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Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the California Golden Trout as Endangered; Proposed Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R8–ES–2011–0089 MO 92210–0–008]

Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the California Golden Trout as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service, announce a 12-month finding on a petition to list the California golden trout (*Oncorhynchus mykiss aguabonita*) as endangered under the Endangered Species Act of 1973, as amended (Act). After review of all available scientific and commercial information, we find that listing the California golden trout is not warranted at this time. However, we ask the public to submit to us any new information that becomes available concerning the threats to the California golden trout or its habitat at any time.

DATES: The finding announced in this document was made on October 11, 2011.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R8–ES–2011–0089. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Sacramento Field Office, 2800 Cottage Way, Sacramento, CA 95825. Please submit any new information, materials, comments, or questions concerning this finding to the above address.

FOR FURTHER INFORMATION CONTACT: Karen Leyse, Field Office Listing/Critical Habitat Coordinator, Sacramento Field Office (see **ADDRESSES**); by telephone at 916–414–6600; or by facsimile at 916–414–6712. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq.*) requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants, to the maximum extent practicable, within 90 days after receiving the petition, we make a finding as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted. In addition, within 12 months of the date of the receipt of the petition, we must make a finding on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted but precluded by other pending proposals. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. Such 12-month findings are to be published promptly in the **Federal Register**. This notice constitutes our 12-month finding on the October 23, 2000, petition to list the California golden trout as endangered.

Previous Federal Actions

On October 23, 2000, we received a petition dated October 13, 2000, from Trout Unlimited, requesting that the California golden trout be listed on an emergency basis as endangered under the Act, and that critical habitat be designated. Included in the petition was supporting information on the subspecies' taxonomy, distribution, and ecology, as well as information regarding factors considered by the petitioners to threaten the subspecies. We acknowledged receipt of the petition in a letter to Trout Unlimited, dated November 7, 2000. In that letter, we also stated that we would be unable to address the petition until fiscal year 2002 or later due to court orders and judicially approved settlement agreements for listing and critical habitat determinations under the Act, which required nearly all of our listing and critical habitat funding for fiscal year 2001. The petitioner filed a complaint in Federal District Court on November 29, 2001, resulting in a ruling on June 21, 2002, ordering us to complete the 90-day finding by September 19, 2002. We completed the finding by the requisite date, and published it in the **Federal Register** on September 20, 2002 (67 FR 59241). In the finding we determined that the petition presented substantial scientific or commercial information to indicate that listing the California golden trout may be warranted. We also determined that an emergency rule to list was not warranted at the time of the 90-day finding. We concurrently initiated a status review on which to base our eventual 12-month finding regarding whether listing of the California golden trout is warranted. On September 22, 2003, Trout Unlimited sent a Notice of Intent to sue the Service for violating the Act by failing to make a 12-month finding within the statutory timeframe. This 12-month finding resolves that issue.

Subspecies Information

Taxonomy and Subspecies Description

The California golden trout (*Oncorhynchus mykiss aguabonita*) (formerly known as Volcano Creek golden trout) is one of three subspecies of rainbow trout (*O. mykiss*) native to the Kern River basin in Tulare and Kern Counties, California (Behnke 1992, p. 191; Behnke 2002, p. 105; Moyle 2002, p. 283). The two other subspecies native to this basin are the Little Kern golden trout (*O. mykiss whitei*), which is found in the Little Kern River and its tributaries, and the Kern River rainbow trout (*O. mykiss gilberti*), which is found in the Kern River. All three subspecies most likely originated from successive invasions of primitive redband trout (ancestral rainbow trout) of the Kern River approximately 10,000 to 20,000 years ago (Behnke 1992, p. 189; Behnke 2002, p. 107; Moyle 2002, p. 283). These fish gained access to the Kern River drainage during glacial cycles and short-term interglacial wet cycles that allowed Lake Tulare to overflow and connect the Kern River drainage to the San Joaquin River and Pacific Ocean (Behnke 2002, p. 109). These primitive forms of rainbow trout that became isolated in the Kern River watershed gave rise to the California golden trout, Little Kern River golden trout, and the Kern River rainbow trout due to local selective factors in their environment (Behnke 2002, p. 111; Moyle 2002, p. 283).

The taxonomy of golden trout in the Kern River basin has been revised several times. Originally, four species of trout were described: *Salmo aguabonita* from the South Fork Kern River, *S. roosevelti* from Golden Trout Creek, *S. whitei* (Little Kern golden trout) from the Little Kern River, and *S. gairdeneri gilberti* (Kern River rainbow trout) from the lower Kern River (Moyle 2002, p. 284). Trout from the South Fork Kern River and Golden Trout Creek were later recognized as color variants of *S. aguabonita* (Schreck and Behnke 1971, p. 994). More recently, rainbow trout were reclassified as *Oncorhynchus mykiss* to reflect their relationship to Pacific salmon, and California golden trout in both the South Fork Kern River and Golden Trout Creek became recognized as the same subspecies of rainbow trout, *Oncorhynchus mykiss* *aguabonita* (Behnke 1992, pp. 163, 172). Similarly, Little Kern golden trout became *O. mykiss whitei,* and Kern River rainbow trout became *O. mykiss gilberti*.

California golden trout are well known for their bright coloration, red to red-orange belly and cheeks, bright gold lower sides, a central lateral band that is red-orange, and a deep olive-green back (Moyle 2002, p. 283). Typically, 10 parr marks (oval colorations) are present along the lateral line on both young fish and adults, but may be lost in older fish under some conditions (Behnke 2002, p. 106). The pectoral, pelvic, and anal fins are orange with a white to yellow tip preceded by a black band; dorsal fins may also have a white to yellow tip (Moyle 2002, p. 283). Body spotting is highly variable, but spots are usually scattered across the dorsal surface with a few below the lateral line (Moyle 2002, p. 283). California golden trout from Golden Trout Creek have few spots on the body, primarily concentrated on and near the caudal peduncle (the muscle before the tail fin), whereas California golden trout in the South Fork Kern River typically have small dark spots present over most of the length of the body above the lateral line, although a few spots can be found below the lateral line (Fisk 1983, p.1; Stephens 2001a, p. 4). Golden trout are rainbow trout, so the basic rainbow trout characteristics apply to the subspecies (Moyle 2002, p. 283); however, golden trout have the lowest number of vertebrae (59 to 60) and pyloric caeca (finger-like projections of the intestine (30 to 32)), and the highest number of scales along the lateral line (170 to 200) of any rainbow trout (Behnke 2002, p. 106). California golden trout in streams can obtain lengths of 19 to 20 centimeters (cm) (7.5 to 7.9 inches (in)) (Knapp and Dudley 1990, p. 168). California golden trout remain geographically isolated from Little Kern golden trout and Kern River rainbow trout, but historical planting of nonnative hatchery trout (*O. mykiss irideus*) has resulted in hybridization in most of the range (see the Hybridization section under Factor E below).

California golden trout also present behavioral and life-history characters that help distinguish them from other subspecies of rainbow trout (see also discussion under the Habitat and Life History section below). These include smaller home ranges (Matthews 1996a, p. 84; Matthews 1996b, p. 587), remaining active during both day and night (Matthews 1996a, pp. 82, 84–85), a relatively long lifespan (Knapp and Dudley 1990, p. 169), and the construction of redds (depressions in the substrate for eggs) using relatively small-grained substrate (Knapp and Vredenburg 1996, pp. 528, 529).

For purposes of this finding, we have considered California golden trout to be those trout within the native range of the subspecies (see Distribution section below) that present the morphological and behavioral characters listed above. We do not rely on genetic tests indicating levels of genetic introgression (infiltration of genes from one species into the gene pool of another species through repeated backcrossing of a hybrid with one of its parent species) with nonnative trout (see Factor E—Hybridization section below) to determine what constitutes a member of the subspecies because the most recent genetic analysis of introgression in California golden trout populations specifically cautioned against the use of strict cutoffs of introgression levels in determining management categories based on any single genetic test (Stephens 2007, p. 55). According to this study, the algorithm used by one genetic test may result in an estimation of low levels of introgression where none actually exist, essentially not allowing for an unambiguous determination between low levels of introgression and genetically ''pure'' populations (Stephens 2007, p. 56). This caution against using single methods for determining cutoffs was due in part to considerable differences in introgression estimates for certain populations of California golden trout, which were generated by the different methodologies and assumptions of the various genetic tests that have been used to test those populations (Stephens 2007, p. 72), as well as to the general need for an adequate understanding of the variance surrounding introgression estimates (Stephens 2007, p. 57). However, while we do not rely on genetic tests of introgression levels to distinguish California golden trout populations from nonnative trout, we do consider such genetic information useful for evaluating the effectiveness of measures taken to prevent further introgression.

Hybridization between California golden trout and nonnative rainbow trout is sometimes displayed by an increased number and location of body spots, especially below the lateral line, and a more rainbow trout-like body coloration; however, not all hybrid trout display rainbow trout characteristics (CDFG *et al.* 2004a, p. 24). We have anecdotal information that suggests there are trout that exhibit changed coloration and spotting patterns from those ascribed to the California golden trout (Trout Unlimited 2000, pp. 18, 19) and that these intergrades may predominate in the lower reaches of the South Fork Kern River (Sims 2011a). Such reports have not been substantiated with systematic measures of, or comparison with, introgression levels or with other morphological or behavioral attributes described above, and there are no studies that have measured the morphological or behavioral changes in introgressed California golden trout as compared to ''pure'' golden trout. Furthermore, there is no documentation that we are aware of that indicates that additional meristic measures used to describe California golden trout (such as number of vertebrae, scale counts, and pyloric caeca) have changed with introgression levels.

Distribution

The historical range of the California golden trout included only the South Fork Kern River and Golden Trout Creek in the upper Kern River basin. Golden Trout Creek and upper portions of the South Fork Kern River were once part of the same stream, which became separated by volcanic activity in the region approximately 10,000 years ago (Cordes *et al.* 2003, p. 20). This led to Golden Trout Creek and the South Fork Kern River as known today (Evermann 1906, pp. 11–14) in two adjacent watersheds draining the Kern Plateau of the southern Sierra Nevada.

The Golden Trout Creek watershed is 155 square kilometers (km^2) (60 square miles (mi^2)). Golden Trout Creek drainage begins around 3,292 meters (m) (10,800 feet (ft)) elevation near Cirque Peak and extends to 2,135 m (7,000 ft) elevation at the confluence of Golden Trout Creek and the Kern River. The headwaters are in the northern section of the Kern Plateau, and several lakes (Chicken Spring, Johnson, and Rocky Basins lakes) drain into the watershed. With the exception of headwater lakes, and the probable exception of upper reaches of some tributary streams, Golden Trout Creek was historically occupied by the California golden trout from the headwaters to a series of waterfalls near the confluence of the creek with the Kern River (Evermann 1906, pp. 12–14; 28, 30). The waterfalls are impassable and thus isolate California golden trout in Golden Trout Creek from fish found in the Kern River. Within Golden Trout Creek, California golden trout currently maintain the same distribution as they did historically.

The South Fork Kern River watershed covers 1,380 km^2 (533 mi^2). The South Fork Kern River begins southeast of Cirque Peak at approximately 3,170 m

(10,400 ft) in elevation and continues until it reaches Isabella Reservoir at 794 m (2,605 ft) in elevation. The headwaters are in the eastern section of the Kern Plateau, starting at South Fork and Mulkey Meadows. California golden trout were historically known in the South Fork Kern River from the headwaters to the southern boundary of the Domeland Wilderness (CDFG *et al.* 2004a, p. 8). The subspecies currently maintains the same distribution as it did historically within the South Fork Kern River; however, the degree of genetic introgression from nonnative rainbow trout increases as one proceeds downstream from Templeton Barrier (Stephens 2007, pp. 42, 72). There is no evidence to suggest that the degree of introgression has been sufficient to remove morphologically and behaviorally distinct California golden trout from the southern portion of its historical range. Therefore, we are considering the subspecies to be present in its entire historical range for purposes of this finding. The range is completely within the Inyo and Sequoia National Forests, which are administered by the U.S. Forest Service.

Range Expansion

California golden trout have been widely transplanted outside of their historical range, but the history of these transplants is poorly documented. Most of these transplanted fish came from hybridized Cottonwood Lakes stock that was derived from Golden Trout Creek (Stephens 2007, pp. 54, 55). Fish were transplanted into fishless lakes and streams within the Golden Trout Creek watershed, the South Fork Kern River watershed, and other areas throughout the Sierra Nevada (such as adjacent to the Kern Plateau, including Ninemile Creek, Cold Creek, Salmon Creek, many of the lakes and streams to the north in Sequoia National Park, and all tributaries to the Kern River). In California, planting records and historical documents indicate that California golden trout have been stocked in Alpine, El Dorado, Nevada, Placer, Sierra, Fresno, Inyo, Madera, Mono, Siskiyou, Trinity, Tulare, and Tuolumne Counties (Fisk 1983, p. 11). Outside of California, golden trout were sent to England, Colorado, Utah, Montana, New York, and Wyoming between 1928 and 1937 (McCloud 1943, p. 194).

For the purposes of this finding, we are analyzing a petitioned entity that includes populations of California golden trout considered native to the South Fork Kern River and Golden Trout Creek in the upper Kern River basin. We do not consider introduced populations present elsewhere as part of the listable entity because we do not consider them to be native populations. Neither the Act nor our implementing regulations expressly address whether introduced populations should be considered part of an entity being evaluated for listing, and no Service policy addresses the issue. Consequently, in our evaluation of whether or not to include introduced populations in the potential listable entity we considered the following:

(1) Our interpretation of the intent of the Act with respect to the disposition of native populations;

(2) A policy used by the National Marine Fisheries Service (NMFS) to evaluate whether hatchery-origin populations warrant inclusion in the listable entity; and

(3) A set of guidelines from another organization (International Union for Conservation of Nature (IUCN)) with specific criteria for evaluating the conservation contribution of introduced populations.

Our interpretation is that the Act is intended to preserve native populations in their ecosystems. While hatchery or introduced populations of fishes may have some conservation value, this does not appear to be the case with introduced populations of California golden trout in California and elsewhere in the United States. These introduced populations were apparently established to support recreational fisheries without any formal genetic consideration to selecting and mating broodstock (group of mature fish kept for breeding purposes), and are not part of any conservation program to benefit the native populations. Consequently, we do not consider the introduced populations of California golden trout in California, England, Colorado, Utah, Montana, New York, and Wyoming to be part of the listable entity.

Habitat and Life History

California golden trout reach sexual maturity when they are 3 to 4 years old and begin spawning during the spring or early summer when maximum water temperatures consistently exceed 15 to 18 degrees Celsius (°C) (59 to 64 degrees Fahrenheit (°F)) and average stream water temperatures exceed 7 to 10 °C (45 to 50 °F) (Stefferud 1993, pp. 139–140; Knapp and Vredenburg 1996, p. 528). Spawning begins with female California golden trout moving fine gravel substrate to construct a shallow depression, known as a redd, to lay their eggs. Although California golden trout can construct redds using gravel of smaller average diameter than other trout species or subspecies, they still select the largest substrates available (Knapp and Vredenburg 1996, pp. 528, 529).

