invasion of California since early 1998 and determined that, under the authority of NANPCA, the development of a cooperative and comprehensive management plan for the genus Eriocheir was appropriate and necessary. The U.S. Fish and Wildlife Service supported a literature search and summary, organized a public meeting and workshop, and developed a report in 1999 to the ANS Task Force entitled ''The Chinese Mitten Crab Invasion of California: A Draft Management Plan for the Genus Eriocheir.'' In 2001 the ANS Task Force developed a Mitten Crab Control Working Group (under the authority of NANPCA) and charged the committee with the task to review and edit the draft plan. The committee submitted a revised version of the draft plan to the ANS Task Force for review and approval in 2002.

The purpose of the draft management plan is to assist the ANS Task Force and other interested parties with a determination of appropriate responses to the Chinese mitten crab invasion of the San Francisco Bay and estuary, as well as the threat to other estuaries. The plan addresses the information and initial recommendations as well as the opinions of committee members regarding priorities for implementation of management actions. Currently, there is not enough information about this crab to implement many management actions with a high degree of confidence; therefore, a vital component of this program is adaptive management. As implementation moves forward, results of new findings will be incorporated into future planning. Continual integration of findings will require flexibility in adoption of many program components, but it will greatly enhance the success of the program by allowing decisions to be based on more complete scientific information.

The goal of the draft National Plan is to prevent or delay the introduction and spread of Eriocheir species to new areas and reduce the negative impacts of existing populations.

The draft plan has identified the following four primary objectives: (1) Preventing introductions and spread; (2) detecting new populations and monitoring existing populations; (3) reducing negative impacts; and (4) developing strategies and methods for population control and management. Elements of research, outreach and management pertain to each of these objectives.

The draft plan has outlined actions not only to minimize further impacts in California, but to also prevent invasions in other ecosystems. Due to reports of crab sightings and the susceptibility of these regions, the Columbia River, Mississippi River, Hudson River, and St. Lawrence River are considered areas that may soon face the same type of invasion that San Francisco Bay has experienced. Without the implementation of proactive efforts to prevent new introductions and spread from California, control and management activities will likely be required in numerous locations throughout the country in the future, making management efforts even more complex and expensive. Importantly, while immediate actions are warranted in the draft plan, additional biological information is also needed to allow development of a theoretically based management plan that will allow us to minimize negative impacts on the very resources we hope to protect.

The draft National Management Plan for the Genus Eriocheir is available on the ANS Task Force Web site (*http://www.anstaskforce.gov*) You may also request copies of the draft plan by calling or writing the person listed under **FOR FURTHER INFORMATION CONTACT**.

Dated: January 21, 2003.

Everett Wilson,

Acting Co-Chair, Aquatic Nuisance Species Task Force, Assistant Director—Fisheries and Habitat Conservation.

[FR Doc. 03–3745 Filed 2–13–03; 8:45 am]

BILLING CODE 4310–55–M

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the California Spotted Owl (*Strix occidentalis occidentalis*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding for a petition to list the California spotted owl (*Strix occidentalis occidentalis*) under the Endangered Species Act of 1973, as amended. After reviewing the best available scientific and commercial information available, we find that the petitioned action is not warranted. We continue to ask the public to submit to us any new information that becomes available concerning the status of or threats to this species. This information will help us monitor and encourage the conservation of this species.

DATES: The finding announced in this document was made on February 7, 2003. You may submit new information concerning these species for our consideration at any time.

ADDRESSES: You may send data, information, comments, or questions concerning this finding to Field Supervisor (Attn: CASPO), Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room W–2605, Sacramento, California 95825. You may inspect the petition, administrative finding, supporting information, and comments received, by appointment, during normal business hours, at the above address.

FOR FURTHER INFORMATION CONTACT: Susan Moore or Ken Sanchez at the above address (telephone at 916/414–6600; facsimile at 916/414–6710).

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the List of Threatened and Endangered Species that presented substantial scientific or commercial information that listing may be warranted, we make a finding within 12 months of receiving the petition on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted but precluded by other pending proposals. Such 12-month findings are to be published promptly in the **Federal Register**.

On April 3, 2000, we received a petition dated April 2000, from the Center for Biological Diversity, Tucson, Arizona, and Sierra Nevada Forest Protection Campaign, Sacramento, California, and other organizations to list as threatened or endangered the California spotted owl (*Strix occidentalis occidentalis*). The names, addresses, and signatures of representatives of these organizations followed in a letter dated April 17, 2000. These organizations filed the petition on behalf of themselves and 14 other organizations and requested that we designate critical habitat for the California spotted owl concurrent with listing. Further, they requested emergency listing and emergency designation of critical habitat. Although emergency listing and designation of critical habitat are not petitionable actions under the Act, we determined that an emergency situation did not exist.

On October 12, 2000, we published a 90-day finding on that petition in the **Federal Register** (65 FR 60605). In that publication we found that the petition presented substantial scientific or commercial information to indicate that listing the California spotted owl may be warranted, and we requested information and data regarding the species. On July 31, 2001, the Center for Biological Diversity and others filed a complaint in District Court, alleging the Service failed to make a timely 12-month finding in response to their listing petition. On March 5, 2002, the District Court entered an order requiring the completion of the 12-month finding by February 10, 2003.

The Petition

The petitioners believe that listing the California spotted owl is necessary because of factors related to loss and modification of habitats from timber harvest and urbanization, lack of existing State or Federal regulatory mechanisms that protect the species, and declines in the population.

The petitioners believe listing is necessary primarily because past timber harvest in the Sierra Nevada has resulted in the loss of key components of spotted owl habitat over large portions of the landscape. They also believe that current Federal land management agency strategies and private land forest practices are resulting in the loss or destruction of spotted owl habitat. They expressed special concern about past timber harvest practices that selectively removed the larger, older trees that comprise a key component of spotted owl breeding habitat.

The petitioners refer to the ''Interim Guidelines'' of the Federal land management strategy in place at the time the petition was submitted (April 2000) to conclude that current and planned timber sales would continue to remove key components of spotted owl habitat. The petitioners believe the cumulative effects of continued timber harvest and fuels reduction projects on Federal lands would have dramatic effects on the spotted owl.

The petitioners state, ''* * * there are almost no protections for spotted owls * * *'' on private lands. They assessed the State mechanism for permitting timber harvest and analyzed recent timber harvest plans to conclude, ''* * * owls are being heavily impacted by logging on private lands.'' Additional evidence of habitat destruction cited by the petitioners includes urbanization and development, particularly loss of habitat at lower elevations from new home construction.

The petitioners cite recent studies that report potential population declines as further evidence to support a positive listing decision. The petitioners review and interpret several studies of California spotted owl population dynamics to infer ''drastic'' annual declines in the population.

Other impacts addressed in the petition include livestock grazing, recreation, climate change, fire, competition from the barred owl, and disease and predation. These are impacts thought by the petitioners to be apparent, though not well studied or documented.

Taxonomy and Description

The spotted owl was first described as *Syrnium occidentale* by John Xantus in 1859 based on a specimen collected at Fort Tejon, Kern County, California (Xantus 1859). The species was later reassigned to the genus *Strix* (Ridgway 1914). The specific name was altered to conform to the Code of Zoological Nomenclature, yielding the scientific name *Strix occidentalis* (Service 1993). Currently, the American Ornithologist Union (AOU) recognizes three subspecies of spotted owls: the California spotted owl (*Strix occidentalis occidentalis*), the northern spotted owl (*Strix occidentalis caurina*), and the Mexican spotted owl (*Strix occidentalis lucida*) (AOU 1957).

The spotted owl is mottled in appearance. It has a brown back with white spots and brown barring. The facial disk is pale brown with concentric rings of dark brown, bordered by a ring of dark brown feathers. A conspicuous light-colored ''X'' is apparent between the eyes above its pale yellowish beak, where ''eyebrows'' and ''whiskers'' merge together. Unlike most other owl species, which have yellow eyes, spotted owls have dark brown eyes. Wings and tail are rounded, and all flight feathers are dark brown with light brown cross-bars. Sexes cannot be distinguished by plumage, but can be readily identified by size and vocalization (Verner *et al.* 1992b). Females are usually larger than males, with males weighing 470 to 685 grams (g) (17 to 24 ounces (oz)), and females 535 to 775 g (19 to 27 oz) (Gutiérrez *et al.* 1995). First- and second-year adults can be distinguished by the tips of the tail feathers, which are white and taper to a sharp point until replaced by adult plumage at about 26 months of age (Gutiérrez *et al.* 1995). The spotted owl is the fifth largest species of owl occurring in North America (Verner *et al.* 1992b); It is 41 to 48 centimeters (cm) (16 to 19 inches (in)) in length, with a wingspan of 107 to 114 cm (42 to 45 in) (Center for Biological Diversity 2000).

California spotted owls are lighter brown with slightly larger white spots than the northern spotted owl. Mexican spotted owls are lighter brown than both the California and northern subspecies, with some individuals having a rare palomino color. The facial disk and upper breast of the Mexican spotted owl contain more white than the other subspecies, and larger white spots add to the perception that they are lighter in color (Gutiérrez *et al.* 1995).

The northern spotted owl was listed as threatened under the Act in 1990 (Service 1990), and the Mexican spotted owl was listed as threatened in 1993 (Service 1993).

Population Genetics

Three genetic markers (*i.e.*, allozymes, mitochondrial DNA and random amplified polymorphic DNA) have been used to examine the genetic structure of spotted owls . Analysis of allozymes (alternate forms of proteins) supports separation of the Mexican spotted owl from the other two subspecies (Gutiérrez *et al.* 1995). Barrowclough *et al.* (1999) compared the sequences of a fragment of mitochondrial DNA (mtDNA) from 73 individual spotted owls, including samples from all three subspecies and from multiple populations within each subspecies. Their data support the separation of the species into the three currently recognized subspecies. Based on their data, the northern spotted owl appears to have diverged from the other two subspecies, and the California spotted owl later diverged from the Mexican spotted owl. In this study, gene flow appeared relatively high within subspecies and low between subspecies (Barrowclough *et al.* 1999). The authors concluded that gene flow between northern and California spotted owls is a recent and uncommon phenomenon.

Haig *et al.* (2001) used random amplified polymorphic DNA (RAPD) to analyze genetic variation between spotted owls at multiple geographic levels, including between subspecies. They found extremely low RAPD variation in spotted owls, with only 11 of 400 primers showing variation. Their data show genetic separation of Mexican spotted owls from California and northern spotted owls, but do not show separation between the California and northern subspecies. They suggest that the lack of separation between the California and northern subspecies in their data may be due to recent gene flow between subspecies, or due to the low variation of the data. We are also aware that additional research by Haig and colleagues bearing on the question of subspecific distinctions in spotted owls has not yet been published (A. Bowers, U.S. Fish and Wildlife Service, in litt. 2002).

Currently available, published genetic data (*i.e.*, mtDNA and RAPDs) apparently lead to different conclusions regarding subspecific distinctions in spotted owls. Therefore, for the purposes of this finding, we adopt the taxonomy accepted by the American Ornithological Union (AOU 1957), which recognizes the California spotted owl as a distinct subspecies (*Strix occidentalis occidentalis*).

Life History

Mating System and Reproduction. Spotted owls usually reach reproductive maturity at two years of age, although first year birds have sometimes nested the season after they were hatched. Considerable variation exists in both the percentage of pairs that nest and the number of pairs that successfully fledge young, both geographically and from year to year (Verner *et al.* 1992b).

Spotted owls are monogamous with no records of extra-pair copulations. They usually pair with the same mate from year to year, although ''divorces'' have been documented. The breeding season of California spotted owls extends from mid-February to mid-September or early October. Individuals begin breeding earlier in the San Bernardino Mountains than in the Sierra Nevada. Within a geographic area, individuals begin breeding earlier at lower elevations (Verner *et al.* 1992b).

California spotted owls are mostly nonmigratory, remaining within the same home ranges year round. However, in the Sierra Nevada, some individuals migrate downslope to winter habitats (Verner *et al.*1992b). Laymon (1988) observed the subspecies migrating from summer home ranges in mixed conifer forests to winter home ranges in lower elevation pine-oak woodlands. He believed that similar migrations may also occur in Southern California. Tibstra (1999) observed that 10 of 22 dispersing juvenile owls having natal sites in coniferous forest habitats above 1,120 meters (m) (3,675 feet (ft)) moved downslope to lower elevation (305 m (1,000 ft) to 732 m (2,402 ft)) pine-oak woodland habitats. Of those ten, data were available through the following spring for only two, both of which overwintered and then moved back to high-elevation sites. The elevational movements of those two owls were significantly correlated with environmental temperature. Tibstra speculated that the pattern of migration to winter range observed in some adults may be established in the first year by dispersing juveniles.

Owls that migrate downslope do so between early October and mid-December and return in late February to late March. Such migrations range from 15 to 65 kilometers (km) (9 to 40 miles (mi)) with altitudinal changes of 500 to 1,500 m (1,640 to 4,921 ft). Some individuals have also been observed to move between high- and low-elevation ranges one or more times within a single winter (Gutiérrez *et al.* 1995).

