Management

Appendix B

Relevant Legal Mandates and Land Acquisition Legislation

Appendix C

Issues Workbook

Appendix D

Planning Update

Appendix E

Summarized Public Comments

Appendix F

Ecosystem Values

Appendix G

Socioeconomic Analysis of Off-road Vehicle Use at Holgate Beach

Appendix H

Species and Habitats of Special Concern

Appendix I

Staffing Charts

Appendix J

MMS Project List

Appendix K

RONs Project List

Appendix L

Glossary

Appendix M

Works Cited

Appendix N

Interim Compatibility Determinations