Growth of California golden trout shows a negative correlation with fish density and a positive correlation with several factors, including the stability of the stream bed and banks, and the presence of aquatic and streamside vegetation (Knapp and Dudley 1990, pp. 165, 170, 171). Aquatic vegetation provides habitat for small invertebrates preyed on by the trout, while overhanging streamside vegetation provides habitat for terrestrial invertebrates that can serve as a food source when they fall in the water (Knapp and Dudley 1990, p. 170; Moyle 2002, p. 285). Streamside vegetation also tends to stabilize banks and to provide cover for young trout from potential predators such as birds (Moyle 2002, p. 277). Overhanging vegetation, steep or undercut banks, and deeper streambeds are all needed by trout (Moyle 2002, p. 286), in part because they provide shade and cooler water during the day. Average daily water temperatures can fluctuate from 2 to 22 °C (Knapp and Dudley 1990, p. 163), while optimal temperatures for trout range from 15 to 18 °C (59 to 64 °F) (Moyle 2002, p. 276). Deeper streambeds and steeper banks are associated with greater stream stablity, thus helping to explain the positive correlation between stream stability and trout growth found by Knapp and Dudley (1990, pp. 165, 171). Stream stability is also likely important because erosion of unstable streams produces higher sediment loads that can cover redds and interfere with feeding by clouding the water (Moyle 2002, p. 278).

California golden trout have been known to live as long as 9 years, and commonly reach 6 to 7 years old (Knapp and Dudley 1990, p. 169). This long lifespan is likely due to a short growing season, high fish densities, and a low food abundance, all of which promote slow growth rates and old ages of trout (Knapp and Dudley 1990, p. 169).

California golden trout adapted to the South Fork Kern River and Golden Trout Creek in the absence of competitors, although they probably did coexist with Sacramento suckers (*Catostomus occidentalis*) in the South Fork Kern River (Moyle 2002, p. 284). Long isolation of California golden trout from other species has likely resulted in a lack of competitive ability, making them vulnerable to replacement by other trout species (Behnke 1992, p. 191). Likewise, the subspecies is thought to have evolved without substantial interspecific predation risk; the birds and mammals that might have been likely predators of the California golden trout occur infrequently in high alpine areas where California golden trout are found (Moyle 2002, p. 285). One possible indication that California golden trout adapted without predators is the trout's active behavior during both day and night (Matthews 1996a, pp. 82, 84–85).

California golden trout home ranges were calculated as the linear distance that encompasses 90 percent of trout locations, based on movements recorded using radio-telemetry during the months of July and September (Matthews 1996a, p. 84; Matthews 1996b, p. 587). California golden trout were found to have small home ranges that average 5 m (16 ft) (Matthews 1996a, p. 84; Matthews 1996b, p. 587). Movements of 26 to 100 m (86 to 328 ft) were observed, but these constituted less than 1 percent of all observations (Matthews 1996b, p. 587).

The Conservation Strategy

Since publication of the 90-day finding in 2002 (67 FR 59241; September 20, 2002), the California Department of Fish and Game (CDFG), the Forest Service, and the Service (hereafter referred to collectively as the Agencies) completed a revised *Conservation Assessment and Strategy for the California Golden Trout* (Conservation Strategy) dated September 17, 2004 (CDFG et al. 2004a). The Conservation Strategy replaced a previous guidance document known as the *Conservation Strategy for the Volcano Creek (California) Golden Trout* (1999 Conservation Strategy), which had been in effect since April 22, 1999. The Agencies also signed a Memorandum of Agreement (MOA) on September 17, 2004, to implement the Conservation Strategy (CDFG et al. 2004b); both the Conservation Strategy and MOA are currently in effect. The purposes of the Conservation Strategy are to:

(1) Protect and restore California golden trout genetic integrity and distribution within its native range;

(2) Improve riparian and instream habitat for the restoration of California golden trout populations; and

(3) Expand educational efforts regarding California golden trout restoration and protection.

The Agencies' intent has been to encourage ongoing nongovernmental stakeholder coordination and consultation throughout the implementation phase of the Conservation Strategy. The Conservation Strategy is based on adaptive management, with tasks being removed, added, or adjusted annually as new information becomes available. The Agencies, through the MOA, agreed to formally implement and collaborate on the Conservation Strategy and make any necessary adaptive management changes as the primary mechanism for the conservation of the California golden trout. Implementation of many tasks described in the Conservation Strategy began while it was under development, and have continued since its finalization. Those tasks and other conservation efforts implemented in prior years are summarized below throughout the five-factor analysis.

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened Wildlife and Plants. The Act treats subspecies such as the California golden trout as species for these purposes (16 U.S.C. 1532(16)). Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In considering what factors might constitute threats, we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as threatened or endangered as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate; we require evidence that these factors are operative threats that act on the species to the point that the species meets the definition of threatened or endangered under the Act.

In making this finding, information pertaining to the California golden trout in relation to the five factors in section 4(a)(1) of the Act is discussed below. In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information. We reviewed the petition, information available in our files, and other available published and unpublished information.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

The petition and our subsequent investigations have identified several habitat-related activities relevant to the conservation status of California golden trout, including: Livestock grazing management, pack stock use, recreation, artificial fish barriers, and beavers. We address each activity below.

Livestock Grazing Management

The combined effect of current livestock grazing activities in the Golden Trout Wilderness and legacy conditions from historically excessive grazing use have the potential to impact habitat and the range of the California golden trout. The following subsections discuss the effects of excessive historical grazing, current grazing management practices, and habitat restoration and monitoring efforts within the basins in which the native stream habitat of the California golden trout occurs.

Historical Effects of Excessive Grazing

Grazing of livestock in Sierra Nevada meadows and riparian areas began in the mid-1700s with the European settlement of California (Menke *et al.* 1996, p. 909). Following the gold rush of the mid-1800s, grazing rose to a level that exceeded the carrying capacity of the available range and caused significant impacts to the grazed ecosystems (Meehan and Platts 1978, p. 275; Menke *et al.* 1996, p. 909). Approximately 95 percent of the California golden trout's native stream habitat has been subjected to varying intensities of grazing for more than 130 years (CDFG *et al.* 2004a, p. 31). Livestock grazing within the national forests in the southern and high Sierras has continued with gradual reductions since the 1920s, except for an increase during World War II (Menke *et al.* 1996, pp. 909–910, 916–919).

Livestock can contribute to the destabilization of stream banks by accelerating erosion and increasing bank disturbance (Kauffman *et al.* 1983, pp. 684–685; Marlow and Pogacnik 1985, p. 279). Livestock grazing in meadows and on stream banks can compact soils, which reduces water infiltration rates and the soil's ability to hold water, thereby increasing surface runoff rates into adjacent streams, downcutting streambeds, and lowering the watertable (Meehan and Platts 1978, pp. 275–276; Kauffman *et al.* 1983, pp. 684–685; Kauffman and Krueger 1984, pp. 433–434; Bohn and Buckhouse 1985, p. 378; Armour *et al.* 1994, pp. 7–10). In some cases, excessive livestock grazing has resulted in the conversion of wet meadows into dry flats and in diminished perennial stream flows (Armour *et al.* 1994, p. 7). Erosion from trampling causes stream bank collapse and an accelerated rate of soil movement from land into streams (Meehan and Platts 1978, pp. 275–276). Accelerated rates of erosion lead to elevated instream sediment loads and depositions, and changes in channel morphology, which alter the structure of the aquatic environment used by fish for spawning (Meehan and Platts 1978, pp. 275–276; Kauffman and Krueger 1984, pp. 433–434; Bohn and Buckhouse 1985, p. 378). These effects to the aquatic ecosystem increase with increases in the intensity of grazing (Meehan and Platts 1978, pp. 275–276).

Livestock grazing can cause a nutrient loading problem due to urination and defecation in or near the water, and elevate bacteria levels in areas where cattle are concentrated near water (Meehan and Platts 1978, p. 276; Stephenson and Street 1978, p. 152; Kauffman and Krueger 1984, p. 432). The nutrient status of streams can create a cause and effect relationship between nutrient levels, bacterial growth, and insect mortality (Lemly 1998, p. 234). Growth of filamentous bacteria on the bodies and gills of aquatic insects was demonstrated to be an effect of nutrient loading in livestock-use pastures, significantly lowering the density of insect occurrences at downstream sites (Lemly 1998, pp. 234–235). Aquatic insects suffered extensive mortality because of this bacterial growth in laboratory and field studies, indicating that elevated bacteria levels can negatively influence stream insect populations (Lemly 1998, pp. 234–235, 237), which can result in detrimental effects to prey species important to fish.

Several studies have documented the environmentally detrimental impacts of historical grazing practices in areas within the range of the California golden trout. Albert (1982, pp. 29–47) studied factors influencing the riparian condition of streams in the Golden Trout Wilderness and adjoining watersheds in Sequoia National Park. Her results showed that stream zones in the South Fork Kern River and Golden Trout Creek were less stable, had more livestock damage, and were generally in poorer condition than those in Sequoia National Park, which had not been grazed for the preceding 50 years. Stream reaches with light cattle use had channel bottoms that were more stable (less subject to erosional and depositional changes) than heavily used reaches (Albert 1982, pp. 48–51).

Odion *et al.* (1988, pp. 277–289) examined the effects of cattle grazing and recovery potential in Templeton and Ramshaw Meadows along the South Fork Kern River. Vegetation change was monitored inside and outside of exclosures that were established along riparian areas within the range of California golden trout. Odion *et al.* (1988, pp. 277–289) concluded that livestock trampling and defoliation caused a breakdown of the protective sod layer in the meadows, allowing streams to incise (where the streambed channel downcuts in elevation, reducing habitat quality and quantity), produce gullies, and lower the water table. Subsequently, plants adapted for a dry habitat, such as sagebrush, invaded the altered meadows. Results of density monitoring indicated that cattle trampling impaired colonization of plant species important in stabilizing substrate on stream banks, thus reducing the natural revegetation potential of bare stream bank habitat (Odion *et al.* 1988, p. 283).

Matthews (1996b, pp. 579–589) used radio transmitters to determine habitat selection and movement patterns of California golden trout in two stream reaches with different levels of habitat recovery on Mulkey Creek. The study areas were differentiated by high and low coverage of *Carex rostrata* (beaked sedge) along the stream banks. Low coverage areas were typically associated with signs of cattle degradation, such as widened stream channels, collapsed banks, and a reduction in areas with undercut banks. In both low and high sedge reaches, California golden trout more often selected undercut banks, aquatic vegetation, and sedge while avoiding bare and collapsed banks caused by livestock grazing. They were most commonly found in pools and runs (slow moving areas in a stream), where they used habitat features such as undercut banks, aquatic vegetation, and sedges, all of which typically can be damaged by excessive cattle grazing along stream banks.

Knapp and Matthews (1996, pp. 816–817) examined the effects of excessive livestock grazing on California golden trout and their habitat inside and outside of grazing exclosures in the South Fork Kern River watershed. In the 2-year study, most physical parameters of the stream channels showed large differences between grazed and ungrazed sites, with ungrazed sites displaying greater canopy shading, stream depth, bank-full height, and narrower stream width. Densities and biomass of California golden trout per unit area were significantly higher in ungrazed versus grazed areas in three out of four comparisons, but differences were less consistent when density and biomass were calculated using stream length. Other findings of this study indicate a significant decrease in stream width in the upper Ramshaw Meadows exclosure between 1984 and 1993, and a greater number of willow plants inside exclosures than outside.

Not all studies found differences in grazed and ungrazed areas. Sarr (1995, pp. 97, 104) did not find significant differences in stream morphology in his study between grazed and ungrazed reaches on the South Fork Kern River. In a movement and habitat use study, California golden trout were monitored with radio transmitters inside and outside of grazing exclosures on the South Fork Kern River (Matthews 1996a, pp. 78–85). No differences in distance moved or home range were found between California golden trout inside and outside exclosures, and most fish were found within 5 m (16.4 ft) of their previously recorded location.

Current Levels of Grazing Use

Many grazing impacts to the Kern Plateau were originally caused by unmanaged grazing practices dating back to the late 1800s, during which tens of thousands of cattle were grazed over long periods of time (CDFG *et al.* 2004a, p. 31). Grazing use has been greatly reduced since then in order to restore natural habitat conditions (CDFG *et al.* 2004a, p. 34). Additionally, during the past decade the Inyo National Forest has completely restricted grazing on two of its four grazing allotments. In February of 2001, a Decision Notice was signed that implemented a 10-year period of rest on the Templeton and Whitney grazing allotments to facilitate recovery of watershed and channel conditions. The notice indicated that grazing on the two allotments would be reconsidered at the end of the 10-year period (USFS 2001a, p. 5). The USFS expects to reach a decision on this issue in June of 2012 (USFS 2011, p. 10).

Within the Sequoia National Forest from 2001 to 2004, two of the three available grazing allotments had little or no grazing, while the third utilized up to 65 percent of the total livestock permitted (CDFG *et al.* 2004a, p. 19). Grazing use levels in the Sequoia National Forest are lower than permitted largely because of remoteness and inaccessibility (Anderson 2006), whereas in the Inyo National Forest, a 1995 amendment (typically referred to as Amendment 6, discussed below) to the Forest-wide grazing utilization standards of the Forest's Land and Resource Management Plan (LRMP) has apparently resulted in reduced cattle use (CDFG *et al.* 2004a, p. 34).

Current Grazing Management Practices

In 1995, Amendment 6 to the Inyo National Forest LRMP was developed to establish forest-wide grazing utilization standards, which are requirements in addition to existing utilization standards contained in grazing permits (USFS 1995, pp. 13, 14). The forest-wide standards were designed, in part, to improve the existing condition of streams supporting California golden trout in grazed watersheds (USFS 1995, pp. 27, 28). The Amendment allows Forest Service personnel to tailor grazing utilization standards to maintain or improve hydrologic and meadow conditions. Grazing utilization standards establish an upper limit of forage that grazing cattle may consume before being moved to a new area (Sims 2011b, p. 1). Inyo National Forest personnel conduct annual monitoring of representative meadows to determine whether utilization standards have been exceeded. If they do find that standards have been exceeded they adjust the standards downwards in following years to allow recovery. The utilization standards themselves are reassessed every 5 to 10 years to ensure that they avoid habitat degradation (including the degradation of stream habitat) (Sims 2011b, p. 1).

The Inyo National Forest LRMP also restricts trampling of streambanks to 10 percent of the streambank length along State trout waters (which include most of the streams supporting California golden trout), and to 20 percent along other waters (USFS 1988a, pp. 78–79). As with utilization standards, annual monitoring of representative streambanks helps assure these standards are not exceeded, and allows grazing prescriptions to be adjusted to promote recovery of the streambanks if the standards are exceeded (Sims 2011b, p. 1). Additionally, salt provided for cattle must be located at least 0.25 mi (0.4 km) away from riparian areas, and additional requirements may apply to specific management areas with unique characteristics. For example, range management direction for the Golden Trout Management Area (#19) amends grazing allotment plans to include necessary mitigation measures and corrective actions if grazing is significantly impacting fish habitat (USFS 1988a, p. 236).