Individuals of migratory pairs of California spotted owls migrate to separate winter ranges rather than wintering together. After they return to their summer ranges, they follow the same breeding cycle as nonmigratory pairs, as described below. However, they probably do not spend as much time together at the beginning of the breeding season, because they may not return from their winter range by the time nonmigratory pairs have begun roosting together (Verner *et al.* 1992b, Gutiérrez *et al.* 1995). Individuals of nonmigratory pairs of California spotted owls remain together on the same home range year round, but they do not usually roost together during the winter. However, late in the winter, they increasingly roost together, preen each other, and occasionally copulate. For approximately two weeks before the first egg is laid, pairs roost together and copulate once or twice each evening. For about one week before the first egg is laid, the female spends most of her time near the nest, and the male brings her prey items (Verner *et al.* 1992b, Gutiérrez *et al.* 1995).

California spotted owl eggs are elliptical, white to pearl grey, and smooth to slightly granular in texture. California spotted owl egg laying peaks in mid-April. When egg laying begins, the female spends almost all her time in the nest, and the male supplies almost all of her food. The number of eggs in clutches ranges from one to four, with most nests containing two. Successive eggs are laid approximately three days apart. Pairs continue to copulate throughout, and for up to four days, after the egg laying period (Verner *et al.* 1992b, Gutiérrez *et al.* 1995).

Only the female incubates the eggs. During the first two days of incubation, she may leave the nest for up to two hours, but thereafter she will only leave the nest for 10 to 20 minutes at a time to regurgitate pellets, defecate, preen, or accept food from her mate (Verner *et al.* 1992b).

Eggs hatch after approximately 30 days. Hatchlings are covered with white natal down, with juvenile plumage starting to replace natal down at about 10 to 20 days (Gutiérrez *et al.* 1995). The female broods the hatchlings almost continuously for eight to ten days. During this period, the male supplies food for the female and young. Two to three weeks after the eggs hatch, the female begins foraging for one to four hours per night. Males have not been observed to feed the chicks directly, but continue to bring food to the nest, which the female passes to the chicks (Verner *et al.* 1992b).

Most chicks fledge 34 to 36 days after hatching. New fledglings are weak fliers and may spend hours or days on the ground. Approximately three days after fledging, most young are able to fly or climb to elevated perches. Within a week, most are able to fly between trees. Both parents continue to feed the fledglings until mid to late September (Verner *et al.* 1992, Gutiérrez *et al.* 1995).

Dispersal. Spotted owls primarily disperse as juveniles (natal dispersal), but may also disperse as adults (breeding dispersal) if habitat within their home range has been degraded or if they have separated from a mate (Verner *et al.* 1992b). Natal dispersal occurs in September and October.

Natal dispersal distances of California spotted owls have been estimated using radio telemetry (Verner *et al.* 1992, Tibstra 1999) and recapturing territorial owls that were banded as juveniles (LaHaye *et al.* 2001, Jennifer Blakesley, Colorado State University, *in litt.* 2002a). Dispersal distances of successfully dispersing owls ranged from 3 km (2 mi) to 76 km (47 mi). Mean natal dispersal distance of 26 owls in the Sierra National Forest and Sequoia National Park estimated using radio telemetry was 15.9 km (9.9 mi) (Tibstra 1999) and median distance of 42 owls on the Lassen National Forest estimated using recapture data was 25 km (16 mi) for females and 23 km (14 mi) for males (Blakesley *in litt.* 2002a). Mean natal dispersal distances of 129 owls in southern California estimated using recapture data were 10.1 km (6.3 mi) for males and 11.7 km (7.3 mi) for females. No significant difference existed in dispersal distance or time to become territorial between sexes (LaHaye *et al.* 2001). In this study, some dispersing owls did not occupy territories until they were four years old, but over 60 percent occupied territories within one year of fledging. Apparent survival of fledglings (calculated as the percentage of banded fledglings that were later relocated) was 31.8 percent.

LaHaye *et al.* (2001) concluded that the presence of conspecifics (members of the same species) may play a vital role in the recruitment of dispersing California spotted owls into a territory, because owls that ''settled'' (established territories) were significantly more likely to do so in territories that were occupied the previous year than would be expected by chance and all previously vacant territories that were settled were adjacent to occupied territories. The percentage of territories occupied varied from 59 to 95 percent from year to year. During the study, young fledged from 28 percent of the 39 territories that were ''frequently vacant,'' indicating that habitat at those sites was suitable to support California spotted owl reproduction.

Four color banded adults on the Sierra National Forest later shifted territories, moving 3.4 km (2.1 mi), 3.5 km (2.2 mi), 3.9 km (2.4 mi), and 7.1 km (4.4 mi) (Verner *et al.* 1992b). In a study of breeding dispersal of California spotted owls in the San Bernardino Mountains (LaHaye and Gutiérrez *in litt.* 2002), 46 females and 38 males dispersed, which were 22 percent and 17 percent of the total banded females and males, respectively. Among dispersing females, 70 percent were adults and 30 percent subadults; among males, 71 percent were adults and 29 percent were subadults. A significantly higher percentage of subadults dispersed (30 percent) compared to the territorial population as a whole (14 percent). Mean dispersal distances were 4.3 km (2.7 mi) for females and 3.0 km (1.9 mi) for males, which are significantly shorter than natal dispersal distances observed in the same population.

Interactions with Other Species and Natural Mortality. Spotted owls are mobbed by many species of diurnal birds (Gutiérrez *et al.* 1995). Red-tailed hawks (*Buteo jamaicensis*) and common ravens (*Corvus corax*) may take away prey items that are captured by spotted owls. The spotted owl's closest competitors are great horned owls (*Bubo virginianus*) and barred owls (*Strix varia*). Barred owls have recently colonized portions of the range of California spotted owls and are known to displace spotted owls from their territories (Verner *et al.* 1992b, Gutiérrez *et al.* 1995). Circumstantial evidence suggests that barred owls may kill spotted owls (Leskiw and Gutiérrez 1998). Northern goshawks (*Accipiter gentilis*), great horned owls, red-tailed hawks and potentially other birds of prey eat spotted owls (Verner *et al.* 1992, Gutiérrez *et al.* 1995). Fishers (*Martes pennanti*) have been observed in spotted owl nest trees and may take eggs or chicks (Gutiérrez *et al.* 1995).

Starvation (Verner *et al.* 1992b, Gutiérrez *et al.* 1995, Tibstra 1999) has been documented as a cause of death in California spotted owls. Starvation is more common in juveniles than adults and may result from low prey availability or lack of hunting experience (Verner *et al.* 1992b). Dispersing juveniles sometimes roost in open habitats during inclement weather, which may result in exposure causing or contributing to their deaths (Gutiérrez *et al.* 1995). Accidents leading to death have been documented for spotted owls, including flying into obstacles and drowning (Verner *et al.* 1992b).

Feeding and Metabolism. Spotted owls are ''perch and pounce'' predators, hunting primarily by selecting an elevated perch, detecting prey by sight or sound, and swooping from the perch to capture the prey with their talons. Spotted owls are not fast fliers, but they are very agile and maneuverable. The flight pattern is a series of quick wing beats interspersed with gliding flight. Spotted owls use gliding flight when approaching prey. When gaining altitude in the forest canopy, they make a series of short climbing flights rather than one continuous flight. Flight is labored when attempting to fly to a higher perch or a nest sight. Flight above the forest canopy is probably rare, except during dispersal (Gutiérrez *et al.* 1995). If a potential prey item is inaccessible or at a considerable distance from an owl's perch, the owl may move closer before pouncing (Verner *et al.* 1992b). Spotted owls will forage at several sites within a single night (Gutiérrez *et al.* 1995). They also hunt by capturing in mid-air flying prey such as insects, bats, and birds (Verner *et al.* 1992b, Gutiérrez *et al.* 1995). California spotted owls forage primarily at night, but have been observed hunting during the day, especially while raising young (Laymon 1991, Verner *et al.* 1992). They may cache prey items on limbs, stumps, or the ground for later consumption (Gutiérrez *et al.* 1995). Prey items include mammals, birds, and insects.

Spotted owls have a high water need relative to their metabolic rate (Weathers *et al.* 2001), and have been observed drinking surface water from seeps and creeks (Gutiérrez *et al.*1995). California spotted owls have a narrow thermal neutral zone (the ambient temperature range through which a bird or mammal can maintain its normal body temperature without expending energy to do so) relative to birds in general and are therefore especially subject to heat stress (Gutiérrez *et al.* 1995, Weathers *et al.* 2001). They roost higher in the forest canopy during winter and lower during the summer. They will also move during a day in response to changes in ambient temperature and sun exposure. The variety of microclimates available in mature and old growth forests has been postulated as an explanation for the spotted owl's use of such habitats (Gutiérrez *et al.* 1995).

Distribution, Range, and Land Ownership

Grinnell and Miller (1944) described the range of the California spotted owl as ''[I]n general, coastal slope of southern California from southern San Diego County northwest to Santa Barbara, Ventura, and western Kern Counties, and west flank of Sierra Nevada north from Tulare County to Tehama County'' and noted that the southern California range was apparently separated from the Sierra portion of the range.

The mapped range of the California subspecies in Grinnell and Miller (1944) indicated a gap in the distribution of spotted owls in Shasta County, separating the California and northern spotted owl subspecies. However, based on newer records and the occurrence of apparently-suitable habitat in the area, more recent authors have concluded that this purported gap between the California and northern subspecies may not have actually existed (Detrich *et al.* 1993). For regulatory purposes, we established the ''Pit River area'' as the boundary between the northern spotted owl and the California spotted owl (55 FR 26114). No historic data are available regarding pre-European settlement population numbers of the California spotted owl.

The northern spotted owl ranges from southwestern British Columbia, Canada through western Washington, western Oregon, and northern California south along the coast to San Francisco Bay (Service 1990). The range of the Mexican spotted owl is disjunct from the other subspecies, from southern Utah and Colorado south through Arizona and New Mexico, and is discontinuous through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau (Service 1993).

Today the California spotted owl still occurs throughout its historic range, including the west side of the Sierra Nevada from Shasta County south to the Tehachapi Pass, and all major mountains of southern California, including the San Bernardino, San Gabriel, Tehachapi, north and south Santa Lucia, Santa Ana, Liebre/Sawmill, San Diego, San Jacinto, and Los Padres ranges (Beck and Gould 1992). In addition, a few sites have been found on the eastern side of the Sierra Nevada and in the central Coast Ranges at least as far north as Monterey County.

Regarding the current distribution of the California spotted owl, Verner *et al.* (1992a) stated ''in spite of the fact that logging has occurred over nearly all of the conifer forests of the Sierra Nevada in the past 100 years, and especially the past 50 years, spotted owls continue to be widely distributed throughout most of the conifer zone. Indeed, spotted owls may be more abundant in some areas of the Sierra Nevada today than they were 100 years ago, '' (due to presumed effects of 19th century sheep grazing on spotted owl prey species.) They also stated that ''Spotted owl distribution in the Sierra Nevada is characterized by its continuity and relatively uniform density.''

The elevation of known nest sites of California spotted owls ranges from about 305 to 2,348 m (1,000 to 7,700 ft), with approximately 86 percent of sites occurring between 915 and 2,135 m (3,000 and 7,000 ft) (USFS 2001a). In conifer forests mean elevation of nest sites was 1,160 m (5,300 ft) in the northern Sierra Nevada and 1,830 m (6,000 ft) in southern California (Gutiérrez *et al.*1992).

The California Department of Fish and Game (CDFG) has maintained a database of the number and location of California spotted owl territories located from the early 1970s to the present. We have combined that database with similar data collected by Sierra Pacific Industries, the major private timberland owner in the Sierra Nevada. The following discussion of locations and land ownership is based on that combined database and includes all records available to us. It is important to note that not all territories are occupied during any given year. The data presented are useful to illustrate the range of the species and jurisdictions under which it occurs, but should not be viewed as a population estimate because the current status of many territories is unknown due to lack of recent surveys; not all territories are occupied in a given year; and, in addition to territorial owls that comprise most of the sites in the database, nonterritorial, ''floater'' owls may be present but uncounted.

California spotted owl territories have been located on Forest Service (USFS), National Park Service (NPS), Bureau of Land Management (BLM), California Department of Parks and Recreation (State parks), California Department of Forestry and Fire Protection (CDF), California State Lands Commission (CSLC), Native American and private lands, and in Mexico.

Sierra Nevada. In the Sierra Nevada the California spotted owl is mostly continuously and uniformly distributed, with several breaks in distribution where habitat appears limited due to natural or human-caused factors (Beck and Gould 1992). These Areas of Concern are further discussed in a later section.

In Sierra Nevada national forests, 99 percent of owl sites occur on the Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, and Sequoia National Forests. The number of territories per national forest are as follows: Modoc 3, Lassen 138, Toiyabe 2, Inyo 5, Tahoe 173, Lake Tahoe Basin Management Unit 14, Plumas 254, El Dorado 202, Stanislaus 234, Sierra 226, and Sequoia 148. This results in a sub-total for Forest Service Sierran lands of 1,399 sites. The number of territories per national park are as follows: Lassen 6, Kings Canyon 19, Sequoia 50, and Yosemite 54. Fourteen territories are on BLM land in the Sierra Nevada. Three territories are on State parks, 1 is on CDF land, and 4 are on CSLC land. One territory is on Native American land and 314 are on private lands. Thus, the total number of California spotted owl sites known in the Sierra Nevada is 1,865 (Service 2002)

Because the subspecies has large home ranges, a given home range may occur across different ownerships. For instance, the Forest Service reported that over 15 percent of 135 Forest Service sites analyzed had greater than 15 percent of their theoretical home range on private lands (USFS 2001).