On the Sequoia National Forest, LRMP grazing standards and guidelines applicable to all streams within the habitat of the California golden trout were amended in 2004 (subsequent to the October 13, 2000, petition to list the California golden trout) by the adoption of the Sierra Nevada Forest Plan Amendment (SNFPA) (CDFG *et al.* 2004a, p. 23). The new standards and guidelines, established for the protection of rare aquatic populations such as the California golden trout, require habitat managers to implement the following conservation measures:

(1) Prevent disturbance to meadow-associated streambanks and natural lake and pond shorelines caused by resource activities from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines.

(2) Limit livestock utilization of grass and grass-like plants to a maximum consumption of 30 percent of each plant by volume (or minimum 6 in (15 cm) stubble height) for meadows in early seral status; limit livestock utilization of grass and grass-like plants to a maximum consumption of 40 percent of each plant by volume (or minimum of 4 in (10 cm) stubble height for meadows in late seral status).

(3) Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels.

(4) Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings (CDFG *et al.* 2004a, pp. 23, 84, 87).

Habitat Restoration and Monitoring Efforts

The Inyo National Forest has installed several exclosures in riparian areas within the range of the California golden trout to protect and restore portions of the South Fork Kern River, Mulkey Creek, Ninemile Creek, and Golden Trout Creek from grazing impacts (see also Historical Effects of Excessive Grazing section above). Livestock exclosures totaling several miles exist on numerous stream reaches in all four grazing allotments within Inyo National Forest. Exclosures in the Monache and Mulkey allotments, where grazing is currently allowed, are currently excluding cattle from areas where they would otherwise be grazing. Exclosures in the Whitney and Templeton allotments, which are currently being rested from grazing, will only begin to actively exclude cattle if and when grazing is resumed on those allotments.

Research by Knapp and Matthews (1996, pp. 816–817) in Mulkey and Ramshaw Meadows showed that areas within exclosures display greater canopy shading, stream depth, bankful height, and narrower stream width. Studies by Odion *et al.* (1988, p. 277) in Ramshaw and Templeton Meadows indicated that exclosures allowed significantly more pioneer species to colonize areas that were bare from disturbance. Photo-points recorded between 1989 and 2005 within a number of these exclosures indicate recovery in many areas that were once degraded by grazing (Sims 2006a). For these reasons, livestock exclosures have contributed to restoring habitat, reducing the effects of grazing, and preventing future damage to these habitats for the subspecies. Because exclosures require maintenance, activities conducted pursuant to annual work plans within the Conservation Strategy have included annual maintenance of cattle exclosure fencing (McGuire and Sims 2006, p. 17; Sims and McGuire 2006, p. 12).

In addition to monitoring and cattle exclusion efforts, Inyo National Forest has completed numerous projects to stabilize soil and prevent erosion (USFS 2005 *in* McGuire and Sims 2006, p. 35). In addition to preventing further degradation, such treatments can direct stream flows to reestablish stream characteristics beneficial to California golden trout, such as overhanging banks and vegetation. These restoration and stabilization projects generally involve placing materials such as rocks or logs at key points of eroding streams in a given area to catch sediments and prevent further erosion. Since 1996, such projects have been completed at 19 sites (USFS 2005 *in* McGuire and Sims 2006, pp. 35, 37). Between 1933 and the mid-1980s, approximately 800 erosion control structures were installed in the Golden Trout Wilderness (USFS 1988a, p. 236; CDFG *et al.* 2004a, p. 34).

Conservation activities that have been conducted for the benefit of the California golden trout are described in the report titled, ''Watershed Restoration and Monitoring Accomplishments on the Kern Plateau'' (Kern Plateau Report) (USFS 2005 *in* McGuire and Sims 2006, pp. 32–42), which summarizes watershed improvement and monitoring projects within the grazing allotments on the

Kern Plateau since the 1930s. For example, from 2002 to 2003, the Forest Service implemented intensive monitoring and data collection over a wide area of the South Fork Kern River and Golden Trout Creek watersheds to assist in determining watershed condition trends (USFS 2005 *in* McGuire and Sims 2006, p. 32). A wide-scale headcut monitoring effort was initiated in 2003 at various parts of the Kern Plateau on both active and rested grazing allotments. Photo-points have been established at various locations on the Kern Plateau to monitor trends in stream bank stability, headcut migration, and vegetation patterns, with data collected indicating recovery in many areas that were affected by grazing (Sims 2006a, p. 1). The Kern Plateau Report also identifies opportunities for monitoring and evaluating the effectiveness of management practices. Recent results from these monitoring efforts showed significant improvement in meadow condition and streambank stability for the two allotments rested from grazing (Templeton and Whitney), and a positive trend in meadow and streambank conditions for the Mulkey allotment (Weixelman 2011, p. 12). No sites were shown to decline in condition (Ettema and Sims 2010, p. 63). Overall, 64 percent of sites in grazed allotments and 74 percent in ungrazed allotments are now meeting desired conditions (good to excellent) (Weixelman 2011, pp. 3, 12).

The Conservation Strategy also includes monitoring of the effectiveness of best management practices (BMPs) to determine their effectiveness in protecting California golden trout habitat, with an annual report completed for inclusion in the annual accomplishment reports (CDFG *et al.* 2004a, p. 54). BMPs are a practice or combination of practices that are the most effective and practical means of preventing or reducing water pollution from non-point sources. We also note that the MOA commits the signatories of the Conservation Strategy to meet annually to evaluate the effectiveness of the strategy, determine whether the goals and objectives are being adequately achieved, and discuss whether the strategy requires any adaptive changes to better conserve the California golden trout (CDFG *et al.* 2004b, p. 3). This means that changes in management can occur if conditions or results of monitoring indicate there is a negative change to the California golden trout's habitat or range. The MOA also contains a provision that if any element of the Conservation Strategy is determined infeasible, or if any new threat is identified, then the Agencies will be notified within 30 days and a meeting will be held to determine the course of action (CDFG *et al.* 2004b, p. 4). Thus, in the event of a change in future conditions that result in an unacceptable level of impacts due to excessive grazing, appropriate changes in management can occur.

Summary of Livestock Grazing Management

In summary, historical excessive grazing practices have affected the stream habitat in nearly the entire native range of the California golden trout. Habitat degradation has been addressed in recent decades with numerous conservation efforts, such as reducing the season of use and number of cattle allowed to graze on an allotment, implementing grazing standards and guidelines in the LRMPs, resting of grazing allotments, implementing watershed monitoring, and completing restoration projects. Monitoring of Golden Trout Creek and upper South Fork Kern watersheds has found that implementing these conservation efforts has improved meadow and streambank conditions for three of four grazing allotments, and has stabilized conditions in the fourth grazing allotment (Ettema and Sims 2010, p. 63; Weixelman 2011, p. 12). Based on our evaluation of current practices and of recent and ongoing restoration activities, we do not consider livestock grazing to present a significant threat to the California golden trout now or into the future.

Pack Stock Use

Similar to cattle, horses and mules may significantly overgraze, trample, or pollute streamside habitat if too many are concentrated in riparian areas too often or for too long. Commercial pack stock trips are permitted in national forests within the Sierra Nevada, providing transport services into wilderness areas with the use of horses or mules. Use of pack stock in the Sierra Nevada increased after World War II as road access, leisure time, and disposable income increased (Menke *et al.* 1996, p. 919). The Inyo National Forest has permitted commercial pack operators since the 1920s (USFS 2006a, p. 1). Current commercial pack stock use is approximately 27 percent of the level of use in the 1980s reflecting a decline in the public's need and demand for pack stock trips. From 2001 to 2005, commercial pack stock outfitters within the Golden Trout and South Sierra Wilderness Areas averaged 28 percent of their current authorized use (USFS 2006b, p. 3–18).

Currently, pack stock use within Golden Trout and South Sierra Wilderness Areas overlaps with historical and current livestock grazing locations, thus making it difficult to identify impacts to vegetation that are due specifically to pack stock use (USFS 2006b, p. 3–13). Monitoring of pack stock grazing impacts on meadows within the California golden trout's range shows a general trend of decreasing impacts to stream bank stability. This trend is believed to be due to restoration efforts and the cancellation of cattle grazing permits (USFS 2006b, p. 3–12).

Allowable pack stock uses are limited in the Inyo National Forest by the same restrictions discussed above for cattle, such as the Amendment 6 forest-wide grazing utilization standards and the 10 percent limit to bank trampling along State trout waters (USFS 200b, p. 3–353). Pack stock grazing is also prohibited in specific meadows, including Volcano Meadow, South Fork Meadow (at the headwaters of the South Fork of the Kern River), and parts of Ramshaw Meadow. As discussed above, these restrictions have resulted in improved conditions for the majority of monitored habitat for which we have monitoring results, and stabilized conditions for the remainder of that habitat (Ettema and Sims 2010, p. 63; Weixelman 2011, p. 12). Accordingly, we consider current habitat management practices sufficient to prevent pack stock use from posing a significant threat to the California golden trout.

Recreation

Recreational activities that include hiking, camping, and off-road vehicle (ORV) use take place throughout the Sierra Nevada and can have impacts on fish and wildlife and their habitats (impacts from fishing are discussed below under Factor B—*Overutilization for Commercial, Recreational, Scientific, or Educational Purposes* section). Impacts to wilderness areas can vary in their extent, longevity, and intensity (Cole and Landres 1996, pp. 169–170). In easily accessible areas, heavy foot traffic in riparian areas can trample vegetation, compact soils, and physically damage stream banks (Kondolf *et al.* 1996, pp. 1014, 1019). Human foot, horse, bicycle, or ORV trails can replace riparian habitat with compacted soil (Kondolph *et al.* 1996, pp. 1014, 1017, 1019), lower the water table, and cause increased erosion.

Recreation is the fastest growing use of national forests (USFS 2001b, p. 453). Because of an increasing demand for wilderness recreational experiences, wilderness land management now includes standards for wilderness conditions, implementing permit systems, and other visitor management techniques to reduce impacts to habitat, including riparian habitat (Cole 2001, pp. 4–5). These wilderness land management techniques are currently being used on the Inyo and Sequoia National Forests where they are expected to benefit California golden trout by reducing impacts on its habitat.

All of the current range of the California golden trout, with the exception of the Monache Meadow and Kennedy Meadow areas, is encompassed within the federally designated Golden Trout, South Sierra, and Domeland Wilderness areas, where access is difficult and impacts from recreation are lower than in easily accessible areas. Recreational use currently is low and well-dispersed in these areas. The Forest Service monitors wilderness use levels and limits wilderness use if recreation levels are determined to be high (Sims 2006a, p. 1). Recreational impacts are ameliorated by the implementation of various management actions, such as camping restrictions, wilderness ranger presence, and permit requirements. Camping within the Golden Trout Wilderness is not allowed within 100 ft (30 m) of lakes or streams, and a permit is required by the Sequoia National Forest for overnight use. These measures minimize impacts to the fish's habitat. Additionally, Federal designation of an area as Wilderness prohibits the use of motorized or mechanized equipment by the public, with limited exceptions, and therefore provides protection from ORV impacts within these areas.

On National Forest lands outside of federally designated wilderness areas, California golden trout stream habitat occurs in high-use areas, such as Monache and Kennedy Meadows. In these areas, recreational impacts are occurring and are expected to continue. Recreational use occurs primarily on the South Fork Kern River through Monache Meadows on the Inyo National Forest and Kennedy Meadows on the Sequoia National Forest. Motorized access in Monache Meadows is restricted to use of a single 4-wheel-drive road that enters to the south of the meadow. Camping, fishing, and hunting are the primary uses, as well as access for pack stock (CDFG *et al.* 2004a, p. 21). Kennedy Meadows is easily accessed by road and receives heavy use during the trout season for fishing and camping activities. Easily accessible and popular fishing areas, such as Monache and Kennedy Meadows, are being impacted by anglers, whose use of the stream banks can lead to collapsed undercut banks, compacted soils, and disturbed riparian vegetation (Stephens 2001a, p. 64).

Although recreational impacts are expected to continue, they are localized to a few areas within the native range of the California golden trout. In addition, the Forest Service and CDFG have implemented measures identified in the Conservation Strategy to offset recreational impacts to the subspecies. Restoration and stabilization projects were implemented adjacent to and within the Monache Allotment in 2004 to address ORV impacts to the meadow habitat in the South Fork Kern River drainage. A brochure for recreational users was produced in 2005 and 2006 that informed the public about fishing and requested help with restoration projects aimed at protecting the California golden trout; it is available for recreational users at area ranger stations, visitor centers, and local flyfishing shops. Information regarding volunteer field activities, opportunities for public involvement, subspecies information, and agency contacts is also posted on the California Trout and Trout Unlimited web pages. Through these volunteer field activities, Trout Unlimited, California Trout, and the Federation of Flyfishers have assisted CDFG and the Forest Service to protect and restore California golden trout and their habitat.

In summary, recreational activities have the potential to negatively impact the habitat and range of the California golden trout through trampling and vegetation loss due to use by pack stock, humans, and ORVs. We believe that some adverse effects to the California golden trout from recreation at high-use areas outside of federally designated Wilderness Areas will continue; however, these effects are expected to remain localized and not rise to a level that would significantly affect the subspecies as a whole. We conclude that current wilderness land management standards afford considerable protection from a variety of potential recreational impacts to habitat of the California golden trout in wilderness. Implementation of management activities by the Forest Service and CDFG have offset recreational impacts to California golden trout habitat in several high-use recreational areas outside of designated wilderness. Activities such as public outreach and stakeholder involvement have been, and continue to be, conducted to help limit potential recreational impacts over the native range of the California golden trout. Consequently, we conclude that habitat loss due to recreational activity does not currently present a significant threat to the California golden trout, and we do not expect it to become a significant threat in the future.

Artificial Fish Barriers

Three barriers have been constructed on the South Fork Kern River to prevent upstream migration of nonnative trout species, and thereby to reduce their introgression and competition with California golden trout. Between 1970 and 1973, the Ramshaw Barrier was constructed in a gorge at the upper end of Ramshaw Meadows; it is located farthest upstream from the other barriers on the South Fork Kern River. In 1973, the Templeton Barrier was constructed of rock, chain-link fencing, and filter fabric at the head of Templeton Gorge, located approximately 11.3 km (7 mi) downstream of the Ramshaw Barrier at the eastern end of Templeton Meadows. In 1980, Templeton Barrier was replaced with a rock-filled gabion structure across the river that resembled a small dam. In 1981, the Schaeffer Barrier was constructed 11.3 km (7 mi) downstream from the Templeton Barrier at the upper end of Monache Meadows.

Although the Ramshaw Barrier has been impassable to fish since 1973, both the Templeton and Schaeffer barriers were determined in 1994 to be on the verge of collapse (Stephens 2001a, p. 33; CDFG *et al.* 2004a, p. 36). In 1996, the gabion dam at Templeton was replaced with a rock and concrete dam immediately downstream and in contact with the existing structure (CDFG *et al.* 2004a, p. 37). In 2003, Schaeffer Barrier was replaced with a reinforced concrete dam that is 2 ft (0.6 m) higher than the old barrier and includes a concrete apron below the spillway to prevent the formation of a jump pool below the barrier (CDFG *et al.* 2004a, p. 37). As a result of these modifications, all three barriers now effectively prevent upstream fish passage (CDFG *et al.* 2004a, p. 37; Lentz 2011, p. 1).

The construction of these fish barriers and subsequent modifications likely have had some negative effect on California golden trout by altering their stream habitat. Dams, water diversions, and their associated structures can alter the natural flow regime both upstream and downstream of dams. However, because the barriers have been constructed to prevent passage of nonnative fish and to protect the California golden trout rather than to impound water, we expect that their effect on stream conditions and hydrology are limited to localized areas where the barriers are placed. The barriers have the potential to fragment the California golden trout's stream habitat because they generally prevent the upstream movement of fish, including California golden trout. However, California golden trout may be somewhat insulated from these effects because they generally do not move far from where they were hatched, except under unusually high flood flows (Stephens 2003, p. 5). The barriers also facilitate the restoration of natural prey and competitor conditions in the California golden trout's stream habitat by preventing population of the streams by nonnative brown trout (*Salmo trutta*). The effects of artificial fish barriers on movement of brown trout are discussed below under Factor C—*Disease or Predation.* Effects on movement of hybridized trout are discussed under Factor E—*Other Natural or Human Factors.*

In summary, the three artificial fish barriers that have been placed on the South Fork Kern River are expected to have localized effects to the stream habitat of the California golden trout, and are also expected to benefit the subspecies in the future by allowing restoration of natural predator and prey relationships within the habitat. We conclude that the barriers do not constitute a significant threat to California golden trout at this time or in the future.

Beavers

Beavers (*Castor canadensis*) currently exist within the native range of the California golden trout. Although beavers were native to California's Central Valley in the early 19th century, they were not generally known from the Sierra Nevada except where introduced by humans (Tappe 1942, pp. 7, 8, 13, 14, 20). Native beaver populations experienced great declines during the early exploration of California by traders and trappers (Tappe 1942, p. 6). Subsequent reestablishment and introductions have extended their original range (CDFG 2006, p. 1). In the Sierra Nevada and Cascade Mountain ranges, beavers inhabit streams, ponds, and lake margins from Modoc County south to Inyo County (CDFG 2006, pp. 1, 2). Beavers commonly inhabit riparian areas of mixed coniferous-deciduous forests and deciduous forests containing abundant beaver forage and lodge-building material, including *Salix* spp. (willows), *Alnus* spp. (alders), and *Populus* spp. (cottonwoods) (Allen 1983, p. 1; CDFG 2006).

There is debate over whether beavers are native to the Kern River basin (Townsend 1979, pp.16–20; CDFG *et al.* 2004a, p. 33). Beavers were introduced by CDFG in the 1940s and 1950s as a tool to restore meadow habitat degraded by livestock grazing. Beavers can have positive and negative effects on trout habitat. Beaver ponds can provide pool habitat for fish, reduce severe ice conditions, and increase populations of bottom-dwelling invertebrates suitable for trout to eat (Gard 1961, p. 240). However, siltation resulting from beaver dams can also degrade spawning habitat for California golden trout, which require gravel for spawning (Knapp and Vredenburg 1996, pp. 528, 529). In a study conducted on Sagehen Creek on the eastern slope of the Sierra Nevada, Gard (1961, pp. 240–241) concluded that beavers were a benefit to trout in this high-elevation creek because they improved fish habitat, forage, spawning activities, and population numbers.

Currently, large beaver populations occur in upper and lower Ramshaw Meadows. Additional populations of unknown size also exist at other locations within the Kern River Plateau (CDFG *et al.* 2004a, p. 33). As of 2004, negative effects of beaver activity within the native range of the California golden trout have not been documented (CDFG *et al.* 2004a, p. 33). Additionally, we are currently unaware of any additional information that document negative effects of beaver within the range of the California golden trout. The Conservation Strategy discusses the beaver as a potential issue for the California golden trout; therefore, CDFG and the Inyo National Forest monitor and evaluate the effect of beaver activity within the native range of the California golden trout. For example, beaver populations were monitored in 2004, 2005, and 2008 at areas on Golden Trout Creek and Ramshaw Meadow that are considered to have the highest potential impacts from beaver on golden trout habitat (CDFG and USFS 2006a, pp. 16–17; CDFG and USFS 2006b, p. 11; McGuire *et al.* 2009, p. 11). At Ramshaw, two active dams were observed in 2008 and the beaver population appeared stable since the previous monitoring in 2005. At Golden Trout Creek, a single beaver dam had been maintained since 2003. No negative impacts from the beaver populations were documented. Therefore, we conclude that beaver activity does not currently constitute a threat to the California golden trout, nor do we expect it to in the future.

Summary of Factor A

California golden trout stream habitat has historically been adversely affected by livestock grazing and, to a lesser degree, pack stock use, recreational activities, and artificial fish barriers. Conservation efforts related to reducing the effects of livestock grazing (including reduced seasonal use, reduced numbers of cattle grazed, resting of grazing allotments, and installation of livestock exclosures) have improved habitat conditions for the California golden trout, resulting in improvements to the majority of monitored habitat for which we have results and stabilization of the remainder of that habitat (Ettema and Sims 2010, p. 63; Weixelman 2011, p. 12). Pack stock use has a minimal effect on the habitat of the California golden trout, and those effects are subject to the same protections governing livestock use. Current wilderness land management standards, restoration activities, and public outreach and stakeholder involvement have reduced potential threats of recreational activities. Although artificial fish barriers have locally altered the stream habitat of the California golden trout, these structures perform a crucial role in the prevention of upstream migration of nonnative brown trout and introgression with nonnative rainbow trout. Finally, available information does not indicate that beaver activity is a concern to the California golden trout. Based on the best available scientific and commercial information, we have determined that the California golden trout is not currently threatened by the present or threatened destruction, modification, or curtailment of its habitat or range such that it warrants listing under the Act, nor do we anticipate it posing a threat in the future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

There is no commercial fishing for California golden trout; however, recreational fishing is permitted by CDFG. In the Golden Trout Wilderness, the fishing season begins on the last Saturday in April and ends November 15. CDFG regulations allow anglers to possess five California golden trout, which is a bag limit guided by State policy to maintain wild trout stocks (CDFG 1979, p. 1). Regulations allow anglers to use only artificial lures with barbless hooks. Angler harvest is light in most areas within the native range of California golden trout except at Monache Meadows, Kennedy Meadows, and a few other easily accessible areas (Stephens 2001a, p. 64). Angler harvest does appear to have depressed the population numbers at these heavily used locations (Stephens 2001a, pp. 64, 65); however, impacts appear to be localized, well-regulated, and small enough to allow sustainable populations. Angling regulations are posted in fishing areas and enforced (McGuire *et al.* 2009, p. 15). Knapp and Matthews (1996, p. 805) reported that California golden trout densities were generally among the highest ever recorded for a stream-dwelling trout in the western United States. Surveys conducted at Templeton Meadow on the South Fork Kern River indicate that California golden trout population numbers increased from 2,000 trout per mile in 1985 to about 7,000 trout per mile in 1999 (Stephens 2001b, p. 2). This indicates that California golden trout population numbers were at a high density in 1999 and not at risk from overutilization from recreational fishing. We are currently unaware of any information that demonstrates a decrease in fish densities or impacts from overutilization from recreational fishing as compared to 1999. Accordingly, the relatively limited harvest of California golden trout does not appear to pose a significant threat to the survival of the subspecies now or in the future.

California golden trout are utilized in a nonlethal way for scientific purposes. Specifically, CDFG, together with conservation partners and volunteers, has been collecting trout fin tissue samples since 2003 to conduct genetic evaluations necessary to restore native golden trout populations. The genetic studies require a small clipping from a fin, and this process rarely results in the death of an individual fish. Because scientific collection is being conducted for the betterment of the subspecies and because it rarely results in death of fish, we conclude that overutilization for scientific purposes is not a threat to California golden trout across its range, nor do we anticipate overutilization for commercial, recreational, scientific or education purposes posing a threat in the future.

Factor C. Disease or Predation

Predation and Competition With Brown Trout

Brown trout are not native to California. They have been introduced to the South Fork Kern River and have established populations there, but they have not established populations in Golden Trout Creek. Brown trout have been noted to thrive in sections of many major west slope streams in the Sierra Nevada mountain range, although their distribution, even in small streams, is noted to be often quite discontinuous, with pools and quieter waters thought to be more to their liking (Dill and Cordone 1997, p. 100). Brown trout distribution within specific habitat types has not been quantified for the South Fork Kern River. The presence of brown trout in the South Fork Kern River is likely due to stocking of the species at Kennedy Meadows carried out by CDFG in 1940, 1941, and 1996 (McGuire 2011, pp. 2, 3). The stocking program predates the construction of the Ramshaw, Templeton, and Schaeffer fish barriers by at least 30 years (see Factor A—Artificial Fish Barriers section above).

CDFG and Inyo National Forest have attempted to eradicate brown trout from the upper reaches of the California golden trout range a number of times by using piscicides (pesticides specific for fish) and then restocking the areas with California golden trout. In 1969, brown trout were present throughout the drainage and even in the headwaters of the South Fork Kern River where brown trout outnumbered golden trout by approximately 50 to 1 (CDFG *et al.* 2004a, pp. 28, 37). Installation of the Ramshaw Barrier, in combination with chemical treatments, resulted in removal of brown trout from the headwaters. Chemical treatments were conducted from the Ramshaw to Templeton barriers in 1981, and the last treatments from the Templeton to Schaeffer barriers in 1987. Subsequent monitoring of the treated reach of South Fork Kern River indicated that the treatment was ineffective due to barrier deterioration, which is now repaired (CDFG *et al.* 2004a, p. 38). Movie Stringer Creek, a western tributary to the South Fork Kern River upstream of Templeton Barrier, was chemically treated in 2000; no other chemical treatments have occurred since then.

The Strawberry Connection was a constructed diversion on Strawberry Creek that facilitated a possible hydrologic route for brown trout to enter the South Fork Kern River above the Templeton Barrier. This diversion was removed in 1999, and efforts have been made to restore Strawberry Creek to its historic channel. The Conservation Strategy indicates some concern that brown trout may still be able to access waters upstream of the Templeton Barrier during high flows (CDFG *et al.* 2004a, p. 25); however, no brown trout have been located above the barrier to date. Subsequent to completion of the Conservation Strategy, the Inyo National Forest conducted an evaluation of the Strawberry Connection during runoff events to map hydrologic flow (Sims and McGuire 2006, p. 7). The evaluation noted that, due in part to the absence of cattle for the previous 5 years, the Strawberry Connection may be converting back to its natural state (Sims and McGuire 2006, p. 7). The area showed less compacted soils and was in the process of reverting to a more boggy meadow, with channel flows focusing more towards Strawberry Creek rather than towards the ''connection'' area. This indicates the likely elimination of a possible passage for brown trout around the Templeton Barrier during high water flows (Sims and McGuire 2006, p. 7).

Annual monitoring of the South Fork Kern River indicates that brown trout are still not present above the Templeton Barrier (Sims and McGuire 2006, p. 6; Lentz 2011, p. 2). Brown trout are currently found in the South Fork Kern River below Templeton Barrier, however, which includes over 483 km (300 mi) of the stream distance that comprises the historical range of the California golden trout (Stephens 2001a, p. 43). The remaining stream length in the historical range above the Templeton Barrier is approximately 161 km (100 mi). The competitive success of brown trout, where present, over California golden trout is likely due to the fact that brown trout prey on all life stages of California golden trout, and are a superior competitor for limited food and habitat resources (Stephens 2001a, p. 43). The South Fork Kern River below Schaeffer barrier has never been treated to remove brown trout. Consequently, brown trout have been present in the lower South Fork Kern River more than 70 years. Successful sampling of California golden trout populations for genetic status has been conducted along the South Fork Kern River (and its tributaries) below Schaeffer Barrier, demonstrating that the species remains in sufficient numbers to maintain reproducing populations in these lower reaches, despite the presence of brown trout.

There is a potential threat of illegal fish transportation due to the ease of vehicular access to Monache Meadows, the recreational popularity of this area, and the presence of nonnative salmonids in downstream portions of the South Fork Kern River. However, enforcement of State fish and game laws are ongoing, and conservation efforts are occurring to inform and educate the public about the conservation needs of the California golden trout. CDFG wildlife protection personnel and National Forest law enforcement personnel continue to inform visitors of regulations, including the illegality of possession and transportation of live trout within the California golden trout's range. CDFG also produced brochures in 2005 and 2006 to inform the public about the restoration program. The brochures were distributed to Forest Service offices and visitor centers, and also to local flyfishing shops, thereby informing the public that transplanting fish is illegal and subject to a fine.

Summary of Predation and Competition With Brown Trout

The risk of predation and interspecific competition from nonnative trout have been addressed through establishment and repair of the three fish barriers, elimination of CDFG-sanctioned brown trout stocking within the native range of the California golden trout, and various treatments (described above) to eliminate brown trout above the established barriers. The Forest Service and CDFG have been monitoring barriers, conducting surveys, and eradicating brown trout. Electrofishing surveys above and below Templeton and Schaeffer Barriers are being conducted annually to assess the effectiveness of the barriers, determine the current status and distribution of brown trout, and reduce brown trout numbers at the upstream extent of their distribution (Lentz 2011, p. 2). Although the goals of completely controlling brown trout in the South Fork Kern River are yet to be achieved, we nonetheless consider active programs by the Forest Service and CDFG to discourage illegal transport, and to monitor for and remove brown trout from California golden trout waters, to be reasonable and effective approaches for addressing the threat of brown trout.

No brown trout have been found above the Templeton Barrier since they were eradicated in the early 1980s (McGuire and Sims 2006, p. 10; Sims and McGuire 2006, p. 6). Mark-recapture tests of golden trout hybrids captured below the Schaeffer Barrier subsequent to its improvement in 2003 failed to find any fish that had successfully navigated past the barrier, indicating that brown trout are also incapable of passing the barrier (Sims and McGuire 2006, p. 6). Subsequent elimination of brown trout between the Schaeffer and Templeton barriers (a goal of the Conservation Strategy (CDFG et al. 2004a, p. 28)) is, therefore, possible. Additionally, current information available to us does not indicate a population-level effect of brown trout predation or competition that would warrant listing. Therefore, we conclude that, due to the management efforts being implemented, risk of predation and competition from brown trout does not pose a significant threat to the California golden trout throughout its range, nor do we anticipate predation posing and competition from brown trout posing a threat in the future.