Coast Ranges and Southern California. In southern California, the owl occupies ''islands'' of high elevation forests isolated by lowlands covered by chaparral, desert scrub, and increasingly (Noon and McKelvey 1992), human development (LaHaye *et al.*1994). California spotted owls have been found on 440 territories or sites in southern California in 15 populations comprised of 3 to 270 individuals, and separated from each other by 10 to 72 km (6 to 45 mi) (Verner *et al.* 1992a, Gutiérrez 1994). Seventy-five percent of known territories are on Federal lands and twenty-five percent are on nonFederal lands. The Angeles National Forest has 64 territories, Cleveland National Forest has 18 territories, Los Padres National Forest has 109 territories, and San Bernardino National Forest has 138 territories; two territories are on BLM land; eight territories are on State parks; six are on Native American lands, 95 are on private lands, and one is in Mexico.

Within the California coastal and inland mountain ranges where California spotted owls occur (San Bernardo, San Gabriel, San Jacinto, Castaic, Santa Ana, and Santa Lucia mountains and San Diego/Peninsular, and Los Padres Ranges) an area of just over 2,428,068 hectares (ha) (6,000,000 acres (ac)) was assessed for all habitats by the Forest Service (Stephenson and Calcarone 1999). Landownership in the assessment area is National Forest (57 percent), private (33 percent), BLM (4 percent), Indian (3 percent), State (2 percent), military (1 percent) and local (1 percent). Not all of the analysis area is suitable spotted owl habitat (mixed conifer hardwood), thus the portion of the total owl population or sites known on Federal lands as determined in Verner *et al.*1992a and Gutiérrez 1994, is higher (75 percent) than their relative ownership in the assessment area (62 percent).

The range of California spotted owls in southern California is disjunct from that in the Sierra Nevada range as a result of natural topographic and manmade factors (Stephenson and Calcarone 1999). Within this southern range, habitat and spotted owls are distributed discontinuously across the landscape reflecting natural vegetation breaks, topographic conditions, and human induced habitat disturbance and fragmentation (Noon and McKelvey 1992). The spotted owls in the southern portion of the range may function as a meta population, with separate subpopulations connected by infrequent but persistent interchange of individual owls (Noon and McKelvey 1992; LaHaye *et al.* 1994).

Habitat

The habitat used by California spotted owls today is comprised of forests that have been shaped by numerous interacting human impacts, including timber harvest, livestock grazing, urbanization, and, because of fire suppression, changes in the character of wildfires. Prior to the occupation of California by Anglo-Americans in the mid-1900s, habitat was probably fairly stable on a large geographic scale, although there were almost certainly localized variations caused by fire and other causes of forest mortality. In recent decades, timber harvest and ingrowth related to fire suppression have created widespread forest conditions believed to be considerably different than that of pre-historic times (McKelvey and Weatherspoon 1992, McKelvey and Johnston 1992). In the following section, the current understanding of use of today's forests by California spotted owls will be portrayed, along with some discussion of the factors that created these conditions. The anticipated trends in habitat will be discussed in the Threats section below.

The suppression of wildfire during the 20th century has been one of the most important factors in creating the forest conditions that provide habitat for the California spotted owl today. For thousands of years preceding European settlement of California, low to moderate intensity fires burned frequently in most Sierra Nevada vegetation types (University of California 1996). Median fire return intervals were typically less than 20 years, and as low as four years, in ponderosa pine (*Pinus ponderosa*) and mixed conifer zones. In the mixed conifer zone, where approximately 80 percent of Sierra Nevada California spotted owl sites occur (see Habitat Requirements, above), many plant species take advantage of, or depend on, fire for their reproduction or as a means of competing with other species. The effects of frequent surface fires largely explain the reports and photographs by early observers who described Sierra Nevada forests as typically open and park-like. However, other early observers reported dense conditions and dark or impenetrable forest. These records suggest that although open conditions were more prominent than they are today, Sierra Nevada forests were a mix of different degrees of openness, with an unknown proportion in dark, dense, nearly impenetrable vegetative cover and with variations in density with latitude, aspect, and elevation (University of California 1996, Gruell 2001).

Suppression of wildland fires had been established in California as State and Federal policy by the early 20th century. The area burned annually in recent times has been estimated to be only about three percent of that burned pre-European settlement in mixed conifer forest types (University of California 1996). As will be discussed further below, fire suppression has resulted in substantial growth of small understory trees in much of the range of the California spotted owl.

Timber harvest has been another obvious impact to California spotted owl habitat (Gutiérrez 1994, Verner *et al.* 1992a). McKelvey and Johnston (1992) used historical documents to describe the status of Sierran forests at the beginning of the 20th century, and detailed the harvest history from the late 19th century to 1990. Harvest steadily intensified from the railroad building and mining eras of the 1800s until the 1950s, then remained at relatively high levels through the 1980s. (Intermittent declines occurred during poor economic conditions of the 1930s and early 1980s.) Low elevations and accessible areas (McKelvey and Johnston 1992, Beardsley *et al.* 1999) and commercially important forest types such as west-side mixed conifer and east-side pine (Franklin and Fites-Kaufmann 1996) have been the most heavily impacted. As a result, McKelvey and Johnston stated that ''The mixed conifer zone of the Sierra Nevada * * * has few or no stands remaining that can be described as natural or pristine.''

Verner *et al.* (1992a) discussed five major factors of concern for California spotted owl habitat that have resulted from historical timber harvest strategies: (1) Decline in the abundance of very large, old trees; (2) decline in snag density; (3) decline in large-diameter logs; (4) disturbance or removal of duff and topsoil layers; and (5) change in the composition of tree species. Of these concerns, they believed significant changes in diameter distributions of trees in the Sierra Nevada and rapid reductions in the distribution and abundance of large, old, and decadent trees posed the greatest threat to the California spotted owl. Thus, extensive commercial harvest of large old trees in late successional forest directly affected the key structural components of California spotted owl habitat.

Timber harvest in the Sierra Nevada peaked in the 1950s and remained at high levels into the late 1980s (McKelvey and Johnston 1992). Since the late 1980s, the volume of timber harvested in the Sierra Nevada has declined substantially. In particular, levels of timber harvest on national forest lands declined after implementation of the California Spotted Owl Sierran Province Interim Guidelines in 1993 (USFS 2001a). From Fiscal Year (FY)1998 through FY 2002, the mean annual total harvest volume (279.4 million board ft (mmbf)) on the seven National Forests that support most of the Sierra owl population was about 28 percent of the mean annual total volume harvested on those forests during the period FY 1986 through FY 1990 (1,007 mmbf) (USFS 2002a). Whereas old-growth accounted for most of the volume in the past, more recent harvest practices have focused on thinning of young, smaller trees (McKelvey and Johnston 1992).

The decline in Federal harvest led an overall decline in the total Federal and private harvest in the Sierra Nevada. According to California timber tax data (California Board of Equalization 2002), total harvest from public lands in 18 Sierra Nevada counties during the late 1980s and early 1990s constituted about half of the total annual volume harvested in those counties, but following the 1993 implementation of protections for the California spotted owl on Forest Service lands, the public lands harvest did not exceed 25 percent of the total annual volume harvested from those counties in any year from 1994 through 2000. In the meantime, private harvest during the 15-year period from 1986 to 2000 remained between 650 and 775 mmbf per year, except for a 2-year spike of over 900 mmbf per year in 1990 and 1991. Mean annual volume from private lands in the 18 Sierra Nevada Counties in the period for the period 1986 to 1990 was about 811 mmbf, and mean annual volume from 1996 to 2000 was about 714 mmbf, a difference of 12 percent. Thus, in the Sierra Nevada, private lands harvest has declined somewhat while Federal harvest has declined sharply since the late 1980s.

Similar trends in timber harvest have occurred in the four southern California national forests, although timber harvest in this area was never as extensive as in the Sierra Nevada. According to McKelvey and Johnston (1992), harvest volume in Los Angeles and San Bernardino counties was about ten to twenty times higher in the 1960s than in the early 1980s, and the decline has continued since the 1980s. Southern California national forests have not had a commercial green timber sale program for over a decade. Harvest in recent years has primarily been salvage and hazard trees along roads and near administrative sites (M. Gertsch, USFS, pers. comm. 2002). Mean annual total harvest volume for the four forests in FY 1998 to 2002 (1.66 mmbf) was about 30 percent of the mean annual total harvested on the four forests during FY 1988 to1992 (5.48 mmbf) (USFS 2002a).

Thus, timber harvest, the primary cause of habitat loss for the California spotted owls for decades, has been much reduced in recent years. Spotted owls today are occupying habitat that is a combination of the remnants of older stands and stands regenerating from timber harvest in past decades. The present habitat used by California spotted owls is further described below.

California spotted owls use a broader range of habitat types than the northern spotted owl (Call *et al.* 1992, Gutiérrez *et al.* 1992, Anderson and Mahato 1995, Moen and Gutiérrez 1997, North *et al.* 2000), in part due to the relatively more complex landscapes available to the California subspecies (Zabel *et al.* 1992b, Franklin and Fites-Kaufmann 1996, Helms and Tappeiner 1996, Beardsley *et al.* 1999). In the Sierra Nevada, this complexity reflects: (1) The variety of environmental conditions due to elevation, latitude, geology, precipitation, and temperature; (2) rich flora; and (3) influence of natural disturbance, especially fire (Andersen and Mahato 1995) and human disturbance (Franklin and Fites-Kaufmann 1996). The forests of the

Sierra Nevada have a complex logging history dominated by selection methods (McKelvey and Johnston 1992, Beardsley *et al.*1999) varying by number of entries, types of species harvested, size distribution of harvested trees, and total volume logged (Zabel *et al.*1992b). The heterogeneity of forests occupied by California spotted owls make quantifying its habitat difficult and sensitive to scale. Several studies have found that analysis of habitat at a coarse, small scale (*e.g.*, using timber type polygons developed for timber management) masks fine grained attributes used or selected by owls (Bias and Gutiérrez 1992, Zabel *et al.*1992a, Moen and Gutiérrez 1997).

Despite the complexity of California spotted owl habitat, several authors have concluded the subspecies is a habitat specialist (Andersen and Mahato 1995, Moen and Gutiérrez 1997, LaHaye *et al.*1997), selecting habitat at several scales. California spotted owls, like the other subspecies of spotted owls, use or select habitats for nesting, roosting, or foraging that have structural components of old forests, including large (typically greater than 61 cm (24 in) diameter at breast height (dbh; breast height has been standardized at 137 cm (4.5 ft) above the ground) (Call 1990, Gutiérrez *et al.*1992, Zabel *et al.*1992a, Moen and Gutiérrez 1997, USFS 2001a), decadent trees (trees with cavities, broken tops, etc.); high density of trees (Laymon 1988, Call 1990, Bias and Gutiérrez 1992, Gutiérrez *et al.*1992, LaHaye *et al.*1997, Moen and Gutirrez 1997); multi-layered canopy/complex structure (Call 1990, Gutiérrez *et al.*1992, LaHaye *et al.*1997, Moen and Gutiérrez 1997); high canopy cover (greater than 40 percent and mostly greater than 70 percent; Laymon 1988, Bias and Gutiérrez 1992, LaHaye *et al.*1992, Gutiérrez *et al.*1992, Zabel *et al.*1992a, Moen and Gutiérrez 1997, North *et al.*2000); snags (Laymon 1988, Call 1990, Bias and Gutiérrez 1992, Gutiérrez *et al.*1992, LaHaye *et al.*1997); and logs (Call 1990). Gutiérrez *et al.* (1992) noted that these characteristics applied to mixed conifer forests, because riparian/hardwood forests occupied by California spotted owls did not necessarily have these characteristics.

Late successional forests provide habitat attributes selected by California spotted owls, including large trees, high canopy closure, multi-layered canopies, snags, and logs (University of California 1996). The current extent of old forests in the Sierra Nevada is believed to be substantially less than in pre-historic times. Estimates of the current extent have been made by several authors. The University of California (1996) reported that in national parks in the Sierra Nevada, which contain the best representation of pre-European settlement conditions because only minor areas have been subject to timber harvest, 55 percent of forests are in late successional conditions, but on all Federal lands in the Sierra Nevada, late successional conditions are now found on only 19 percent of forest lands. The Forest Service (USFS 2001a) reported that old forest conditions have declined from 50 to 90 percent in various vegetation types compared to the range of historical conditions. Beardsley *et al.* (1999) estimated that approximately 15 percent of coniferous forests in the Sierra Nevada remain in high quality old growth/late successional stages; most of these stands are in high elevations and national parks (Franklin and Fites-Kaufmann 1996). Most of the remaining high quality late successional/old growth habitat in the Sierra Nevada is in public ownership; less than two percent of 1,214,000 ha (3 million ac) of private land was classified as high quality late successional/old growth habitat (Franklin and Fites-Kaufmann 1996).

California spotted owls in the Sierra Nevada may have undergone at least three periods of decline: (1) Elimination of prey species by intensive livestock grazing and burning in the 1800s; (2) logging beginning in the late 1800s, which removed basic structural elements of owl habitat; and (3) recent California spotted owls in the Sierra Nevada may have undergone at least three periods of decline: (1) Elimination of prey species by intensive livestock grazing and burning in the 1800s; (2) logging beginning in the late 1800s, which removed basic structural elements of owl habitat; and (3) recent logging of stands that regenerated following initial entry (Gutiérrez 1994).