Whirling Disease

Whirling disease is caused by *Myxobolus cerebralis,* a metazoan parasite that penetrates the head and spinal cartilage of fingerling trout, where it multiplies very rapidly and puts pressure on the organ of equilibrium. This causes the fish to swim erratically (whirl) and have difficulty feeding and avoiding predators. In severe infections, the disease can cause high rates of mortality in young-of-the-year fish. Those that survive until the cartilage hardens to bone can live a normal lifespan, but are marred by skeletal deformities. Fish can reproduce without passing on the parasite to their offspring. Rearing ponds used in many trout hatcheries provide conditions where the second host of the parasite (the oligochaete worm *Tubifex tubifex*) can thrive.

Myxobolus cerebralis has never been found in any golden trout sampled in California streams (Cox 2006, p. 1; Lentz 2011, p. 1). The only fish currently stocked within the native range (sterile trout stocked in Kennedy Meadows) are raised in a hatchery that is certified free of disease (Stephens 2006, p. 1). Because hatchery-raised California golden trout are no longer stocked within the native range of this subspecies, it is extremely unlikely that whirling disease could be spread to wild California golden trout populations. The disease has not been found in California golden trout to date, and there has been no documented loss or decline in California golden trout populations due to the disease. Although it could represent a future threat to the California golden trout, at this time the best scientific and commercial information does not indicate that it is a threat now nor likely to be a threat in the future.

Summary of Factor C

Although predation by, and competition with, brown trout have posed a threat to the California golden trout in the past, continuing conservation measures implemented by the State, cooperating agencies, and other interested groups have reduced this threat to manageable levels. Continued improvements of barriers have eliminated brown trout from the upper reaches of the South Fork Kern River where they were previously identified as a threat to the California golden trout. In the lower reaches of the South Fork Kern River, our best information indicates that populations descended from California golden trout have not sustained population-level declines due to brown trout. Finally, whirling disease has not been found in California golden trout to date. Therefore, we conclude that predation (and competition) with brown trout and whirling disease do not currently pose a threat to the California golden trout throughout its range, nor do we anticipate these to become threats in the future, such that listing under the Act is warranted.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Federal Regulations

Management of habitat for the California golden trout falls under the direction of the Sequoia and Inyo National Forests. Existing Federal regulatory mechanisms that are relevant to providing protection for the California golden trout in the Sierra Nevada include the following: National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*), Wilderness Act of 1964 (16 U.S.C. 1131–1136), Wild and Scenic Rivers Act (16 U.S.C. 1271–1287), Multiple-Use Sustained-Yield Act of 1960 (MUSY) (16 U.S.C. 528–531), Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 *et seq.*), National Forest Management Act of 1976 (NFMA) (16 U.S.C. 1601 *et seq.*), Land and Resource Management Plans for the Inyo and Sequoia National Forests (USFS 1988a; CDFG *et al.* 2004a, pp. 79–82), as amended by the SNFPA, and the Clean Water Act (CWA) (33 U.S.C. 1344).

National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.)

NEPA requires all Federal agencies to formally document, consider, and publicly disclose the environmental impacts of major Federal actions and management decisions significantly affecting the human environment. NEPA documentation is provided in an environmental impact statement, an environmental assessment, or a categorical exclusion, and may be subject to administrative or judicial appeal. The California golden trout has been identified as a sensitive species by the Region 5 (Pacific Southwest Region) Regional Forester. As part of Forest Service policy, an analysis will be conducted to evaluate potential management decisions under NEPA, including preparation of a biological evaluation to determine the potential effect of potential Forest Service actions on this sensitive subspecies. However, the Forest Service is not required to select an alternative having the least significant environmental impacts and may select an action that will adversely affect sensitive species provided that these effects were known and identified in a NEPA document. The NEPA process in itself is not likely to be considered a regulatory mechanism that is certain to provide significant protection for the California golden trout.

Wilderness Act of 1964 (16 U.S.C. 1131–1136)

The Wilderness Act of 1964 established a National Wilderness Preservation System made up of Federal lands designated by Congress as ''wilderness areas'' for the purpose of preserving and protecting designated areas in their natural condition, ''where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.'' The native range of the California golden trout within the South Fork Kern River lies within three wilderness areas: Golden Trout, South Sierra, and Domeland. The Domeland Wilderness was designated in 1964 and is just south of the South Sierra Wilderness (the road to Kennedy Meadows separates these two wildernesses). The Golden Trout Wilderness was designated in 1978 specifically to provide protection for California golden trout; Golden Trout Creek is wholly within this wilderness area. The South Sierra Wilderness was designated in 1984 and is adjacent to and south of the Golden Trout Wilderness.

Grazing of livestock is permitted within wilderness areas if it was established prior to the passage of this Act. The Wilderness Act does not specifically mention fish stocking, though it does state that the Wilderness Act shall not affect the jurisdiction or responsibilities of States with wildlife and fish responsibilities in the national forests. Fish stocking in wilderness areas is a controversial issue (Bahls 1992, pp. 2568–2578, p. 2568; Landres *et al.* 2001, pp. 287–294); however, wilderness designation generally has not limited fish stocking in the Sierra Nevada (Knapp 1996, pp. 3–12). The Wilderness Act has direction for managing designated wilderness to protect natural ecological processes and is a regulatory mechanism that protects California golden trout habitat from development or other types of habitat conversions, such as commercial enterprise, road construction, use of motorized vehicles or other equipment, and structural developments.

Wild and Scenic Rivers Act (16 U.S.C. 1271–1287)

Congress established the National Wild and Scenic Rivers System in 1968 to protect certain outstanding rivers from the harmful effects of new Federal projects, such as dams, hydroelectric facilities, bank armoring, and bridges. Rivers are classified as wild, scenic, or recreational, and fishing is permitted in components of the system under applicable Federal and State laws. The South Fork Kern River is designated as Wild and Scenic throughout 66 river km (41 mi) as the river passes through the South Sierra, Golden Trout, and Domeland Wildernesses. This regulatory mechanism, along with the Wilderness Act, thus protects approximately 10 percent of the California golden trout's range from new Federal projects such as those listed above.

Multiple-Use Sustained-Yield Act of 1960 (MUSY) (16 U.S.C. 528–531)

The Multiple-Use Sustained-Yield Act of 1960 (MUSY) provides direction that the national forests be managed using principles of multiple-use and that the forests produce a sustained yield of products and services. Specifically, MUSY provides policy that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. MUSY directs resource management not to impair the productivity of the land while giving consideration to the relative values of the various resources, though not necessarily in terms of the greatest financial return or unit output. MUSY provides direction to the Forest Service that fish and wildlife is a value that must be managed for, though discretion is given to each forest when considering the value of fish and wildlife relative to the other uses for which it is managing. Because the entire range of the California golden trout falls within lands administered by the Forest Service, this regulatory mechanism aids in the conservation of the subspecies in that fish are an important benefit for which management must occur.

Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 et seq.)

The Federal Land Policy and Management Act was enacted in 1976, and as amended by the Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901–1908), provides the primary legal foundation for how the Forest Service manages livestock grazing under its jurisdiction. This Act requires that a percentage of all monies received through grazing fees collected on Federal lands (including the Forest Service-administered lands within the range of the California golden trout) be spent for the purpose of on-the-ground range rehabilitation, protection, and improvement, including all forms of rangeland betterment, including fence construction, water development, and fish and wildlife enhancement. Half of the appropriated amount must be spent within the national forest where such monies were derived. FLPMA, as amended, is a regulatory mechanism that provides for some rangeland improvements intended for the long-term betterment of forage conditions and resulting benefits to wildlife, watershed protection, and livestock production, which if implemented can result in various habitat improvements and protections for the California golden trout.

National Forest Management Act of 1976 (NFMA) (16 U.S.C. 1601 et seq.)

National Forest Management Act of 1976 (NFMA) provides the primary legal foundation for Forest Service management of the public lands under its jurisdiction. NFMA includes a provision that planning regulations will include guidelines for land management plans that provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives. Current planning regulations direct that forests manage fish and wildlife habitat to maintain viable populations of existing native and nonnative vertebrate species. Within each planning area, the provided habitat must support at least a minimum number of reproductive individuals (36 CFR 219.20). The Forest Service published new proposed planning regulations on February 14, 2011, which are intended ''to guide the collaborative and science-based development, amendment, and revision of land management plans that promote healthy, resilient, diverse, and productive national forests and grasslands'' (76 FR 8480, pp. 8480, 8481). The proposed regulations specify that plans must maintain viable populations of species of conservation concern within the plan area to the extent that it is within the authority of the Forest Service or the inherent capability of the plan area to do so (76 FR 8480, p. 8518). Revisions to the Inyo and Sequoia National Forest LRMPs would follow the regulations established by this proposed rule, if made final.

Land and Resource Management Plans (LRMPs) for the Inyo and Sequoia National Forests

The 1988 Inyo National Forest LRMP, as amended (USFS 1995), and the 1988 Sequoia National Forest LRMP, were both amended by the SNFPA (USFS 2004) and provide management direction for the California golden trout. The Inyo National Forest is expecting to revise its LRMP in 2014 (Sims 2011c, p. 1), while the date for revision of the Sequoia National Forest LRMP is uncertain (Galloway 2011, p. 1) Specific direction under the current LRMPs is described in the following paragraphs.

The Sequoia National Forest LRMP provides direction for managing general aquatic and riparian species to increase the diversity of the animal communities. Riparian areas are managed to maintain or restore habitats for riparian species and those species associated with late successional stages of vegetation.

The Inyo National Forest LRMP has direction specific for managing a variety of resources. Specific standards and guidelines concerning grazing are presented in Factor A above, but in brief, they include trampling standards, direction for developing range Allotment Management Plans, conducting annual utilization checks, and locating salt outside of riparian areas. Direction specific for managing riparian resources includes forest-wide standards and guidelines aimed at maintaining or enhancing riparian-dependent resources and includes (but is not limited to): Giving priority to the rehabilitation of riparian areas when planning range, wildlife habitat, and watershed improvements; using Allotment Management Plans as a vehicle for ensuring protection of riparian areas from unacceptable impacts from grazing; and rehabilitating or fencing riparian areas that consistently show resource damage.

On January 12, 2001, a record of decision (ROD) was signed by the Forest Service for the SNFPA Final Environmental Impact Statement (USFS 2001b). The SNFPA addresses five problem areas: Old-forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels; noxious weeds; and lower west-side hardwood ecosystems. Subsequent to the establishment of management direction by the SNFPA ROD, the Regional Forester assembled a review team to evaluate specific plan elements. The review was completed in March 2003, and as a result the Final Supplemental Environmental Impact Statement was issued in January 2004 (USFS 2004). Forest Plans were amended to be consistent with the new (2004) ROD, and all subsequent project decisions fall under the 2004 direction. Within the native range of the California golden trout, management of the Inyo and Sequoia National Forests is affected by the SNFPA (USFS 2004).

Relevant to the California golden trout, the SNFPA aims to protect and restore aquatic, riparian, and meadow ecosystems and to provide for the viability of its associated native species through an Aquatic Management Strategy (AMS). The AMS is a general framework with broad goals for watershed processes and functions, habitats, attributes, and populations. There are nine goals associated with the AMS:

(1) Maintenance and restoration of water quality to comply with the Clean Water Act and the Safe Drinking Water Act.

(2) Maintenance and restoration of habitat to support viable populations of native and desired nonnative riparian-dependent species and to reduce negative impacts of nonnative species on native populations.

(3) Maintenance and restoration of species diversity in riparian areas, wetlands, and meadows to provide desired habitats and ecological functions.

(4) Maintenance and restoration of the distribution and function of biotic communities and biological diversity in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes).

(5) Maintenance and restoration of spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically, and biologically unobstructed movement for their survival, migration, and reproduction.

(6) Maintenance and restoration of hydrologic connectivity between floodplains, channels, and water tables to distribute flood flows and to sustain diverse habitats.

(7) Maintenance and restoration of watershed conditions as measured by favorable infiltration characteristics of soils and diverse vegetation cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.

(8) Maintenance and restoration of in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and to keep sediment regimes within the natural range of variability.

(9) Maintenance and restoration of the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

Riparian conservation objectives were developed to implement the Aquatic Management Strategy. These objectives contain standards and guidelines to maintain and restore riparian habitat and species.

The SNFPA ROD also includes two designations for aquatic and riparian areas: Critical Aquatic Refuges (CARs) and Riparian Conservation Areas (RCAs) (CDFG 2004a, p. 23). CARs are sub-watersheds that contain either known locations of threatened, endangered, or sensitive species, highly vulnerable populations of native plant or animal species, or localized populations of rare aquatic or riparian-dependent plant or animal species. RCAs are the lands around aquatic features where special standards and guidelines exist to conserve those features. RCA standards and guidelines apply in CARs except where an overlapping land allocation has a greater restriction on management activities. The width of an RCA is 91 m (300 ft) on each side of the stream for perennial streams, and 46 m (150 ft) on each side of intermittent and ephemeral streams, both being measured from the bankfull edge of the stream (the edge of the channel slope descending from the floodplain). An RCA width of 91 m (300 ft) is applicable to the California golden trout because it exists in perennial streams. Several CARs occur within the native range of the California golden trout. Two CARs occur on the Sequoia National Forest, and one CAR occurs on the Inyo National Forest.

Clean Water Act (CWA) (33 U.S.C. 1344)

The Clean Water Act (CWA) is the primary mechanism in the United States for surface water quality protection. It establishes the basic structure for regulating discharges of pollutants into waters of the United States. It employs a variety of regulatory and nonregulatory tools to reduce direct water quality impacts, finance water treatment facilities, and manage polluted run-off. The Forest Service is the designated water quality management agency under the CWA Section 208 Management Agency Agreement. Under this Agreement, the Forest Service is required to implement State-approved BMPs and other measures to achieve full compliance with all applicable State water quality standards. Project-level analysis conducted under NEPA is required to demonstrate compliance with CWA and State water quality standards (USFS 2004). Waterbodies that do not meet water quality standards with implementation of existing management measures are listed as impaired under section 303(d) of the CWA. Waters within California golden trout habitat are not listed as impaired by the State (Strand 2006), indicating that, in implementing this regulatory mechanism, the Forest Service designs land management activities so that existing levels of water quality and beneficial uses are maintained and protected.

State Regulations

State regulatory mechanisms that could provide some protection for the California golden trout and its habitat include the California Endangered Species Act (CESA), California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 *et seq.*), and the California Fish and Game Code (14 C.C.R. § 1 *et seq.*). Applicable sections are discussed below. In addition, the California Fish and Game Commission (Commission) has regulatory powers to decide policy such as season, bag limits, and methods of take for sport fish.

California Endangered Species Act (CESA)

The California golden trout was designated as the State freshwater fish of California in 1947 and was listed as a fish species of special concern by CDFG in 1995. The status of ''species of special concern'' applies to animals that are not listed under the Act or the California Endangered Species Act (CESA) but meet the following criteria: Populations are low, scattered, or highly localized and require active management to prevent them from becoming threatened or endangered species (Moyle *et al.* 1995, p. 3).

California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.)

CEQA is the principal statute mandating environmental assessment of projects in California. The purpose of CEQA is to evaluate whether a proposed project may have an adverse effect on the environment (including native fish and wildlife species), to disclose that information to the public, and to determine whether significant adverse effects can be reduced or eliminated by pursuing an alternative course of action or through mitigation. CEQA applies to projects proposed to be undertaken or requiring approval by State and local public agencies. CEQA requires full disclosure of the potential environmental impacts of public or private projects carried out by or authorized by non-Federal agencies within the State of California. As such, CEQA provides some protection for the California golden trout, should projects that would be subject to CEQA be proposed within the native range of the species. Fish stocking is not subject to full disclosure of its potential environmental impacts, as it is exempt from CEQA under Article 19 section 15301(j). However, as discussed elsewhere stocking of nonnative trout has been discontinued within the species' range.

California Fish and Game Code (14 C.C.R. § 1 et seq.)

The California Fish and Game Commission, a separate entity from CDFG, is a five-member group appointed by the Governor and confirmed by the Senate. The Commission has set up several policies regarding the California golden trout. Pursuant to section 703 of the Fish and Game Code, the Commission has designated certain State waters to be managed exclusively for wild trout. Those waters include the entire Golden Trout Creek watershed and the majority of the South Fork Kern watershed from the headwaters to the southern end of the South Sierra Wilderness.

In 1952, the Commission developed the Golden Trout Policy that covers the three subspecies of golden trout in the Sierra Nevada. In summary, the policy states the following:

(1) Certain waters within the high mountainous areas of Madera, Fresno, Inyo, Mono, and Tulare Counties may be designated by CDFG as ''Golden Trout Waters of California'' and shall be maintained in as genetically pure state as possible, and rainbow trout and other species of trout shall not be planted in these designated golden trout waters.

(2) A brood stock shall be maintained in lakes set aside for the sole purpose of egg production to provide fingerlings for planting waters.

(3) Hatchery-reared or wild fingerlings may be used for initial stocking in streams and lakes designated by CDFG, and whenever practicable, the range of golden trout will be extended through wild fish or fingerling plantings in native waters, or in other waters possessing adequate spawning grounds.

(4) The Golden Trout Policy prevails over the general Trout Policy if the two are in conflict.

Contrary to the Golden Trout Policy that ''rainbow trout and other species of trout shall not be planted in designated golden trout waters,'' rainbow trout have been stocked in the South Fork Kern River at Kennedy Meadows since about 1947. To prevent additional hybridization, CDFG began planting triploid rainbow trout in 2004, of which 99 to 100 percent are sterile (CDFG *et al.* 2004a, p. 52; McGuire 2011, p. 3). Although the trout planting has been popular with some members of the angling public, CDFG discontinued the stocking program entirely in 2009 (McGuire 2009, p. 9; McGuire 2011, p. 3).

Section 200 of the Fish and Game Code delegates to the Commission the power to regulate the taking or possession of fish. California Sport Fishing Regulations include the California golden trout and require a sport fishing license and the use of barbless hooks to take a maximum of five California golden trout in the Golden Trout Wilderness (CDFG 2011a, p. 13). Outside the Golden Trout Wilderness, a fisherman may possess up to 10 California golden trout, but may only take 5 per day (CDFG 2011b, p. 2). These limits, coupled with the remote backcountry condition of much of the subspecies' range, appear sufficient to prevent angling pressure from posing a threat (see Factor B—*Overutilization for Commercial, Recreational, Scientific, or Educational Purposes* section above).

Section 1603(a) of the California Fish and Game Code necessitates a permit from CDFG for any activity that may alter the bed, channel, or bank of any river, stream, or lake. The permit may incorporate measures to minimize adverse impacts to fish and wildlife; therefore, this regulation may offer protection to California golden trout habitat. The extent to which this regulation has provided the California golden trout with protection is unknown, as much of the range of this subspecies is protected under management of federally protected areas where few habitat modifications subject to this permit have been proposed. Section 6400 of the California Fish and Game Code declares it unlawful to place, plant, or cause to be placed or planted in any waters of California any live fish without permission from CDFG. Violation could result in a fine of up to $50,000 and 1 year imprisonment, with revocation of fishing privileges. In addition, violators would be held liable for damages. Rewards of up to $50,000 may be offered for information leading to the conviction of persons violating Section 6400, pursuant to Section 2586.

Thus, State regulations provide protections primarily through State Fish and Game Codes, and enforcement of these regulations by both CDFG wildlife protection personnel and by Forest Service law enforcement personnel (CDFG *et al.* 2004a, pp. 57–58; McGuire and Sims 2006, p. 18; Sims and McGuire 2006b, p. 13).

Summary of Factor D

Some Federal and State regulations afford protections for the California golden trout and their habitat. Implementation of LRMPs, as amended by the SNFPA, provides protections through management direction for the subspecies and the aquatic, riparian, and meadow ecosystems that it relies on. State regulations provide some protections through the Golden Trout Policy and the Fish and Game Code. Therefore, based on the best scientific and commercial information available, we find that the California golden trout is not currently threatened by the inadequate regulatory mechanisms throughout its range, nor do we anticipate inadequate regulatory mechanisms posing a threat in the future.

Factor E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Potential Factor E threats include hybridization, fire suppression activities, invasion of California golden trout waters by the New Zealand mudsnail (*Potamopyrgus antipodarum*), and climate change. With regard to hybridization, this potential threat involves introduced nonnative rainbow trout breeding with the California golden trout. For purposes of this review, ''hybridization'' refers to the creation of hybrid individuals due to matings between California golden trout and nonnative rainbow trout (in this case introduced hatchery trout, *Oncorhynchus mykiss spp.*) or due to matings between California golden trout and hybrid trout. Genetic introgression refers to the movement of genes originally indicative of nonnative trout into the gene pool of California golden trout populations. Because native California golden trout, introduced rainbow trout, and hybrid offspring interbreed, hybridization leads to genetic introgression, and the threats (discussed below) of both hybridization and introgression are treated the same.

Hybridization

The petition states that hybridization, due to the substantial stocking of rainbow trout and hybridized golden trout during the past 100 years, is the most immediate and destructive threat that California golden trout faces (Trout Unlimited 2000, pp. 17–18). Hybridization and consequent introgression is thought to dilute the fundamental genetic characteristics of California golden trout populations (CDFG *et al.* 2004a, p. 24). If the hybridization and introgression continue at large enough rates, those fundamental genetic characteristics could be lost entirely, leading to ''genetic extinction'' (Rhymer and Simberloff 1996, p. 100). In the Golden Trout Creek watershed, Trout Unlimited (2000, pp. 20–24) cites the past stocking of hybridized California golden trout in the fishless headwater lakes, Johnson Lake, Rocky Basin Lakes 1, 2, 3, and 4, and Chicken Spring Lake, as potential sources of hybridization. In the South Fork Kern River watershed, the petition (Trout Unlimited 2000, p. 18) states that hybridization has resulted from the extensive official and unofficial stocking of rainbow trout that has occurred at various places throughout the watershed.

Hybridization in Relation to Implementing the Endangered Species Act

The Act does not directly address questions related to species that have some degree of hybridization. The purpose of the Act is to conserve threatened and endangered species and the ecosystems on which those species depend. The definition of species under the Act includes any taxonomic species or subspecies, and distinct population segments of vertebrate species. Key issues for this status review are the scientific criteria used by professional zoologists and field biologists to taxonomically classify individuals, and populations of interbreeding individuals, as members of the California golden trout subspecies (*Oncorhynchus mykiss aguabonita*).

Previous Service positions regarding hybridization, based upon interpretations in a series of opinions by the U.S. Department of the Interior, Office of the Solicitor, generally precluded conservation efforts under the authorities of the Act for progeny, or their descendants, produced by matings between taxonomic species or subspecies (O'Brien and Mayr 1991, pp. 1–3). However, advances in biological understanding of natural hybridization (such as Arnold 1997, pp. 182–183) prompted withdrawal of those opinions. The reasons for that action were summarized in two sentences in the withdrawal memorandum (Memorandum from Assistant Solicitor for Fish and Wildlife, U.S. Department of the Interior, to Director, U.S. Fish and Wildlife Service, dated December 14, 1990): ''New scientific information concerning genetic introgression has convinced us that the rigid standards set out in those previous opinions should be revisited. In our view, the issue of ''hybrids'' is more properly a biological issue than a legal one.''

Our increasing understanding of the wide range of possible outcomes resulting from exchanges of genetic material between taxonomically distinct species and between entities within taxonomic species that also can be listed under the Act (i.e., subspecies, DPSs) requires the Service to address these situations on a case-by-case basis. In some cases, introgressive hybridization (infiltration of genes from one species into the gene pool of another species through repeated backcrossing of a hybrid with one of its parents) may be considered a natural evolutionary process reflecting active speciation or simple gene exchange between naturally sympatric species (or those species that occupy the same or overlapping geographic areas without interbreeding). Introgressed populations may contain unique or appreciable portions of the genetic resources of an imperiled or listed species. For example, populations with genes from another taxon at very low frequencies may still express important behavioral, life-history, or ecological adaptations of the indigenous population or species within a particular geographic area. In other cases, human-caused or facilitated hybridization may threaten the existence of a taxon, either because native genes are lost due to sheer numbers of introgressing genes, or because hybridized individuals have lowered fitness (Rhymer and Simberloff 1996, pp. 85–86, 92). Consequently, the Service carefully evaluates the long-term conservation implications for each taxon separately on a case-by-case basis where introgressive hybridization may have occurred. The Service performs these evaluations objectively based on the best scientific and commercial information available consistent with the intent and purpose of the Act.

A potential dichotomy thus exists under the Act between: (a) The need to protect the genetic resources of a species in which introgression has occurred, and (b) the need to minimize or eliminate the threat of hybridization posed by another taxon. Implementing actions under the Act that distinguish between these two alternatives is difficult when imperiled species are involved because a large number of populations may have experienced varying amounts of genetic introgression from another taxon. With regard to the California golden trout, an acceptable level of hybridization has not yet been defined.

Hybridization as a Potential Threat to California Golden Trout

In Golden Trout Creek, which contains approximately 82 km (51 mi) of native range, movement and reproduction of introgressed California golden trout from headwater lakes into downstream reaches has resulted in introgression at low levels, estimated at 0 to 8 percent on average (Cordes *et al.*

2006, pp. 110, 117; Stephens 2006, p. 2). Higher introgression rates (10 to 12 percent on average) were found in the headwater lakes (Cordes *et al.* 2006, p. 117), which had been stocked with hybridized California golden trout. Since 1995, managers have concentrated efforts to remove the hybridized trout from these lakes (Johnson Lake, Rocky Basin Lakes, and Chicken Spring Lake) (Cordes *et al.* 2001, p. 15). Survey results indicate that the six lakes are now fishless (Sims and McGuire 2006, p. 4; McGuire *et al.* 2009, p. 3). Thus, the source for future introgression has been removed. The removal of these source populations of introgressed fish will allow rainbow trout alleles to become less common in the watershed (Cordes *et al.* 2001, p. 15). Eventually, many of the rainbow trout alleles may drop out of the population altogether due to genetic drift (Cordes *et al.* 2001, p. 15). Within the Golden Trout Creek watershed, the Volcano Creek population, representing the only known pure population to date, contains approximately 8 km (5 mi) of stream habitat. This population is isolated from introgressed trout by a natural bedrock barrier near its mouth. Cordes *et al.* (2001, p. 15) found that this population had reduced genetic variability and are genetically distinct from other populations in Golden Trout Creek; however, these samples only came from one reach of stream, necessitating the need for additional analysis.

In the South Fork Kern River, which comprises approximately 644 km (400 mi) of native range, genetic tests indicate that all California golden trout have detectable levels of introgression with rainbow trout, with the downstream populations exhibiting the highest known levels, congruent with the known historical management of these populations (Cordes *et al.* 2003, pp. 16, 40; Stephens 2007, p. 72). Prior to construction and improvement of the manmade barriers, there were no upstream impediments to fish movement in the mainstem South Fork Kern. Currently, there are relatively low levels of introgression in the headwater reaches, and percentages of rainbow trout alleles are fairly uniform in samples collected above Templeton Barrier, likely reflecting the homogenizing effect of previous chemical treatments and restocking efforts (Cordes *et al.* 2003, p. 12). With no pure populations known to exist within this watershed, Cordes *et al.* (2003, p. 22) recommend that management focus should be to isolate the California golden trout with high levels of hybridization in the lower reaches from those less hybridized in the upper reaches, and to maintain and expand remaining pure populations if these are identified. If no pure populations are found, then Cordes *et al.* (2003, p. 22) recommend preservation of the existing South Fork Kern River populations with the lowest levels of introgression. Currently, introgression levels measured at barrier sites (41 percent at Schaeffer Barrier, 17 percent at Templeton Barrier, which is upstream) indicate that separation of lower levels of introgression above Schaeffer Barrier has been successful.

As both the petition and the Conservation Strategy note, illegal transport of nonnative or introgressed trout into areas that currently have low introgression levels, is a serious concern (Trout Unlimited 2000, pp. 26, 27; CDFG *et al.* 2004a, pp. 57, 58). However, as discussed above under under Factor C—Predation and Competition with Brown Trout,'' we consider the management actions that have been and are being undertaken to address this threat to be effective. Additionally, although the petition indicated that the Schaeffer barrier (the farthest downstream of the three) has historically been ineffective at preventing upstream movement (Trout Unlimited 2000, p. 6), the barrier was repaired in 2003, and is now considered impassable (CDFG *et al.* 2004a, p. 37; Lentz 2011, p. 1). See Factor A—Artificial Fish Barriers above. In addition, all fish stocking has been discontinued within the native range of the California golden trout; at Kennedy Meadows Reservoir, stocking of fertile rainbow trout ended in 2003 and stocking of sterile rainbow trout ended in 2008 (McGuire 2011, p. 3).

Once more genetic information becomes available, the Conservation Strategy describes management actions that can be undertaken, starting with the development and implementation of a peer-reviewed genetics management plan (CDFG *et al.* 2004a, p. 47). The genetics management plan is currently in development, with an expected completion date of December 31, 2011.

In summary, the best available scientific and commercial data, as described above, indicates that California golden trout in Volcano Creek and Golden Trout Creek are not threatened by hybridization to the point where listing is warranted. Stocking of nonsterile fish has ceased; all fish have been removed from the headwater lakes of Golden Trout Creek; barriers in the South Fork Kern River to prevent migration of hybridized fish have been repaired and tested; and measures are in place to address risks of illegal fish stocking (Sims and McGuire 2006, pp. 6, 7). We expect that due to the management actions taken to isolate California golden trout from nonnative trout within their native range, that, for the species as a whole, the level of introgression should not increase and may decrease over time. Therefore, we determine that existing levels of introgression within the subspecies do not constitute a significant threat, and that management actions have lowered the extent and likelihood of further hybridization, such that introgression is unlikely to become a significant threat in the future.