In the early 1990s, researchers expressed concern regarding potential lag effects in population decline, in which the negative effects of habitat modification might not be observed until subsequent years (Noon *et al.* 1992, Gutiérrez 1994, LaHaye *et al.* 1994). However, it seems reasonable to presume that the causal mechanisms of negative effects ascribed to the high levels of timber harvest circa 1990 were substantially reduced as timber harvest levels dropped and increased protection measures were instituted in the mid- and late-1990s. In the opinion of the Forest Service (USFS 2001a), it is unlikely that recent timber harvest on national forests has caused declines in spotted owl populations, although the possibility exists that declines are due in part to latent effects of past timber harvest. However, because the regeneration of habitat may take several decades, modification of habitat components that resulted from past timber harvest is probably still affecting the subspecies to various degrees.

Although late-successional forests with large old trees are believed to provide the best habitat for California spotted owls, descriptions of suitable habitat derived from habitat use studies often also include smaller size classes, and thus, include a greater proportion of the landscape than that included in the above estimates of older forest extent. In the early 1990s, Verner *et al.* (1992a) estimated the amount of suitable California spotted owl habitat on public land. They defined suitable habitat as having canopy cover exceeding 40 percent and dominant trees 30 to 36 cm (12 to 14 in) dbh or larger, or areas with the potential to reach those values relatively rapidly. Their estimates of California spotted owl habitat in the Sierra Nevada by jurisdiction were as follows: 1,416,400 ha (3,500,000 ac) on national forests;186,560 ha (461,000 ac) on national parks; 27,721 ha (68,500 ac) on BLM lands; and 10,522 ha (26,000 ac) on State lands. Their estimates for the Coast ranges and southern California were: 218,530 ha (540,000 ac) on national forests; 3,076 ha (7,600 ac) on BLM; and 10,117 ha (25,000 ac) held by State and local governments. Thus, the total estimated habitat was 1,872,926 ha (4,628,100 ac). An undetermined amount of suitable habitat also existed on private and Native American lands (Verner *et al.* 1992a).

Habitat in the Sierra Nevada. The Final Environmental Impact Statement (FEIS) for the Sierra Nevada Framework Amendment (SNFPA) (USFS 2001a) estimated the amount of suitable habitat for California spotted owls on national forest lands in the Sierra Nevada to be 1.7 million ha (4.3 million ac). This estimate was about 14 percent higher than that of Verner *et al.* (1992a). The new estimate was based on more refined analysis, rather than an actual increase in habitat. This constitutes about 59 percent of the forested lands on the Sierra Nevada national forests.

Amounts of habitat on private lands have not been quantified. Generally, industrial landowners regard information relevant to timber inventories as proprietary. Based on Forest Service data, there were about 485,600 ha (1.2 million ac) of industrial timberland in the Sierra Nevada as of 1994 (derived from Waddell and Bassett 1997a, Waddell and Bassett 1997b, Waddell and Bassett 1997c). National forests in the Sierra Nevada include approximately 560,000 ha (1.4 million ac) of private land within their administrative boundaries. Private land inholdings are much greater in extent in the northern national forests (especially the Lassen, Plumas, and Tahoe) than in the southern Sierra Nevada forests. Much of the private land within the boundary of the Lassen and Plumas National Forests is in contiguous blocks, leaving national forest lands also fairly contiguous. Most private land on the Tahoe National Forest is in checkerboard ownership, and the Eldorado National Forest has a combination of checkerboard ownership and large contiguous blocks of inholdings. We acknowledge that considerable amounts of suitable habitat exist on private lands, especially in the smaller size classes. This is reflected in the occurrence of over 300 spotted owl activity centers (about 17 percent of the Sierra Nevada total) on private lands.

The mixed-conifer forest type (sugar pine (*Pinus lambertiana*), ponderosa pine, white fir (*Abies concolor*), Douglas-fir (*Pinus lambertiana*), giant sequoia (*Sequoiadendron giganteum*), incense-cedar (*Calocedrus decurrens*), black oak (*Q. kelloggii*), and red fir (*Abies magnifica*) is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, 10 percent in red fir forest (red and white fir, lodgepole pine (*Pinus contorta*), and quaking aspen (*Populus tremuloides*), seven percent in ponderosa pine/hardwood forest type (ponderosa pine, interior live oak (*Quercus wislizenii*), canyon live oak (*Quercus chrysolepis*), black oak, incense-cedar, white fir, tanoak (*Lithocaarpus densiflorus*), and Pacific madrone (*Arbutus menziesii*)), and the remaining three percent in foothill riparian/hardwood forest (cottonwood (*Populus* ssp.), California sycamore (*Platanus racemosa*), interior live oak, Oregon ash (*Fraxinus latifolia*), and California buckeye (*Aesculus californica*) and east-side pine (ponderosa and Jeffrey pine (*P. jeffreyi*)) (Verner *et al.* 1992a, USFS) 2001).

Six major studies (Gutíerrez *et al.* 1992) have described habitat relations of the owl in four areas spanning the length of the Sierra Nevada. These studies examined spotted owl habitat use at three scales: landscape; home range; and nest, roost, or foraging stand. Based on comparisons of time spent by owls in various habitat types to amounts of habitat available, owls preferentially use areas with at least 70 percent canopy cover, use habitats with 40 to 69 percent canopy cover in proportion to their availability, and spend less time in areas with less than 40 percent canopy cover than might be expected if habitat were selected randomly.

California spotted owls in the Sierra Nevada prefer stands with significantly greater canopy cover, total live tree basal area, basal area of hardwoods and conifers, and snag basal area for nesting and roosting. Owls use stands dominated by trees with dbhs between 30 and 61 cm (12 and 24 in) and canopy covers between 40 and 100 percent for nesting significantly more than expected, based on the proportion of those forest types (Gutíerrez *et al.* 1992). Stands suitable for nesting and roosting have: (1) Two or more canopy layers; (2) dominant and codominant trees in the canopy averaging at least 61 cm (24 in) in dbh; (3) at least 70 percent total canopy cover (including the hardwood component); (4) higher than average levels of very large, old trees; and (5) higher than average levels of snags and downed woody material (Gutíerrez *et al.* 1992, USFS 2001a).

Analysis of vegetation characteristics of plots surrounding 292 California spotted owl nest and roost sites on the Lassen, Eldorado, and Sierra National Forests, and in Sequoia and Kings Canyon National Parks provides further information on habitat types favored by the species (USFS 2001a). Thirty-two percent of the plots were in stands with multilayered canopies exceeding 60 percent closure and with average trees exceeding 61 cm (24 in) in dbh. Eighteen percent were in stands with 40 to 59 percent canopy closure and with average trees exceeding 61 cm (24 in) in dbh. Fourteen percent were in stands with over 60 percent canopy cover and with average trees between 28 and 61 cm (11 to 24 in) in dbh. Eleven percent were in stands with 40 to 59 percent canopy closure and average trees between 28 and 61 cm (11 to 24 in) in dbh. Nine percent were in stands with over 60 percent canopy closure and average trees exceeding 61 cm (24 in) in dbh. Seven percent were in stands with 25 to 39 percent canopy cover and average trees exceeding 61 cm (24 in) in dbh. Five percent were in stands with 25 to 39 percent canopy cover and average trees between 28 and 61 cm (11 to 24 in) in dbh. North *et al.* (2000) suggested that canopy cover, tree density, and foliage volume represent conditions consistent across different forest types and therefore could indicate the basic nest site conditions selected by California spotted owls. California spotted owl nests were consistently located in sites with 75 percent canopy cover, 300 trees/ha (122 trees/ac), and 40,000 cubic m/ha (571,860 cubic ft/ac) of foliage volume.

Moen and Gutiérrez (1997) analyzed California spotted owl habitat at the landscape, habitat patch, and microsite levels on a 355 square kilometer (137 square mile) study area on the El Dorado National Forest. They used remote sensing to analyze vegetation in 457 ha (1,129 ac) circular plots surrounding spotted owl activity centers, and compared those plots with randomly selected plots of equal size. Owl plots were significantly more homogeneous than random sites, indicating that owls select against patchy or fragmented habitats; owl sites contained significantly more area with canopy closure exceeding 70 percent than random plots; and California spotted owl roosts were significantly more likely to be located in mixed conifer habitat containing trees greater than 30 cm (12 in) dbh than would be expected by chance. In addition, of 82 roost sites examined, 56 (68 percent) were in habitat with greater than 40 percent canopy closure and trees greater than 30 cm (12 in) dbh, and 97 percent of roost sites had trees over 100 cm (39 in) dbh. Microsite comparison between sixteen 0.04 ha (0.10 ac) vegetation plots surrounding nest sites and random plots of equal area showed that nest plots had significantly higher structural diversity, more total trees, larger trees, and more trees over 100 cm (39 in) dbh.

Bias and Gutiérrez (1992) attributed low use of private timberlands by roosting and nesting California spotted owls to sanitation (removal of damaged or diseased trees or species of low commercial value) and high-grade logging (harvest of large trees of high commercial value) that removed potential nest trees. However, as stated above, California spotted owls do occur on private timberlands. Habitat use by California spotted owls has been studied on a private timber production area in the Sierra Nevada, 48 kilometers (km) (30 mi) east of Chico, California (Larry L. Irwin *et al.*, National Council for Air and Stream Improvement, Incorporated, *in litt.* 2002). Seven pairs of California spotted owls were repeatedly located using radiotelemetry. Habitat use was similar to that observed in other studies on Federal lands. Owls were located in areas with canopy closure averaging 70 percent, dominated by trees 30 to 36 cm (12 to 14 in) in dbh but with a few larger (over 66 cm (26 in) dbh) trees, and with tree densities ranging from 930 to 1,360 trees/ha (372 to 544 trees/ac). To our knowledge, there are no studies providing information on demographic performance of owl populations on private lands in the range of the California spotted owl.

Habitat in the Coast Range and Southern California. In the coast range, California spotted owls occupy redwood/California-laurel forests which consists of a mix of coast redwood (*Sequoia sempervirens*), California-laurel (*Umbellularia californica*), tanoak, Pacific madrone, red alder (*Alnus rubra*), and white alder (*Alnus rhombifolia*), coast live oak, Santa Lucia fir (*Abies bracteata*), and bigleaf maple (*Acer macrophyllum*) (Verner *et al.* 1992a). Spotted owls can be found at elevations below 305 m (1,000 ft) along the Monterey coast to approximately 8,500 ft (2,591 m) in the inland mountains (Stephenson and Calcarone 1999). Lower elevation (less than 3,000 ft (914 m)) birds can be found in pure oak stands and higher elevation (greater than 6,500 ft (1,981 m)) birds can be found in pure conifer stands.

Verner *et al.* (1992a) noted that California spotted owls also use riparian hardwood forest types (coast and canyon live oak, cottonwood, California sycamore, white alder, and California laurel) in southern California. Owls on Mount San Jacinto used conifer and riparian hardwood forests significantly more than would be expected based on their availability and owls on Palomar Mountain primarily used conifer or mixed forests of conifers and hardwoods. California spotted owl nest sites in the San Bernardino Mountains were more likely to be located in areas with steeper slopes and in the lower third of canyons and owl nest and roost sites in this area were more likely to be located in areas with higher canopy closure and higher basal area (the area of all trees at breast height) than random sites.

Spatial positions and vegetation types were compared between plots surrounding 144 California spotted owl territory centers and 144 random plots in the San Bernardino Mountains of southern California (Smith *et al.* 1999, Humboldt State University, *in litt.* 2002). Owl sites were significantly closer to one another than random sites, showing a clumped distribution. Owl sites contained more area of closed canopy forest, larger mean patch sizes of closed canopy forest, and lower habitat diversity than random sites. California spotted owl territories in this study were found in three vegetation types; canyon live oak/ big cone Douglas-fir (39 percent of territories), mixed conifer/hardwood (which includes canyon live oak, big cone Douglas-fir, sugar pine, white fir, Coulter pine (*P. coulteri*), incense cedar, and black oak) (28 percent of territories), and mixed conifer (which contains white fir, Jeffrey pine, and incense cedar (33 percent of territories).

Stephenson and Calcarone (1999) estimated that there were approximately 473,473 ha (1,170,000 ac) of habitat types where spotted owls were known to reproduce (low-elevation oak/bigcone Douglas-fir, mid-elevation conifer/ hardwood, and high elevation mixed conifer) within the range of the subspecies in southern California and the central Coast Ranges. The total amount of available suitable habitat in the analysis area is likely lower, because it is possible that not all habitat is currently in a condition suitable for reproduction, roosting or foraging.

Nest Tree Characteristics. California spotted owls nest in a variety of tree/ snag species in pre-existing structures such as cavities, broken top trees, and platforms such as mistletoe brooms, debris platforms and old raptor or squirrel nests (Gutiérrez *et al.* 1992, 1995). Nest trees are often large, over 89 cm (35 in) average dbh (Gutiérrez *et al.* 1992, Steger *et al.* 1997, LaHaye *et al.* 1997), and larger than other trees in the same stand (Gutiérrez *et al.* 1992). Nest trees are also often greater than 200 years old (Gutiérrez *et al.* 1992, North *et al.* 2000). However, approximately 25 percent of nest trees out of a sample of over 250 were less than 76 cm (30 in) dbh (Gutiérrez *et al.* 1992). Although old, large trees are important to California spotted owls, intermediate-sized (28 to 61 cm (11 to 24 in)) trees were also selected by nesting (LaHaye *et al.* 1997; and trees 51 to 76 cm (20 to 30 in) dbh), roosting (Moen and Gutiérrez 1997), and foraging (Laymon 1988) owls.