Fire Suppression Activities

Potential adverse effects to the California golden trout resulting from fire suppression activities include changed forest structure; direct mortality due to water drafting (taking of water) from occupied drainages; hybridization and competition with nonnative trout that may arise from dropping water from a helicopter within the Golden Trout Creek and South Fork Kern River watersheds using water that may contain trout not native to the watersheds; and contamination due to use of fire retardants for fire suppression.

In some areas within the range of the California golden trout, long-term fire suppression has changed forest structure and conditions, resulting in the potential for increased fire severity and intensity (McKelvey *et al.* 1996, p. 1038). Fire can cause direct mortality of fish and aquatic invertebrates within aquatic ecosystems. However, even in the case of high-severity fires, local extirpations of fish have been patchy, allowing for relatively rapid recolonization (Gresswell 1999, p. 193). Lasting adverse effects of fire on fish populations have consequently been limited to areas where native populations had declined for reasons other than fire, and were already small and isolated prior to the fire (Gresswell 1999, pp. 193, 212). In contrast, California golden trout typically show relatively high population densities where they occur (Knapp and Dudley 1990, p. 169), and known populations are not typically isolated from each other (Stephens 2007, p. 72). In 2000, the Manter Fire burned on the Sequoia National Forest, and surveys found dead California golden trout on Fish Creek and the South Fork Kern River. Since live fish were seen in these areas after the fire, it is likely that the fire did not result in total mortality of the local population (Strand 2006).

The Federal Wildland Fire Policy and Program Review, which is a comprehensive Federal fire policy for the Departments of the Interior and Agriculture, was created in 1995 and recognizes the essential role of fire in maintaining natural systems. Wildland fire use is a management option on Federal lands and is available to Federal agencies with an approved land use plan and a fire management plan (USDA and USDOI 2005, p. 2; USDA and USDOI 2009, pp. 8, 9). The Sequoia National Forest has begun using wildland fire on a case-by-case basis as a tool to reduce fuel loading in wilderness areas, most recently in 2010 on the Big Sheep Fire (Lang 2011, p. 1). In 2004, the Forest Service completed the Fisheries and Aquatic Input for Wildland Fire Suppression Planning Specific to Golden Trout Management (McGuire and Sims 2006, pp. 22–25). Criteria include avoiding moderate to extreme fire intensities within the Golden Trout watershed, avoiding water transfers in key areas, and using small intake screens when drafting from water sources.

Fire retardants and suppressant chemicals are used extensively in the United States for suppression and control of range and forest fires, and are often applied in environmentally sensitive areas (Hamilton *et al.* 1996, introduction). Laboratory tests of these chemicals have shown that they cause mortality in fishes and aquatic invertebrates by releasing surfactants and ammonia when added to water (Hamilton *et al.* 1996, pp. 1–5). Fire retardant chemicals dropped in or near California golden trout habitat could have negative effects on individuals or isolated populations. On April 20, 2000, direction was given to all national forests in regard to fire retardant use during wildland fire suppression activities. Guidance includes avoiding aerial application of retardant or foam within 91 m (300 ft) of waterways. Further details concerning delivery from different types of aircraft, interactions with threatened and endangered species, and exceptions are given in the document. These guidelines are updated annually and published in the Interagency Standards for Fire and Fire Aviation Operations (National Interagency Fire Center 2006, Chapter 12, pp. 1–6) for the Bureau of Land Management, Forest Service, National Park Service, and the Service.

The Forest Service, through the direction of the Conservation Strategy, created written plans for integration of California golden trout populations and habitat protection in Forest Service fire suppression planning. Both the Inyo and the Sequoia National Forests' fishery biologists have been coordinating with fire personnel to ensure that measures contained in the plans are implemented (McGuire and Sims 2006, p. 8; Sims and McGuire 2006, p. 5). One such avoidance measure identifies the need to prevent water transfers from nonnative water bodies into California golden trout waters during fire suppression activities, or any other management activity that would use large quantities of water.

While fire suppression activities have the potential to affect the California golden trout, evidence indicates that lasting adverse effects on fish populations are rare. Although inadvertent application of fire suppression chemicals could negatively affect some isolated populations, the potential for this is lessened by implementation of the national direction on aerial applications of these fire retardants. Furthermore, the Forest Service has incorporated measures into fire suppression planning documents, and implementation of these measures reduces the effects that fire management activities would otherwise have on California golden trout. Therefore, we conclude that fire suppression activities are not a threat to the California golden trout.

New Zealand Mudsnail (*Potamopyrgus antipodarum*)

The New Zealand mudsnail (NZMS) is an invasive nonnative mollusk that can impact the food chain of native trout by competing with native invertebrates (including native mollusks) for food and space, and through altering the physical characteristics of the streams (Aquatic Nuisance Species Task Force 2006, p. 1). NZMS are able to withstand a variety of temperature regimes and can stay alive out of water under moist conditions for 5 or more days, and are small enough that anglers can inadvertently transfer this species between different waterbodies (Aquatic Nuisance Species Task Force 2006, pp. 1, 2; Sims 2006b, p. 1). Since they reproduce clonally, one introduced NZMS can begin a new population. NZMS has the ability to reproduce quickly and mass in high densities (Aquatic Nuisance Species Task Force 2006, p. 1).

The closest location of NZMS to the California golden trout is in the Owens River drainage, which is approximately a 2-hour drive to Horseshoe Meadow trailhead and an hour hike into California golden trout habitat, or about a 4-hour drive to Monache Meadows (Sims 2006b, p. 1; Lentz 2011, p. 2). These NZMS were located in 2000 at the lower Owens River near Bishop; since 2000, NZMS has moved throughout the Owens drainage including Hot Creek, Rush Creek, and Lone Pine Creek. Because NZMS can survive on waders for several days, human transport of the organism to the California golden trout's habitat would be likely if precautions are not taken by anglers. The Inyo National Forest requires all permitted fishing guides to follow appropriate disinfection methods for their gear (Sims 2006b, p. 1).

Several conservation measures reduce the likelihood that this invasive species will enter the native waters, including the cooperative effort between the Inyo and Sequoia National Forests and CDFG to ensure that the transfer of water from nonnative waterbodies does not occur during fire suppression activities. Also, a brochure has been distributed that informs the public about how to prevent the spread of nuisance species, with an Internet link provided to a NZMS Web site.

In summary, NZMSs have not been found within the native range of the California golden trout. While it is possible that this invasive species will continue to spread, ongoing efforts are occurring to address the risk of spread of NZMS to habitat of the California golden trout. Consequently, we conclude NZMS is not a threat to the subspecies.

Climate Change

''Climate'' refers to an area's long-term average weather statistics (typically for at least 20- or 30-year periods), including the mean and variation of surface variables such as temperature, precipitation, and wind, whereas ''climate change'' refers to a change in the mean and/or variability of climate properties that persists for an extended period (typically decades or longer), whether due to natural processes or human activity (Intergovernmental Panel on Climate Change (IPCC) 2007a, p. 78). Although changes in climate occur continuously over geological time, changes are now occurring at an accelerated rate. For example, at continental, regional, and ocean-basin scales, recent observed changes in long-term trends include: A substantial increase in precipitation in eastern parts of North America and South America, northern Europe, and northern and central Asia, and an increase in intense tropical cyclone activity in the North Atlantic since about 1970 (IPCC 2007a, p. 30); and an increase in annual average temperature of more than 2 °F (1.1 °C) across the United States since

1960 (Global Climate Change Impacts in the United States (GCCIUS) 2009, p. 27). Examples of observed changes in the physical environment include: An increase in global average sea level, and declines in mountain glaciers and average snow cover in both the northern and southern hemispheres (IPCC 2007a, p. 30), substantial and accelerating reductions in Arctic sea-ice (such as Comiso *et al.* 2008, p. 1), and a variety of changes in ecosystem processes, the distribution of species, and the timing of seasonal events (such as GCCIUS 2009, pp. 79–88).

The IPCC used Atmosphere-Ocean General Circulation Models and various greenhouse gas emissions scenarios to make projections of climate change globally and for broad regions through the 21st century (Meehl *et al.* 2007, p. 753; Randall *et al.* 2007, pp. 596–599), and reported these projections using a framework for characterizing certainty (Solomon *et al.* 2007, pp. 22–23). Examples include: (1) It is virtually certain there will be warmer and more frequent hot days and nights over most of the earth's land areas; (2) it is very likely there will be increased frequency of warm spells and heat waves over most land areas, and the frequency of heavy precipitation events will increase over most areas; and (3) it is likely that increases will occur in the incidence of extreme high sea level (excludes tsunamis), intense tropical cyclone activity, and the area affected by droughts (IPCC 2007b, p. 8, Table SPM.2). More recent analyses using a different global model and comparing other emissions scenarios resulted in similar projections of global temperature change across the different approaches (Prinn *et al.* 2011, pp. 527, 529).

All models (not just those involving climate change) have some uncertainty associated with projections due to assumptions used, data available, and features of the models; with regard to climate change this includes factors such as assumptions related to emissions scenarios, internal climate variability, and differences among models. Despite this, however, under all global models and emissions scenarios, the overall projected trajectory of surface air temperature is one of increased warming compared to current conditions (Meehl *et al.* 2007, p. 762; Prinn *et al.* 2011, p. 527). Climate models, emissions scenarios, and associated assumptions, data, and analytical techniques will continue to be refined, as will interpretations of projections, as more information becomes available. For instance, some changes in conditions are occurring more rapidly than initially projected, such as melting of Arctic sea ice (Comiso *et al.* 2008, p. 1; Polyak *et al.* 2010, p. 1797), and since 2000 the observed emissions of greenhouse gases, which are a key influence on climate change, have been occurring at the mid- to higher levels of the various emissions scenarios developed in the late 1990's and used by the IPPC for making projections (such as Raupach *et al.* 2007, Figure 1, p. 10289; Manning *et al.* 2010, Figure 1, p. 377; Pielke *et al.* 2008, entire). Also, the best scientific and commercial data available indicate that average global surface air temperature is increasing and several climate-related changes are occurring and will continue for many decades even if emissions are stabilized soon (such as Meehl *et al.* 2007, pp. 822–829; Church *et al.* 2010, pp. 411–412; Gillett *et al.* 2011, entire).

Changes in climate can have a variety of direct and indirect impacts on species, and can exacerbate the effects of other threats. Rather than assessing "climate change" as a single threat in and of itself, we examine the potential consequences to species and their habitats that arise from changes in environmental conditions associated with various aspects of climate change. For example, climate-related changes to habitats, predator-prey relationships, disease and disease vectors, or conditions that exceed the physiological tolerances of a species, occurring individually or in combination, may affect the status of a species. Vulnerability to climate change impacts is a function of sensitivity to those changes, exposure to those changes, and adaptive capacity (IPCC 2007, p. 89; Glick *et al.* 2011, pp. 19–22). As described above, in evaluating the status of a species, the Service uses the best scientific and commercial data available, and this includes consideration of direct and indirect effects of climate change. As is the case with all potential threats, if a species is currently affected or is expected to be affected by one or more climate-related impacts, this does not necessarily mean the species is a threatened or endangered species as defined under the Act. If a species is listed as threatened or endangered, this knowledge regarding its vulnerability to, and impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

While projections from global climate model simulations are informative and in some cases are the only or the best scientific information available, various downscaling methods are being used to provide higher resolution projections that are more relevant to the spatial scales used to assess impacts to a given species (see Glick *et al.,* 2011, pp. 58–61). With regard to the area of analysis for the California golden trout, downscaled projections are not available.

Climate change may potentially impact California golden trout populations by affecting water temperature, water availability, or the timing of flows. California golden trout prefer temperatures below 60 °F (15 °C), but can endure daytime temperatures ranging into the 70's °F (21 °C) so long as temperatures cool again at night (CDFG 2004a, pp. 11–12). Stretches of the South Fork Kern can currently reach up to 77 °F (25.2 °C) (CDFG 2004a, p. 55). Stream temperatures are being monitored, as required by the Conservation Strategy, but a detailed report has not yet been produced (McGuire *et al.* 2009, p. 11).

Both the Golden Trout Creek and South Fork Kern watersheds are high-elevation watersheds strongly influenced by snowmelt. The extent of water contained in the spring snowpack (typically measured as the snow water equivalent on April 1st) is thus an important predictor of summer streamflow and temperatures (Mote *et al.* 2005, p. 40). Most areas in the western United States have shown decreases since 1950 in the amount of water contained in their spring snowpacks (Mote *et al.* 2005, p. 41). However, the water content of spring snowpacks in the southern Sierras (including the areas surrounding the Golden Trout Creek and South Fork Kern watersheds) have actually increased over that same time (Mote *et al.* 2005, pp. 41, 42; Ray *et al.* 2010, p. 16). Mote *et al.* (2005, pp. 46, 47) attributed this effect to an increase in precipitation, combined with relatively mild temperature increases at the high elevations involved. Mote *et al.* (2005, p. 40) compared the water content of spring snowpacks across the American West, both as measured from 1950 to 1997 and as predicted by a hydrologic model called the Variable Infiltration Capacity (VIC). The VIC accounts for vegetation, soil layers, and the interaction of water and heat energy at the land surface. They found general agreement between the model and observations, except that the model, while correctly predicting an increase in snowpack water content for the southern Sierras (Mote *et al.* 2005, pp. 41, 42), still under-predicted the amount of snowpack water content due to a lack of meteorological information for the highest elevations (Mote *et al.* 2005, pp. 41, 43).

Changes in timing of flows may be possible despite predicted trends in springtime snowpack. For instance the snowpack may be maintained by increased snowfall, despite earlier melting of some portion of that snowpack (Stewart *et al.* 2005, p. 1144). This may advance the timing of relatively warm water entering the Golden Trout Creek and South Fork Kern watersheds. California golden trout spawn when water temperatures consistently exceed 59 °F (15 °C) (Knapp and Vredenburg 1996, p. 1). They also tend to spawn more actively during times of day when the water is warmest. Earlier meltwater runoff from the snowpack might reasonably cause the minimum spawning temperatures to be reached earlier in the year. As the Conservation Strategy notes, California golden trout tend to grow slowly, in part because of cold water temperatures and a short growing season (CDFG 2004a, p. 12). Earlier meltwater runoff may, therefore, have a positive effect on California golden trout populations.

In summary, modeled and observed data indicate that the water content of snowpacks in the southern Sierras is likely to increase or at least remain the same in the future. Streams supporting California golden trout are, therefore, likely to remain supplied year round with water in the temperature ranges required by the subspecies. We conclude that global climate change does not pose a threat to the subspecies, either now or in the future.