Prey and Foraging Habitat. California spotted owls are considered prey specialists (Verner *et al.* 1992b) because they select a few key species (Verner *et al.* 1992b) among the variety of taxa on which they prey. In the upper elevations of the Sierra Nevada (about 1,200 to 1,525 m (4,000 to 5,000 ft), the primary prey is the northern flying squirrel (*Glaucomys sabrinus*), which is most common in larger stands of mature forests (Verner *et al.* 1992b). In lower elevations of the Sierra Nevada and in southern California, the primary prey is the dusky-footed woodrat (*Neotoma fuscipes*) (Thrailkill and Bias 1989), which is most abundant in shrubby habitats and uncommon in pure conifer forests or forests with little shrub understory (Williams *et al.* 1992). Both flying squirrels and woodrats occur in the diets of owls in the central Sierra Nevada (Verner *et al.* 1992b). Home ranges of owls in areas where the primary prey is northern flying squirrels are consistently larger than those where the primary prey is dusky-footed woodrats presumably because woodrats occur in greater densities and weigh more than flying squirrels (Zabel *et al.* 1992a). Verner *et al.* (1992b) reported that approximately 25 percent of known owl sites in the Sierra Nevada occur where woodrats are the primary prey species and 75 percent of sites occur where flying squirrels are the primary prey species.

Other prey items include gophers (*Thomomys* spp.), mice (*Peromyscus* spp.), diurnal squirrels (*Tamiasciurus douglasii, Sciurus griseus, Spermophilus beecheyi, Eutamias* spp.) and a variety of other rodents; shrews (*Sorex* spp.); moles (*Scapanus* spp); bats (*Myotis* spp.); birds; frogs; lizards; and insects (Verner *et al.* 1992b, Gutiérrez *et al.* 1995, Tibstra 1999). California spotted owls have low metabolic rates relative to other birds. Analysis of metabolic rates and the energy content of prey items indicates that an individual California spotted owl would need to eat one flying squirrel every 1.8 days or one woodrat every 3.7 days (Weathers *et al.* 2001).

California spotted owls in the Sierra Nevada forage most commonly in intermediate- to late-successional forests with greater than 40 percent canopy cover and a mixture of tree sizes, some larger than 61 cm (24 in) in dbh. The birds consistently use stands with significantly greater canopy cover, total live tree basal area, basal area of hardwoods and conifers, snag basal area, and dead and downed wood than are found at random locations within the forest. Studies on the Tahoe and Eldorado National Forests found that owls forage in stands with large diameter trees (defined as trees greater than 61 cm (24 in) in dbh in one study and trees 51 to 89 cm (20 to 35 in) in dbh in the other) significantly more than expected based on availability. Owls also forage in stands with trees between 30 and 61 cm (12 and 24 in) dbh and greater than 70 percent canopy cover significantly more than expected, based on the proportion of that forest type (USFS 2001a).

Stands suitable for owl foraging have: (1) At least two canopy layers; (2) dominant and codominant trees in the canopy averaging at least 28 cm (11 in) in dbh; (3) at least 40 percent canopy cover in overstory trees (30 percent canopy cover in red fir dominated forests); and (4) higher than average numbers of snags and downed woody material. California spotted owls forage in forests with ample open flying space within and beneath the canopy (Gutiérrez *et al.* 1995); therefore, extremely dense stands may not be used for foraging. Although canopy covers down to 40 percent are suitable for foraging, they appear to be so only marginally. Radio tracking data from the Sierra National Forest showed that owls tended to forage more in sites with greater than 50 percent canopy cover than predicted from their availability; while stands with 40 to 50 percent canopy cover were used about in proportion to their availability (USFS 2001a). The subspecies avoids open (0–30 percent canopy cover; Gutiérrez *et al.* 1992) or logged (Call 1990, Zabel *et al.* 1992b, Gutiérrez and Pritchard 1990) areas.

Winter Habitat. Winter habitats of owls that undertake altitudinal migrations have similar canopy closures, but lower basal areas of both green trees and snags, and higher shrub densities than higher-elevation summer habitats (Gutiérrez *et al.* 1995).

General Description of Suitable Habitat. Based on the above studies, nesting habitat for California spotted owls is generally described as stands with an average dominant and co-dominant tree diameter of greater than 24 in and canopy cover of greater than 70 percent. Foraging habitat is generally described as stands of trees of 30 cm (12 in) in diameter or greater, with canopy cover of 40 percent or greater. Exceptions to both descriptions are known to occur. Suitable habitat includes California Wildlife Habitat Relationship (WHR) habitat types 4M, 4D, 5M, 5D, and 6 (Mayer and Laudenslayer 1988).

Home Range

Spotted owl pairs have large home ranges that may overlap those of conspecifics (Verner *et al.* 1992b). A portion of the home range is defended as a territory, especially against unknown intruders (Gutiérrez *et al.* 1995). However, territorial disputes between neighbors are rare. Members of the same sex are more likely to display aggression toward each other than members of the opposite sex (Verner *et al.* 1992b). Spotted owls may roost near conspecifics other than their mates (Gutiérrez *et al.* 1995). Verner *et al.* 1992b suggested that the spotted owl territorial system functions such that an individual or pair are dominant within a territory and prevent conspecifics from breeding there, but that feeding or roosting by those birds may be tolerated.

Carey *et al.* (1992) studied the relationship between the amount of habitat used by northern spotted owls and prey abundance within those habitats. They found that owls used more area in habitats where the estimated biomass of medium sized prey, primarily flying squirrels and woodrats, was lower. The largest home ranges of California spotted owls occur where flying squirrels comprise the majority of the owl's diet and the smallest occur where woodrats dominate (Verner *et al.* 1992b, Zabel *et al.* 1992a). Woodrat populations are denser than flying squirrel populations, often by at least 10 fold, and woodrats weigh nearly twice as much as flying squirrels. Variation in prey availability likely affects the percentage of California spotted owl pairs that nest and successfully fledge young. Weather may also affect these parameters, either by directly affecting the owls or by affecting their prey base (Verner *et al.* 1992b).

Estimates of California spotted owl home range size are extremely variable. All available data indicate that they are smallest in habitats at relatively low elevations that are dominated by hardwoods, intermediate in size in conifer forests in the central Sierra Nevada, and largest in the true fir forests in the northern Sierra Nevada (Zabel *et al.* 1992a, USFS 2001a). Based on an analysis of data from telemetry studies of California spotted owls, mean breeding season pair home range sizes have been estimated as 3,642 ha (9,000 ac) in true fir forests on the Lassen National Forest; 1,902 ha (4,700 ac) in mixed conifer forests on the Tahoe and Eldorado National Forests; and 1,012 ha (2,500 ac) in mixed conifer forests on the Sierra National Forest. Zimmerman *et al.* (2000) used radiotelemetry data to estimate the breeding season home range of two pairs of California spotted owls in the San Bernardino Mountains of southern California. The average home range (571 ha (1,410 ac)) was smaller than those reported for the Sierra Nevada and varied widely between the two pairs (325 to 816 ha (803 to 2,016 ac)).

Gutiérrez *et al.* (1992) analyzed the sizes of stands containing nest trees (*i.e.*, nest stands) and the cumulative sizes of each nest stand plus all adjoining stands that were in vegetation strata preferentially used by owls for nesting. The mean size of nest stands was about 40 ha (100 ac); the mean size of the nest stand plus adjacent suitable stands was about 120 ha (300 ac). In radio tracking studies, the central area including half of the foraging locations of owls was found to vary from an average of 128 ha (317 ac) on the Sierra National Forest to an average of 319 ha (788 ac) on the Lassen National Forest (Gutiérrez *et al.* 1992). Bingham and Noon (1997) used radiotelemetry data to calculate core areas within the home ranges of four California spotted owls. Owls used the core areas more than would be expected if the entire home range were used at random. Core areas contained an average of 66 percent of points at which owls were located within an average of 21 percent of the home range.

Habitat in Home Range. California spotted owls were found to select more consistently for habitat patches with high canopy cover than for large tree size-class (Zabel *et al.* 1992a). Call (1990) estimated 42 percent of the home range to be medium timber 28 to 53 cm (11 to 21 in) dbh, and 55 percent large timber greater than 53 cm (21 in). The proportion of habitat in home ranges of owls in conifer forests of the Sierra Nevada with canopy cover greater than 40 percent was 68 percent and 81 percent for the two conifer sites studied. (Zabel *et al.* 1992a).

California spotted owls have been known to use stands that were recently selectively harvested (Zabel *et al.* 1992b). However, where forests in the Sierra National Forest were heavily thinned, owls consistently nested in patches with large, old, high crown-volume trees (North *et al.* 2000), relying on the remaining components of the original forest.

Numerous studies have described habitat used by spotted owls and habitat that occurs around owl nest sites and activity centers, but the relationships between these forest habitat characteristics and the distribution and demographic performance of California spotted owls are not completely understood. Several studies that have related habitat characteristics with California spotted owl demographic performance and occupancy rates found that productivity was positively correlated with amounts of forest with high canopy cover. Blakesley (2002a) characterized habitat within 1,830 ha (4,532 ac) circles surrounding 67 California spotted owl nest sites in northeastern California and used those data to explain observed variation in site occupancy, apparent survival probability, reproductive output, and nest success. Site occupancy was positively associated with the amount of habitat dominated by large trees and high canopy cover. North *et al.* (2000) found higher reproduction in conifer forest associated with high foliage volumes and concluded: ''The possible interaction of weather and nest-site structure on owl reproduction suggests forest managers should be cautious about reducing canopy volume in potential owl nesting areas. Retaining groups of large, old, high crown-volume trees may be needed to maintain the number of potential nesting sites in a forest.'' Apparent survival and reproductive output were positively correlated with the proportion of habitat surrounding each nest that was selected by the owls throughout the Sierra Nevada, as described by Gutiérrez *et al.* (1992). Nest success was positively associated with the presence of large trees within the nest stand.

Verner *et al.* (1992b) reported that about 75 percent of the California spotted owls in the Sierra Nevada occurred in areas where the northern flying squirrel was the primary prey species. Northern flying squirrels have been shown to be most common in larger stands of mature forests (Williams *et al.* 1992). Flying squirrels typically use older mature forest because they provide suitable nest sites, including snags, and abundant sources of food including arboreal lichens and truffles, which are associated with an abundance of soil organic matter and decaying logs (Verner *et al.* 1992b). In second-growth forests in Oregon, northern flying squirrels were found in younger forests if large snags and down logs remained from earlier stands (Carey and Peeler 1995). Thus, past selection harvest that removed the largest trees and snags probably did not favor northern flying squirrels, and, therefore, probably had negative effects on foraging by California spotted owls.

Blakesley (2002a, pers. comm. 2002) studied California spotted owls in an area where northern flying squirrels (*Glaucomys sabrinus*) comprised 70 to 80 percent of prey taken. She found that both survival and reproductive output were positively related to the proportion of the home range that was comprised of habitat selected by owls. Furthermore, site occupancy and reproductive output were negatively associated with the amount of non-habitat (non-forest and areas dominated by small trees and/or very low canopy cover).

In areas where the primary prey consists of dusky-footed woodrats, effects of timber harvest, either by selection or small patch cuts, may have been less severe on spotted owl prey. Dusky-footed woodrats are more abundant in shrubby areas than in areas with little shrub understory (Williams *et al.* 1992), so this forage species may persist in harvested areas, at least at the lower elevations where it is more common. Franklin *et al.* (2000), who studied demographic performance of northern spotted owls in an area of northwestern California where dusky-footed woodrats were the primary prey, reported that adult owls with access to larger blocks of suitable forested habitat had slightly lower mortality rates, but those with home ranges that were more patchy with more openings had slightly higher fecundity (number of young produced per breeding female). A landscape pattern with some small patches of other habitats dispersed within and around a main patch of old forest appeared to provide the optimum balance in promoting both high fecundity and high survival. It seems likely that California spotted owls would have similar responses in the minority of their range where dusky-footed woodrats are the primary prey and thus may be less affected by habitat modification in those areas.

According to McKelvey and Johnston (1992), clear-cutting was the predominant harvest method on Sierran national forests only from 1983 through 1987. In areas where clear-cutting occurred during those years, and perhaps also where catastrophic fire has eliminated forested habitat, it may be reasonable to evaluate impacts based on studies of the effects of clear-cutting on the similar northern spotted owl. Bart (1995b) examined the relationship between amount of a northern spotted owl pair's home range that is suitable habitat and productivity and survivorship of owls. In Bart's (1995b) study area, habitat remaining after harvest was either of good quality (*i.e.*, remaining old growth) or very poor quality unsuitable for extensive use by owls (clear cuts). That analysis suggested that removing any suitable habitat within the vicinity of the nest tends to reduce productivity and survivorship of resident owls. Bart concluded that replacement rate reproduction might occur when 30 to 50 percent suitable habitat is retained within an owl's home range. However, he also noted that productivity and survivorship declined steadily below 80 percent suitable habitat and advised that northern spotted owl habitat should not be reduced to perceived thresholds in all instances or viability could be compromised. The primary form of habitat modification in the Bart (1995b) analysis area was clear-cutting. Therefore, these results may only have limited application to the California spotted owl, because much of the range of the California spotted owl has been selectively harvested. The selection harvest practiced in the Sierra is believed to have lowered habitat quality by removing large trees and snags, but it may not have rendered habitat completely unsuitable (USFS 2001a). Thus, the degree of impact of past selection harvest practices on California spotted owls remains unclear.

Spotted owl distribution in the Sierra Nevada is generally continuous and of uniform density within the historic range. However, several "areas of concern" were identified in Beck and Gould (1992). These are areas where densities of spotted owls are low, local populations are isolated, or distribution of habitat or owls is not continuous or is restricted because of past timber harvest, fire, and natural breaks in habitat. Areas of concern might be important if the range of the spotted owl begins to shrink. Beck and Gould (1992) identified 16 areas distributed throughout the range where there are gaps that delineate discontinuities in owl distribution (no habitat exists or there is a bottleneck) and 19 areas where concern relates to low population density, fragmented habitat, or loss of habitat due to fire.

The USFS (2001a) further cautioned that management in at least nine of these areas of concern in the Sierra Nevada could have disproportionate impacts to spotted owls without special management consideration. USFS noted that areas of concern that fall within checkerboard ownerships (blocks of private land interspersed with Federal lands) or fragmented habitats warranted special attention. Final management direction selected by the USFS-modified alternative 8 (USFS 2001b) included objectives for the amounts of habitat within each owl home range to provide for replacement rate reproduction.

Demographic Analysis

As one of the most intensively studied birds in the United States, the spotted owl has been the focus of research for well over two decades. Many sophisticated statistical techniques for estimating population trends have been developed and refined using data from the northern spotted owl, and the state of information for the California subspecies has benefitted accordingly. Across the range of the California spotted owl, five study areas (Lassen, Eldorado, Sierra, Sequoia-Kings Canyon, and San Bernardino), totaling about 2,200 square miles, have been established to examine the subspecies' population status. This research serves as a valuable resource for evaluating whether or not listing under the ESA may be warranted. In this section, we offer a synopsis and evaluation of the most current research on California spotted owl population trends. Because analytical techniques for assessing population status are complex, it is necessary to discuss the techniques, the studies, and their conclusions in some detail.

Several analytical methods have been applied to the analysis of population trend in spotted owls, and each method carries certain strengths and weaknesses. Thus, to best understand population trend, it is important to concurrently assess the results of all methods instead of relying on a single analytical approach. One of the simpler methods uses raw empirical abundance data, where banded owls are counted and numbers are compared over time. Population trends can then be crudely assessed by evaluating abundance data from one year against similar data from a later year, or multiple years of data can be used in a regression analysis to determine the population trend from the slope of a regression line. While count data may appear straightforward, they are often subject to important sources of unquantifiable bias if the ability to detect owls changes from year to year. This can occur if survey effort changes over the course of the study or if the study area changes in size during the study period. Also, variation in detectability can be caused by environmental or behavioral factors. Numerous sources of possible bias can be present during the collection of abundance data in the field, especially over the long periods of time required to evaluate population trends in long-lived species such as spotted owls. However, basic abundance data can provide a reference point for comparison with the results of more sophisticated statistical methods, especially when possible error is reduced by careful data collection. Abundance data are available for each of the California spotted owl study areas, and are included in this evaluation by the Service.

Because of the problems that accompany abundance data, scientists have developed more sophisticated methods for estimating population trends that can be described in statistical terms, and which allow various statistical tests of the estimated population trend. These methods derive estimates of the annual rate of population change, otherwise known as lambda (λ), which is the fundamental measure for retrospective estimation of population trend. Varying analytical methods derive λ from data on vital rates (*i.e.*, birth and death rates) gathered using methods described for the northern spotted owl (Forsman 1983). Reproductive output is measured from direct observation of the number of young leaving the nest, and estimates of survival are obtained using mark-recapture techniques. Capture-recapture theory (Lebreton *et al.* 1992) provides the foundation for deriving a statistical estimate of survival and population trend. In brief, this is done by capturing and uniquely marking individuals, and then recapturing (or resighting) those same individuals in subsequent years (Lebreton *et al.* 1992). Some of the potential bias factors remain, such as variation in survey effort, but the recapture history for each marked individual serves as the basis for calculating vital rates for each age and gender class. After fecundity (*i.e.*, birth rate: number of female young fledged per female) and survival for the population are statistically estimated from field sampled data, those estimates are used to compute the finite rate of population change, or λ.

Lambda provides an estimate of two useful measures: the direction in population trend and the magnitude of population change (Franklin *et al.* 1996). A λ value equal to 1.0 indicates a stationary population; less than 1.0 indicates a declining population; and greater than 1.0 indicates a growing population. The amount by which λ differs from 1.0 indicates the magnitude of the trend (*i.e.*, if $\lambda = 1.10$, the population has increased by an average of about 10 percent each year [1.10 to 1.0 = 0.10]). However, λ is a point estimate, and this estimate has a measure of precision. Therefore, researchers often test whether λ is significantly greater or less than 1.0, or equal to 1.0. For example, a $\lambda = 0.97$ may not be statistically different from 1.0 at some predetermined significance level if the confidence interval includes 1.0 (Lande 1988).

It should be noted that the estimate of lambda applies only to the period during which the data are collected. For this reason, long term studies are necessary to avoid misinterpretation of apparent trends. For instance, if a population demonstrates cycles that are completed over multiple decades, ten years of data may only capture a down cycle (which would falsely appear to be a decline) or up cycle (which would falsely appear to be an increase), depending on the timing of the study.

The five individual studies conducted on California spotted owl populations were consistent in their initial method for calculating λ, which has also been extensively described and applied in analyses of the northern spotted owl (Franklin *et al.* 1996). In this method, survival and fecundity estimates for females were used in a mathematical tool called a projection matrix to solve for λ. Several issues may affect the validity of the projection matrix approach to calculating lambda. First, the method assumes that adult survival and fecundity are constant over time (Franklin *et al.* 1996). Long term research on the northern spotted owl has demonstrated that this assumption is sometimes violated. Survival rates are not constant (Burnham *et al.* 1996), and spotted owls have demonstrated variable annual fecundity, with occasional years of very high fecundity (Franklin *et al.* 2002). However, the magnitude of the resulting bias appears to be small (Burnham *et al.* 1996, Noon and Biles 1990). Second, individuals, particularly juveniles, may emigrate to areas outside the study area boundaries. Even though they could still be alive, these individuals are considered mortalities because they disappear from the study area, resulting in a survival rate that is biased low (Raphael 1996). To better understand the possible error in juvenile mortality rates, researchers compare the observed mortality rate with calculated theoretical rates that would be necessary for a stable population, and examine the difference. Although useful in some respects, this exercise does not alter the estimate of lambda for the subject owl population. The issue of juvenile emigration was addressed in the 1999 meta-analysis for the northern spotted owl, as well as for some of the individual northern spotted owl study areas, and overall trend estimates were adjusted for juvenile emigration (Franklin *et al.* 1999).

Another potential issue regarding the projection matrix method is that the calculation includes only territorial birds (which are relatively easy to locate), ignoring nonterritorial, unlocated ''floaters'' that may be present and available to fill vacancies left by the eventual mortality of breeding birds (Franklin 1992). Bart (1995b) argued that the presence of floaters causes population trends to be determined by the trend in the amount of habitat, not by birth and survival rates. Using lambda estimates corrected for floaters and false juvenile mortalities, Bart (1995b) calculated that lambda estimates using the projection matrix method could be 0.13 to 0.03 lower than the actual value. Thus, for example, a population with an estimated lambda of 0.90 (signifying a decline of 10 percent per year) could actually be an increasing population. This argument should be considered in evaluation of lambda estimates. Trends in the nonterritorial segment of the population cannot be evaluated with the projection matrix method, although it is likely that over the long term, trends in the territorial and nonterritorial segments will follow similar trajectories, since they both depend on similar environmental conditions.

For these reasons, we approach the use of population matrix λ estimates with caution in this finding, and where possible, has sought additional corroborative data and analyses before concluding that a population is declining. Our following discussion of the results from each of the five study areas will include evaluation of potential error in the lambda estimate that might result from these factors.

More recently, the data from the five study areas were reanalyzed using another statistical method. In 2001, owl researchers from the five California spotted owl study areas, timber industry consultants, and stakeholders met with experts in population analyses to conduct a meta-analysis of the available data (Franklin *et al.* 2002). The term meta-analysis refers to the combined analysis of data collected from numerous studies to increase sample size and investigate relationships that would be difficult to assess with data from an individual study. A draft report authored by 15 participants (Franklin *et al.* 2002) summarized the results of the five-day meta-analysis workshop and subsequent analysis.

It is our understanding that, as of the publication of this finding, peer review comments have been received by the authors of the meta-analysis, but the incorporation of peer review comments by the authors has not been completed. Thus, the meta-analysis manuscript remains a draft. We have examined the draft meta-analysis document, the comments of prominent peer reviewers, and solicited comments from the authors regarding our conclusions herein. We regard the draft meta-analysis as the best available science on the subject, but as stated above, we have not relied solely on this analysis in developing our conclusions regarding population trend.

The meta-analysis of adult survival was based on female and male adult capture histories for the five study areas, but fecundity was estimated for each study area separately because differences existed in field sampling protocols. To eliminate a possible bias in projection matrix estimates of λ due to inaccurate rates of survival (resulting from unknown emigration rates), a new technique was used to calculate λ, called the ''temporal symmetry capture-recapture model'' (Pradel 1996). Pradel's method calculates the rate of change in population size between two successive years using mark-recapture histories for each owl, and since this technique calculates annual estimates, λ can change each year. In contrast, the projection matrix method calculates an average λ estimate for the period of study using a population's average birth and death rates. Pradel's measure applies to subadult and adult territorial owls, and incorporates birth, death, emigration, and immigration rates. Estimates of juvenile survival are unnecessary because movement of spotted owls into and out of the study area is considered in changes of owl numbers over time.

While Pradel's λ accounts for permanent emigration of juveniles, it doesn't provide insight as to the root cause of a population's rate of change. For example, if λ = 1.0, indicating a stable population, it is impossible to know if the stability is a result of immigration or new recruits from births, which prevents inferences about the health of the local population (Franklin *et al.* 2002). Thus, it is important that trends in survival and fecundity rates be examined concurrently with assessments of λ. Pradel's λ provides information as to whether owls are being replaced from within or outside the study area, and not solely whether they are replacing themselves, which is the goal of the projection matrix approach. Because the Pradel method provides an estimate of one λ for each year, the annual λ estimates can themselves be assessed for trends, and a mean estimate can be calculated for the period of study.

Franklin *et al.* (2002) applied the Pradel method to each of the five individual study areas, and conducted a combined meta-analysis of the results from the four study areas (Lassen, Eldorado, Sierra, and Sequoia / Kings Canyon) that lie in the Sierra Nevada. The following discussion details the results of the earlier projection matrix analyses and reports of basic count data for each study area, and compares those results with the new results derived using the Pradel method, as reported by the draft. Following the discussion of individual areas, we will describe the results of the meta-analysis of the four combined Sierra Nevada study areas.

Since survey areas changed throughout the course of some studies, only those areas (within larger study areas) that received surveys from start to finish were included in the new analysis, and only years that received consistent survey effort were used in the analysis (Lassen study area [490 mi^2]: 1992 to 2000; Eldorado study area [137 mi^2]: 1990 to 2000; Sierra study area [137 mi^2]: 1990 to 2000 Sequoia and Kings Canyon study area [132 mi^2]: 1991 to 2000; San Bernardino study area [730 mi^2]: 1991 to 1998).

In this review, we primarily used the most recent report or published article for each area, although we reference earlier reports to clarify apparent changes in results for a given area. We summarize the results below.

Lassen Study Area—The Lassen study area encompassed approximately 850 mi^2 in northeastern California, the majority of which was located in the Lassen National Forest. Small segments of the study area included the Plumas National Forest, private timber lands, Lassen Volcanic National Park, and Bureau of Land Management land. According to Blakesley and Noon (*in litt.* 2003), four lines of evidence suggest that the Lassen population has been decreasing. However, this information, received very recently, could not be fully evaluated. The most recent publication for this study area (Blakesley *et al.* 2001) covered 10 years of field sampling (1990 to 1999), during which the annual rate of population change was estimated to be 0.910 using the projection matrix method. This estimate was significantly less than that of a stationary population (λ = 1.0), and suggested that the territorial female owl population (those females that occupy and defend a habitat area) declined 9 percent annually from 1990 to 1999. Blakesley *et al.*(2001) inferred that if the conditions present during their study remained constant into the future, and if the true rate of change were as low as 4 percent instead of the estimated 9 percent, that the population would decline by one-half within 20 years. Such forecasting beyond the period of data collection is unreliable, and the accuracy of this projection is likely biased, as conditions are unlikely to remain constant for 20 years (Burnham *et al.* 1996, Raphael *et al.* 1996, Noon *et al.* 1992).