Summary of Factor E

Although California golden trout have historically been adversely affected by several manmade or human exacerbated factors, those potential threats have been well-addressed by conservation efforts. Threats of increased hybridization resulting from natural fish movement and interbreeding in areas that are currently less-hybridized have been ameliorated by conservation efforts that include repair and maintainance of the three fish barriers on the South Fork Kern River, removal of all fish from the headwater lakes of Golden Trout Creek, and various genetic monitoring efforts. While these efforts do not eliminate introgression that has already occurred, they prevent areas of low introgression, such as the upper reaches of the South Fork Kern River, from being further introgressed by hybridized fish coming upstream from lower reaches. This stabilization of the threat has allowed management efforts, including elimination of introgressed populations, to proceed in a well-considered manner.

Fire suppression planning and guidance documents, including the Conservation Strategy (CDFG *et al.* 2004a, p. 87), Interagency Standards for Fire and Fire Aviation Operations (National Interagency Fire Center 2006, chapter 12, pp. 1–6), and the Wildland Fire Use Implementation Procedures Reference Guide (USDA and USDOI 2005, entire) adequately address both the direct potential impacts of fire suppression activities and the indirect habitat impacts that may result from fuels buildup in the lack of fire. The threat that the New Zealand mudsnail may be introduced into California golden trout waters is relatively low due to distance to source areas, and is addressed by public education efforts. Available data also indicate that water temperature and availability issues related to climate change will not threaten the subspecies. Based on the above, we conclude that the California golden trout is not currently threatened by other natural or manmade factors affecting its continued existence throughout its range, nor do we anticipate other natural or manmade factors posing a threat in the future.

Finding

As required by the Act, we considered the five factors in assessing whether the California golden trout is threatened or endangered throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the California golden trout. We reviewed the petition, information available in our files, other available published and unpublished information, and we consulted with recognized California golden trout experts and other Federal and State agencies.

The primary potential threats to the subspecies include livestock grazing at levels that are environmentally harmful, competition and predation from introduced brown trout, and hybridization with nonnative trout. These potential threats are all addressed by a Conservation Strategy and Memorandum of Agreement that we, the USFS, and CDFG are currently implementing (CDFG *et al.* 2004a, entire; CDFG *et al.* 2004b, entire). Impacts from environmentally detrimental grazing practices have been greatly reduced through the resting of grazing allotments and establishment of cattle exclosures, by the implementation of standards for maintaining desired vegetative and habitat conditions, and by significant reductions in the number of cattle using the area.

Predation and competition with brown trout have been addressed by the discontinuation of brown trout stocking, construction and improvement of fish barriers, chemical treatments, and annual surveys to keep brown trout out of cleared areas. Hybridization concerns have been addressed under the Conservation Strategy through the discontinuation of fish stocking in the California golden trout's home range, the removal of hybridized fish from Golden Trout Creek headwater lakes, and the restoration of fish barriers on the South Fork Kern River. In the South Fork Kern River, introgression levels appear to be generally uniform in stream sections that are separated by barriers, indicating that in general, particular populations are insulated from increased introgression. In Golden Trout Creek, the source of introgression has been removed. California golden trout densities have generally been among the highest ever recorded for a stream-dwelling trout in the western United States (Knapp and Matthews 1996, p. 805). Population surveys conducted at Templeton Meadow on the South Fork Kern River have indicated that population numbers increased between 1985 and 1999 (Stephens 2001b, p. 2), indicating that in general golden trout population numbers are at a high density and do not appear to be at risk.

Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the threats are not of sufficient imminence, intensity, or magnitude to indicate that the California golden trout is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout its range at this time.

Distinct Vertebrate Population Segment

Under the Service's Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722; February 7, 1996), three elements are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to or removal from the Federal List of Endangered and Threatened Wildlife. These elements include:

(1) The discreteness of a population in relation to the remainder of the species to which it belongs;

(2) The significance of the population segment to the species to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment endangered or threatened).

Discreteness

Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

If the population meets the first two criteria under the DPS policy, we then proceed to the third element in the process, which is to evaluate the population segment's conservation status in relation to the Act's standards for listing as an endangered or threatened species. The DPS evaluation in this finding concerns the California golden trout that we were petitioned to list as endangered.

In the threats assessment performed above, we concluded that in relation to the entire range of the California golden trout, none of the activities identified as potential threats, either singly or in combination, constitute a level of risk serious enough to bring a local population to the point where it would be in danger of extinction, either now or in the foreseeable future.

Under the DPS Policy, California golden trout in both Golden Trout Creek and the South Fork Kern River each could meet the criterion for discreteness as a markedly separate population because while the two drainages were connected in the geologic past, they became separated by volcanic activity in the region approximately 10,000 years ago (Cordes *et al.* 2003, p. 20). This led to Golden Trout Creek and the South Fork Kern River as known today (Evermann 1906, pp. 11–14) in two adjacent watersheds draining the Kern Plateau of the southern Sierra Nevada.

Significance

If a population segment is considered discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used ''sparingly'' while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the discrete population segment in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;

(3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

A population segment needs to satisfy only one of these conditions to be considered significant. Furthermore, other information may be used as appropriate to provide evidence for significance.

California golden trout in Golden Trout Creek and the South Fork Kern River could each be considered to meet the significance criterion of the DPS policy because the evidence indicates that the loss of either population segment could result in a significant gap in the range of the subspecies.

However, since it is our conclusion that, based on the best information available, recent management actions and restoration activities have ameliorated the risks presented by these potential threats to the extent that they do not present a concentrated level of risk to California golden trout anywhere in its range, including in Golden Trout Creek and the South Fork Kern watershed, we conclude that there is no geographic concentration of threats and thus no need to proceed further with an evaluation of potential DPSs within the range of the subspecies. Even if populations of California golden trout were found to meet the distinctness and significance criteria of the DPS Policy, we have already found that the conservation status of these entities would not meet the Act's standards for listing as endangered or threatened. As a result, no further analysis under the DPS policy is necessary.

Significant Portion of the Range and Distinct Vertebrate Population Segments

After assessing whether the California golden trout is threatened or endangered throughout its range, we next consider whether either a significant portion of the California golden trout's range or a distinct population segment (DPS) of the species meets the definition of endangered or is likely to become endangered in the foreseeable future (threatened).

Significant Portion of the Range

The Act defines ''endangered species'' as any species which is ''in danger of extinction throughout all or a significant portion of its range,'' and ''threatened species'' as any species which is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The definition of ''species'' is also relevant to this discussion. The Act defines the term ''species'' as follows: ''The term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature.'' The phrase ''significant portion of its range'' (SPR) is not defined by the statute, and we have never addressed in our regulations: (1) The consequences of a determination that a species is either endangered or likely to become so throughout a significant portion of its range, but not throughout all of its range; or (2) what qualifies a portion of a range as ''significant.''

Two recent district court decisions have addressed whether the SPR language allows the Service to list or protect less than all members of a defined ''species:'' *Defenders of Wildlife* v. *Salazar,* 729 F. Supp. 2d 1207 (D. Mont. 2010), concerning the Service's delisting of the Northern Rocky Mountain gray wolf (74 FR 15123, April 2, 2009); and *WildEarth Guardians* v. *Salazar,* 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010), concerning the Service's 2008 finding on a petition to list the Gunnison's prairie dog (73 FR 6660, Feb. 5, 2008). The Service had asserted in both of these determinations that it had authority, in effect, to protect only some members of a ''species,'' as defined by the Act (i.e., species, subspecies, or DPS), under the Act. Both courts ruled that the determinations were arbitrary and capricious on the grounds that this approach violated the plain and unambiguous language of the

Act. The courts concluded that reading the SPR language to allow protecting only a portion of a species' range is inconsistent with the Act's definition of ''species.'' The courts concluded that once a determination is made that a species (i.e., species, subspecies, or DPS) meets the definition of ''endangered species'' or ''threatened species,'' it must be placed on the list in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through special rules under sections 4(d) and 10(j) of the Act).

Consistent with that interpretation, and for the purposes of this finding, we interpret the phrase ''significant portion of its range'' in the Act's definitions of ''endangered species'' and ''threatened species'' to provide an independent basis for listing; thus there are two situations (or factual bases) under which a species would qualify for listing: a species may be endangered or threatened throughout all of its range; or a species may be endangered or threatened in only a significant portion of its range. If a species is in danger of extinction throughout an SPR, it, the species, is an ''endangered species.'' The same analysis applies to ''threatened species.'' Therefore, the consequence of finding that a species is endangered or threatened in only a significant portion of its range is that the entire species shall be listed as endangered or threatened, respectively, and the Act's protections shall be applied across the species' entire range.

We conclude, for the purposes of this finding, that interpreting the SPR phrase as providing an independent basis for listing is the best interpretation of the Act because it is consistent with the purposes and the plain meaning of the key definitions of the Act; it does not conflict with established past agency practice (i.e., prior to the 2007 Solicitor's Opinion), as no consistent, long-term agency practice has been established; and it is consistent with the judicial opinions that have most closely examined this issue. Having concluded that the phrase ''significant portion of its range'' provides an independent basis for listing and protecting the entire species, we next turn to the meaning of ''significant'' to determine the threshold for when such an independent basis for listing exists.

Although there are potentially many ways to determine whether a portion of a species' range is ''significant,'' we conclude, for the purposes of this finding, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for ''significant'' in terms of an increase in the risk of extinction for the species. We conclude that a biologically based definition of ''significant'' best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation. Thus, for the purposes of this finding, a portion of the range of a species is ''significant'' if its contribution to the viability of the species is so important that, without that portion, the species would be in danger of extinction.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation. *Resiliency* describes the characteristics of a species that allow it to recover from periodic disturbance. *Redundancy* (having multiple populations distributed across the landscape) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Representation* (the range of variation found in a species) ensures that the species' adaptive capabilities are conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristic of a species or area may contribute to all three. For example, distribution across a wide variety of habitats is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain threats, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be ''significant'' due to its contributions under any one of these concepts.

For the purposes of this finding, we determine if a portion's biological contribution is so important that the portion qualifies as ''significant'' by asking whether, *without that portion,* the representation, redundancy, or resiliency of the species would be so impaired that the species would have an increased vulnerability to threats to the point that the overall species would be in danger of extinction (i.e., would be ''endangered''). Conversely, we would not consider the portion of the range at issue to be ''significant'' if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction throughout its range if the population in that portion of the range in question became extirpated (extinct locally).

We recognize that this definition of ''significant'' establishes a threshold that is relatively high. On the one hand, given that the consequences of finding a species to be endangered or threatened in an SPR would be listing the species throughout its entire range, it is important to use a threshold for ''significant'' that is robust. It would not be meaningful or appropriate to establish a very low threshold whereby a portion of the range can be considered ''significant'' even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: listing would be rangewide, even if only a portion of the range of minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to establish a threshold for ''significant'' that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered ''significant'' only if threats in that portion result in the entire species' being currently endangered or threatened. Such a high bar would not give the SPR phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136 (9th Cir. 2001).

The definition of ''significant'' used in this finding carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions will be imposed or resources expended that do not contribute substantially to species conservation. But we have not set the threshold so high that the phrase ''in a significant portion of its range'' loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders* litigation. Under that interpretation, the portion of the range would have to be so important that current imperilment there would mean that the species would be *currently* imperiled everywhere. Under the definition of ''significant'' used in this finding, the portion of the range need not rise to such an exceptionally high level of biological significance. (We recognize that if the species is imperiled in a portion that rises to that level of biological significance, then we should conclude that the species is in fact imperiled throughout all of its range, and that we would not need to rely on the SPR language for such a listing.) Rather, under this interpretation we ask whether the species would be in danger of extinction everywhere without that portion, *i.e.,* if that portion were completely extirpated.

The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that have no reasonable potential to be significant *and* threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) The portions may be ''significant,'' and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. Thus, if we determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is ''significant.'' In practice, a key part of the portion status analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that clearly would not meet the biologically based definition of ''significant'', such portions will not warrant further consideration.

The most serious of the potential threats to California golden trout discussed above in the Summary of Information Pertaining to the Five Factors section are livestock grazing, predation and competition from brown trout, and hybridization issues with rainbow trout. These potential threats generally occur across the species range and are not concentrated in any areas. Even areas that may currently lack one or more of these potential threats remain at some risk from them. The level of risk presented by each of these potential threats has, in the past, been highest in the South Fork Kern watershed. However, recent management actions and restoration activities have ameliorated the risks presented by these potential threats to the extent that they do not present a concentrated level of risk to California golden trout anywhere in its range, including the South Fork Kern watershed. Efforts in place to address these potential threats include the development and implementation of the Conservation Strategy, with its associated management and monitoring requirements (CDFG *et al.* 2004a, pp. 1–4; McGuire *et al.* 2009, entire; Lentz 2011, pp. 1, 2); the ongoing development of a genetics management plan scheduled for completion in June 2012 (Lentz 2011, p. 2); the construction and renovation of the three fish passage barriers restricting movement of brown trout and hybridized fish (Lentz 2011, pp. 1, 2); the eradication of brown trout above the Templeton barrier (Lentz 2011, p. 2); the curtailment of stocking of brown and rainbow trout (with the exception of sterile triploid rainbow trout at Kennedy Meadows) (CDFG *et al.* 2004a, p. 52; Lentz 2011, p.1); and extensive grazing restrictions and effects-monitoring across the range (USFS 1988a, pp. 78–79, 236; USFS 1995, pp. 2, 27; Knapp and Mathews 1996, pp. 816, 817; CDFG *et al.* 2004a, p. 34; McGuire and Sims 2006, p. 17; Ettema and Sims 2010, pp. 58–64).

Of the additional potential threats to California golden trout discussed above under the Summary of Information Pertaining to the Five Factors section, some are more applicable to the South Fork Kern watershed (recreation, fish barriers, beavers, angling, illegal trout transplants, fish stocking, and the New Zealand mud snail), while others are equally applicable to both watersheds (pack stock use, collection of fin tissue samples, whirling disease, fire suppression activities, and climate change). However, for the reasons discussed above in relation to the entire range of the subspecies, none of these activities (either singly or in combination) constitute a level of risk serious enough to bring a local population to the point where it would be in danger of extinction, either now or in the foreseeable future. Accordingly, based on the best available scientific and commercial information, we conclude that the California golden trout is not threatened or endangered in a significant portion of its range. Moreover, the subspecies currently exists throughout its historical range (see Distribution section above), so there is no need to address the question of whether lost historical range is a significant portion of the species' range.

Conclusion of 12-Month Finding

We do not find the California golden trout (or any DPS) to be in danger of extinction now, nor is this species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Therefore, listing this species as threatened or endangered under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, the California golden trout to our Sacramento Ecological Services Field Office (see **ADDRESSES** section) whenever it becomes available. New information will help us monitor the California golden trout and encourage its conservation. If an emergency situation develops for the California golden trout or any other species, we will act to provide immediate protection.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the Sacramento Fish and Wildlife Office (see **ADDRESSES** section).

Authors

The primary authors of this notice are the staff members of the Sacramento Fish and Wildlife Office.

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: September 22, 2011.

Rowan Gould,

Acting Director, Fish and Wildlife Service.

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