We were unable to compare the estimated value of λ to the observed numbers of territorial adults in this study, because the survey area increased over time. However, from the estimated growth rate of 0.910, we can conclude that over 50 percent of the population would be lost by the end of the study. According to Blakesley and Noon (*in litt.* 2003), within 68 territories surveyed consistently from 1993 to 2001, the number of female owls declined from 56 to 37. This suggests a decline of 5 percent annually, which is not statistically different from the 9 percent decline estimated above. A potentially large source of error arises from unknown rates of juvenile and adult emigration. Blakesley *et al.* (2001) suggested that while incorrect juvenile emigration rates may have resulted in a survival estimate biased low, the magnitude of the bias was probably small. For the Lassen population to demonstrate a stationary trend during the study period (given that all other vital rates were accurate, including an adult survival probability of 0.827), the juvenile survival rate would have to more than double (from the estimated 0.333) to 0.790. However, given that all other parameters remain the same, Franklin (2003) estimated that if adult and subadult survival was actually 0.85, juvenile survival would have to be 0.657 to achieve a stationary population, and if adult and subadult survival were actually 0.87, juvenile survival would have to be 0.55 for a stationary population. A juvenile survival probability of 0.55 is within the realm of possibility based on juvenile survival estimates for northern spotted owls on two study areas (Franklin *et al.* 1999).

The meta-analysis for this study area included nine years of sampling (1992 to 2000) and encompassed 490 mi². The mean λ estimate for the period using Pradel's method was less than 1.0 (0.985), but was not statistically different from that of a stationary population ($\lambda = 1.0$). Examination of the annual λ estimates (per year, as opposed to the above mean λ) showed no evidence of a trend for the Lassen study, and adult apparent survival showed no substantive variation or trends through time. Fecundity was so variable through time that a linear trend (as opposed to sporadic high-low trends) could not be identified.

Although there is information that suggests that this population may be declining, uncertainties exist when interpreting the projection matrix approach, actual counts, and Pradel's methodology. Without further refinement of the projection matrix approach (*i.e.*, adjusting juvenile survival estimates using radio telemetry), it is difficult to reconcile the declining projection matrix λ of 0.910 with the statistically stationary estimate of 0.985 derived using Pradel's methodology. Thus, we cannot conclude with certainty that the population is declining, increasing, or stationary.

Eldorado Study Area—The Eldorado study area consisted of two segments: a 137-mi² density study area, and a 220-mi² regional study area. The most recent publication for this study area (Seamans *et al.* 2001a) covered 10 years of field sampling (1990 to 1999). Although surveys took place from 1986 to 1999 in the density study area, surveys in the regional study area were initiated in 1997. Only data from 1990 to 1999 were used because survey effort and sample sizes increased dramatically after 1989 due to increased funding (Seamans *et al.* 2001a). The study area was located primarily within the Eldorado National Forest, but portions were also located within the Tahoe National Forest and the Tahoe Basin Management Area. Researchers lacked sufficient data to calculate the juvenile survival rate on the Eldorado study area, so they used the survival rate from the nearby Lassen study area (0.333) as a surrogate. This estimate was thought to be optimistic, as estimates of northern spotted owl juvenile survival from 11 study areas averaged 0.258 (Forsman 1996), and in the Eldorado study area, 11 of 147 individuals banded as juveniles were recaptured as territory holders, which would translate to a survival probability of 0.074 (Gutiérrez *et al.* 2001). However, there is a likelihood that the estimated juvenile survival of 0.258 for northern spotted owls was underestimated, as it was not corrected for juvenile emigration. A later report (Franklin *et al.* 1999) adjusted juvenile survival estimates in three northern spotted owl study areas to reflect juvenile emigration rates calculated from radiotelemetry data. The adjusted juvenile survival rates were 0.598, 0.632, and 0.366. These estimates represented increases of 137.2%, 41.8%, and 87.9% in juvenile survival estimates for each respective study area.

Using the projection matrix approach, the annual rate of population change was estimated to be 0.948, which was significantly less than that of a stationary population. This λ value suggested that the territorial female owl population declined 5.2 percent annually from 1990 to 1999. In contrast, female abundance at the start (1990) and finish (1999) of the study was 26 and 28 individuals, respectively. This difference between the estimated λ and the rate calculated from actual numbers could be attributed to immigration of individuals into the study area. If true, this would indicate that individuals were not replacing themselves, but were being replaced by recruits from outside the study population. Earlier estimates of λ from this study area calculated similar trends ($\lambda = 0.947$) using only 6 years of data (Noon *et al.* 1992). This six year estimate was not statistically less than 1.0, but the power (ability to detect differences) of this test was low, so the trend of the population was uncertain at the time (Verner *et al.* 1992). Results from the 2001 study (Seamans *et al.* 2001a) expanded the sample size and study period, and increased the statistical power of their test so that their estimate of lambda (0.948) was then found to be statistically less than 1.0.

The use of a surrogate juvenile survival rate in this study may introduce bias into the estimate of λ for two reasons: the Lassen estimate of juvenile survival probably carries certain biases given the inability to consider juvenile emigration in the estimate of juvenile survival, and the Lassen study area may not accurately represent the Eldorado study area. Further, Gutiérrez *et al.* (2001) reports that survey effort for this study area changed over time, and that survey effort can influence density and survival estimates. For this reason, data from the first four years of study were not included in the estimate of survival or reproduction (Seamans *et al.* 2001a analyzed data starting in 1990, not 1986). In a subsequent report (Seamans *et al.* 2001b), the projection matrix estimate of λ was compared to a growth rate calculated from actual numbers of adult females present during the study. The growth estimate from actual numbers was 0.951, and was significantly less than zero. This estimate was calculated using data from 1993 (37 adult females) to 2000 (24 adult females), while the value derived from the projection matrix approach (0.948), which was calculated using data from 1990 to 1999.

The meta-analysis for this study area included 11 years of sampling (1990 to 2000) and encompassed 137 mi². The mean λ estimate for this study area was greater than 1.0 (1.042), and was not statistically different from that of a stationary population ($\lambda = 1.0$). Examination of annual λ estimates showed a significant decline, and similar to the Lassen study area, adult apparent survival showed no substantive variation or trends through time. No linear trend in fecundity could be identified.

While the projection matrix estimate of λ showed a decline, (and trend in Pradel's annual λ showed a decline), actual counts increased a small amount from 1990 (26 adult females) to 1999 (28 adult females) but decreased from 1993 (37 adult females) to 2000 (24 adult females), and the mean λ estimate using Pradel's method appeared to show a stationary population. Furthermore, there were substantive uncertainties regarding the accuracy of vital rate estimates used in the projection matrix estimate of λ. These results do not allow us to reach a definitive decision with respect to population trend on the Eldorado study area, and we cannot conclude the population is declining.

Sierra Study Area—The Sierra study area was located primarily (92 percent) within the Sierra National Forest, and encompassed the watersheds of the San Joaquin River and the North Fork of the Kings River (Franklin *et al.* 2002). The study area included approximately 263 mi², and the boundaries were delineated based on National Forest boundaries and major topographic features such as ridges and drainages. Spotted owl telemetry studies and intensive surveys began in 1987 and 1990, respectively, on a 160 mi^2 portion of this study area (old Sierra study area). In 1994, surveys were expanded to include an additional 103 mi^2 (new Sierra study area; Steger *et al.* 1999). Juvenile survival rate was not calculated using data from this study area. Instead, the juvenile survival rate from the San Bernardino study area (0.328) was used to approximate the Sierra study area's juvenile survival rate.

Using survey data from 1990 to 2000 and the projection matrix method, the annual rate of population change was estimated for the old Sierra study area (1987 to 2000) and both old and new Sierra study areas combined (1987 to 2000). Annual rates of population change for the old Sierra and combined Sierra study areas were 0.897 and 0.901, respectively. These estimates were significantly less than that of a stationary population, and suggested that the territorial female owl population declined about 10 percent annually from 1987 to 2000. For an 11 year period (1990 to 2000), this translates to a population decline of around 60 percent. For the old Sierra study area during 1991 to 2000 (1990 was not examined as survey guidelines were not yet established on the study area), actual owl numbers seemed to corroborate a decline, albeit the drop in numbers was less severe than 60 percent. Owl abundance in 1991 and 2000 were 69 and 55, respectively. These numbers represent a 20 percent decrease, although the accuracy of the count numbers is unknown. The new Sierra study area also showed a decline: actual owl numbers dropped from 37 in 1994 to 29 in 2000.

The meta-analysis for this study area included 11 years of sampling (1990 to 2000) and encompassed 137 mi^2. The mean λ estimate for this study area was less than 1.0 (0.961), but was not statistically different from that of a stationary population ($\lambda = 1.0$). Annual λ estimates showed a weak (nonsignificant) decline, and adult apparent survival showed no substantive variation or trends through time. The Sierra study showed a negative trend in fecundity, which could have been driven by a high reproduction year early in the study.

Although the mean λ was statistically stationary using Pradel's methodology, actual numbers of owls declined; the projection matrix approach showed a decline; there was a negative trend in fecundity; and there was a weak, nonsignificant decline in annual λ estimates (using Pradel's method). It appears that a decline in this study area is possible, but the use of a surrogate juvenile survival rate introduced a bias of unknown proportion, and thus, the magnitude of a possible decline remains uncertain.

Sequoia and Kings Canyon Study Area—The Sequoia and Kings Canyon study area encompassed approximately 130 mi^2 of land in Fresno and Tulare counties. The majority of the area was located in the Sequoia and Kings Canyon National Parks. Small segments of the study area include the Kings River watershed, but most of the study area was in the Kaweah River watershed (Franklin *et al.* 2002). Surveys in this study area cover 11 years of field sampling (1990 to 2000), but useful data exist from a previous demographic study that began in 1988 (Steger *et al.* 2000). Demographic surveys were conducted on130 mi^2 of land in this area, and methods for calculating λ were identical to those used for the Sierra study area. The annual rate of population growth using the projection matrix method was estimated to be 0.973, suggesting a decline of 2.7 percent per year. Statistical testing found that λ was not significantly less than 1.0. Actual owl counts during the study period seemed to indicate that the population might be growing, but again, the accuracy of such numbers is uncertain. Owl abundance in 1990 and 2000 were 54 and 64, respectively.

The meta-analysis for the Sequoia and Kings Canyon study area covered 132 mi^2 during 1991 to 2000. The resulting mean λ estimate was 0.984, but was not statistically different from that of a stationary population. A significant quadratic trend (decline, then increase) was detected for annual λ estimates, but adult apparent survival showed no substantive variation or trends through time. A linear trend could not be identified in fecundity estimates, as fecundity was highly variable through time. Apparent survival for the Sequoia and Kings Canyon study area was significantly higher (0.877) than that of the other study areas combined (0.819).

Lambda estimates using the projection matrix approach and Pradel's method suggest stationary population trends, and actual owl numbers do not show declines. Trend in annual λ estimates also does not show a decline, and apparent survival in this study area was higher than all other study areas examined in this finding. Based on these results, and considering the inclusion of the juvenile survival rate from another study area, we cannot conclude that this population is declining.

San Bernardino Study Area—The San Bernardino study area was located entirely within the San Bernardino National Forest, and comprised all suitable habitat for spotted owls within the mountains. Surveys covering approximately 200 mi^2 (Big Bear study area) began in 1987, but were expanded in 1989 to cover the entire San Bernardino Mountain range (approximately 730 mi^2; San Bernardino Mountains study area; Gutiérrez et al 1999). This study area was unique in that it exists in southern California as a relatively isolated population (Gutiérrez and Pritchard 1990, LaHaye *et al.*1994). Higher elevations in the study area contained forested habitat suitable for spotted owls, while lowland areas of unsuitable desert scrub and chaparral habitats surrounded and isolated the higher peaks (Noon and McKelvey 1992). Early projection matrix studies using four, five, and six years of data estimated significant annual declines during years between 1987 and 1993 (λ = 0.769, 0.827 and 0.860, respectively; LaHaye *et al.* 1992, Noon *et al.* 1992, LaHaye *et al.* 1994). The annual rate of population change for the most recent report we possess was estimated to be 0.91 based on 11 years of data (1988 to 1998; LaHaye *et al.* 1999). This estimate was significantly less than that of a stationary population, and suggested that the territorial female owl population declined nine percent annually from 1988 to 1998. Over the 11-year study period, this rate of decline would translate to a loss of over 60 percent of the population.

Although all forested habitat within the San Bernardino Mountains study area (including unoccupied habitat) was surveyed (Gutiérrez 2001), survey effort increased during the study period. In 1989, 532 total surveys were conducted, whereas in 1998, 1,185 total surveys were conducted (LaHaye *et al.* 1999). This change in survey effort could cause the number of owls observed in any year to be a function of the survey effort instead of an actual trend in numbers. Thus, there is a high likelihood that an assessment of actual owl numbers through time could be biased, and may not accurately represent the true population size in any given year.

The meta-analysis for this study area included 8 years of sampling (1991 to 1998) and encompassed 730 mi^2. The mean λ estimate for this study area was less than 1.0 (0.978), but was not statistically different from that of a stationary population ($\lambda = 1.0$). Examination of annual λ estimates showed a weak (nonsignificant) decline, and as with all other study areas, adult apparent survival showed no substantive variation or trends through time. No linear trend in fecundity could be identified.

Although the projection matrix approach showed a decline and there was a weak, nonsignificant decline in annual λ estimates using Pradel's method, the mean λ was statistically stationary using Pradel's methodology. This is more meaningful than with the other study areas. Recall that using Pradel's method, the population could appear stationary or growing, even if the population growth is caused by outside immigration. For this study area, recruitment cannot likely be attributed to immigrants entering the study area, as the study area is relatively isolated. Thus, the disparity between the projection matrix estimate and the estimate using Pradel's method could be a result of either (1) measurement error in survival rates of juveniles or adults, or (2) the presence of unlocated floaters in the study area (Franklin 1992). Regardless, we have insufficient certainty as to the status of this population to conclude that it is either declining, increasing, or stationary.

Meta-Analysis Results

The meta-analysis used the Pradel method to evaluate data from various study areas, as described above. The analysis was also applied to some aspects of the population as a whole. The estimated mean lambda for each of the individual studies was not significantly different than 1.0 over the periods analyzed. The meta-analysis did not estimate a mean overall value of lambda for all study areas combined. Examination of trends in annual λ over the periods analyzed for each study area showed no evidence of a trend for the Lassen study, a significant decline for the Eldorado study, a significant quadratic trend (decline, then increase) for the Sequoia and Kings Canyon study, and a weak (nonsignificant) decline for the Sierra study. The overall trend in annual lambda rates for these four Sierra Nevada study areas was declining, then increasing. The trend in annual rates for the San Bernardino study was a weak (nonsignificant) decline for the period analyzed.

Adult survival rate for the Lassen, San Bernardino, Sierra, and Eldorado study areas combined was 0.819, which was substantially lower than the mean estimate (0.850) for adult northern spotted owls across 15 study areas (Franklin *et al.* 1999). Except for the Sierra study area, fecundity estimates for the California spotted owl study areas were so variable through time that linear trends could not be identified. The Sierra study showed a negative trend in fecundity, which could have been driven by a high reproduction year early in the study.

Conclusions—In total, the findings reported above are not conclusive with respect to the population status of the California spotted owl. There is no definitive evidence that the population is decreasing across its range, and various analytical results of the individual study areas are not wholly supportive of conclusions regarding declines in any given study area. Low levels of declines may be occurring in some study areas, but if so, they are not clearly evident using existing analytical techniques. The strongest support for a possible decline is on the Sierra study area, and the strongest support for a possible stationary population is on the Sequoia and Kings Canyon study area. The combined rate of adult survival for all study areas except the Sequoia and Kings Canyon study area may be of concern, as it is substantially lower than that reported for the northern spotted owl. However, Pradel's λ estimate for each study area consistently showed statistically stationary populations, so we cannot conclude that this lower adult survival rate is causing a decline in California spotted owl populations. At this time we have no clear statistical evidence to show that the California spotted owl is declining throughout its range.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1531 *et seq.*) and the regulations (50 CFR part 424) that implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the California spotted owl are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

There are two categories of possible threats to the California spotted owl that are related to habitat. The first is the current threat related to the condition of existing populations and habitat, and existing, ongoing habitat modification. The second is the potential threat that may result from future management of habitat.

Threats related to current condition of populations and habitat. Numerous authors have expressed concern over the current status of the California spotted owl, and much of this concern is related to the quality of the habitat available to the subspecies at the present time. The best scientific information available indicates that high survival of spotted owls is achieved by maintaining large, unfragmented areas of suitable habitat (Moen and Gutiérrez 1997, Franklin *et al.* 2000, Blakesley *in litt.*, 2002a). Important habitat components, especially large trees, large snags, and large down logs, are currently in short supply across the range of the California spotted owl (Verner *et al.* 1992b, USFS 2001a). The diameter of nest trees selected by owls in the Sierra Nevada is significantly greater than the average diameters of conifers in the Sierra Nevada. Large trees become future large snags and large downed logs, the latter providing important habitat attributes for some prey species. The length of time required to recover old trees and increase their density over the landscape raises the level of concern associated with their decline (USFS 2001a).

Concern has been exacerbated because, although harvest volume was declining markedly in the 1990s, existing management direction did not appear to be sufficient to arrest completely habitat decline (USFS 2001a), and because, until recently, most of the remaining old growth in national forests in the Sierra Nevada remained in areas available for timber harvest (Franklin and Fites-Kaufmann 1996, Beardsley *et al.* 1999). Thus, Blakesley and Noon (1999) argued that the most positive step that can be taken to reverse apparent declines of California spotted owls would be to increase retention and recruitment of large trees and closed canopy conditions throughout the Sierra Nevada.

Concern also exists because the existing habitat used by California spotted owls appears to be vulnerable to stand-replacing catastrophic fire. Removal of large overstory trees in conjunction with fire exclusion has lead to changes in forest structure that favor spread of high intensity fire. Conifer stands have become denser and composed mainly of trees in small and medium size classes (University of California 1996). The species composition of these forests has also shifted, from more shade intolerant, fire-hardy species such as ponderosa pine and black oaks to more shade tolerant, fire sensitive species such as white fir and incense-cedar (Verner *et al.* 1992, Weatherspoon *et al.* 1992). Similar increases in density and changes in species composition have been documented for coniferous forests of southern California (Weatherspoon *et al.* 1992, Minnich *et al.* 1995). Forests in southern California were logged significantly into the 1960s (Verner *et al.* 1992a) and have also been affected by intensive fire suppression. Dense stand conditions in California forests have lead to increased tree mortality, due to competition, drought, insects, disease, and, in some cases, air pollution (University of California 1996). The increased density and continuity of young trees together with increased fuels from fire suppression and tree mortality have created conditions favorable to more intense and severe fires (University of California 1996). Over the last 30 years, the annual acreage burned in the Sierra has been about 19,020 ha (47,000 ac), but in the last ten years, that average was 30,756 ha (76,000 ac) (USFS 2001b).

Paradoxically, the growth of understory trees that contribute to the high degree of canopy closure favored by California spotted owls also increases the risk that wildfire might spread into the canopy and destroy the stand. Because fire suppression has increased density of stands in the Sierra Nevada, the possibility exists that it has led to net improvement in owl habitat in some areas (Weatherspoon *et al.* 1992) with resultant increases in spotted owls (Verner *et al.* 1992a). Weatherspoon *et al.* (1992) characterized forests selected by spotted owls as having the structural components favorable for crown fires.

However, in recent years, relatively few California spotted owl sites have been severely impacted by wildfire (USFS 2001a). From 1993 to 1998, only 15 Protected Activity Centers, a 121 ha (300 ac) management area established around all Forest Service owl sites in 1993, burned in wildfires, and three of those remain occupied (USFS 2001a). This possibly is because of the success of initial attacks on wildfires in Sierran mixed conifer types (Weatherspoon *et al.* 1992) or because California spotted owls often occupy relatively moist areas such as northern aspects (Gould 1977, Barrows 1981, Gutiérrez *et al.* 1992, North *et al.* 2000), lower slopes of canyons (Gould 1977, Gutiérrez *et al.* 1992), or areas close to water (Gould 1977) where average fire intervals are longer (Weatherspoon *et al.* 1992). Weatherspoon *et al.* (1992) noted that most of the large fires in the Sierra Nevada had occurred on the eastside and at low elevations on the westside, outside the areas where spotted owls occur.

During development of the SNFPA, the overall concerns regarding the status of the California spotted owl and its old forest habitat were so pervasive that the Forest Service, the primary land manager in the Sierra Nevada, formally adopted the assumption that the owl's population was declining as a basic tenet driving land management direction, and in the SNFPA Record of Decision established that ''The primary objective is to conserve rare and likely important components of the landscape such as stands of mid and late seral forests with large tree, structural diversity and complexity, and moderate to high canopy cover'' (USFS 2001b).

The SNFPA FEIS (USFS 2001a) provided analysis that suggested that many California spotted owl territories might not contain sufficient amounts of suitable habitat to provide for desirable levels of reproduction, based on inferences made from the work by Hunsaker *et al.* (2002) (which was in press at the time of publication of the FEIS). However, during the process of publication of that study, analysis of the data by another Forest Service scientist found that the statistical methodology of Hunsaker *et al.* (2002) was flawed and that the study's conclusion regarding the relationship between habitat and reproductive success could not be supported (Lee 2001). Thus, while the FEIS analysis of the amounts of habitat in home ranges may be of descriptive value, certain of its conclusions as to the possible population implications were not valid. The FEIS reported that, overall, 50 percent of the home ranges contained less than 60 percent of their area in suitable habitat. In the central Sierra Nevada (represented as the Plumas, Tahoe, Eldorado, and Stanislaus National Forests, which contain about 46 percent of the owl sites in the Sierra), 58 percent of the home ranges contained less than 60 percent suitable habitat.

In southern California, recent prolonged drought, particularly on the San Bernardino National Forest, has led to significant mortality in the big-cone Douglas-fir and mixed conifer vegetation types, both of which provide nesting, roosting, and foraging habitat for California spotted owls. The extent of mortality is projected to be 8,094 to 12,140 ha (20,000 to 30,000 ac), much of which is considered suitable nesting/roosting habitat. The San Jacinto Mountains are experiencing especially high mortality. It is anticipated that most of the nesting and roosting habitat in the San Jacinto Mountains will be lost. This area supports about 10 pairs of spotted owls, all of which could be lost (Loe *in press* 2002).

Despite well-founded concerns regarding the current status of the subspecies, there are several factors that suggest that the California spotted owl is not in immediate danger of extinction nor will be in the foreseeable future. These factors include: (1) The subspecies remains widespread and well-distributed throughout its historic range, despite extensive historical effects on habitat and apparent sub-optimal conditions in current habitat; (2) The estimated numbers of the subspecies combined with its wide distribution reduce the likelihood of widespread extirpation due to a catastrophic event; and (3) Although there are analyses that suggest populations may be declining, the population declines are not conclusively demonstrable.

Threats to Habitat from Future Timber Harvest, Catastrophic Fire, and Vegetative Management. With the current status and performance of California spotted owl populations and their habitat in question, the evaluation of potential future threats is a key aspect of this finding. In the following discussion, we evaluate the potential effects of impending management on the habitat of the subspecies.

In this evaluation, we confine the scope of our judgement of the future actions and programs of Federal land management agencies to reasonably foreseeable outcomes of established management direction, rather than more speculative assessment of possible future management scenarios. In particular, and most importantly, this limitation confines us to evaluation of the established management direction for Forest Service lands in the Sierra Nevada, (*i.e.*, SNFPA). As discussed below, we are aware that Forest Service is considering changes in management direction, and that other parties have called for actions that could have more widespread impacts on California spotted owl habitat. However, because such proposals are not incorporated in established management direction, they remain outside the scope of this finding.

Timber harvest on Federal lands in the Sierra Nevada—Timber harvest in coming decades on Forest Service lands in the Sierra Nevada will be governed by the Record of Decision for the SNFPA. The Record of Decision states: ''For each national forest affected by this decision, a revised allowable sale quantity (ASQ) will be established at the time of their Forest Plan Revision. Until those revisions are complete, the total annual Probable Sales Quantity (PSQ) green volume for the 11 national forests is estimated to be approximately 191 million board feet (mmbf) for the next five years, which includes approximately 137 mmbf from the pilot project for the Herger-Feinstein Quincy Library Group (HFQLG). The estimated annual volume for the ensuing five years is approximately 108 mmbf. An additional 91 mmbf of salvage harvest per year may also be made available (USFS 2001b).

Totaling approximately 282 mmbf per year in combined volume of green and salvage timber harvest for the first five years, this harvest level would be similar to the annual average harvest volume (about 279 mmbf) from Sierra Nevada national forests from FY 1998 to 2000, described above. However, the harvest would be distributed somewhat differently than in past years, as over 70 percent of the green tree volume will be harvested from the three forests (Lassen, Plumas, and Tahoe) involved in the HFQLG pilot project. (Since 1994, the amount harvested from these three forests has ranged from 56 percent to 71 percent of the total harvested from all Sierra forests.) All of the planned harvest would be subject to the SNFPA Standards and Guidelines summarized below. It should be noted that even though the projected volume from the HFQLG pilot project was 139 mmbf per year, the total harvest in the first two years was only about 60 mmbf, primarily as a result of the constraints of the SNFPA and planning delays (Mary Carroll-Martin, USFS, pers. comm. 2003).

Timber harvest on private lands in the Sierra Nevada—Private timber harvest is widespread in the Sierra Nevada. Between 1999 and 2001, 765 timber harvest plans covering 86,685 ha (216,675 ac) within the range of the California spotted owl were submitted (Susan Britting, Sierra Nevada Forest Protection Campaign, *in litt.* 2002). For the foreseeable future, timber harvest on industrial timber lands in the Sierra Nevada will be conducted in compliance with the California Forest Practice Rules. Regulatory aspects of the Sustained Yield Plans (SYP) program are further described in Factor D below.

The primary private industrial timberland owner in the Sierra Nevada is Sierra Pacific Industries, Inc. (SPI), which owns about 376,351 ha (930,000 ac) within the range of the California spotted owl. For the next several decades, SPI's timber harvest will be conducted according to their Maximum Sustainable Production (MSP) plan pursuant to the California Forest Practice Rules (further described in Factor D below). Under this plan, SPI projects an increase of large tree/closed canopy conditions from about 20 percent of the landscape in year one (current condition) to 65 percent in year 80 and stabilizing to 55 percent in year 100. Over the 100 year period, the average diameter of trees increases from 18 in class (current condition) to 32 in class, and projections anticipate maintenance of the higher proportion of larger tree class over time with harvest practices (SPI 1999 a and b).

Timber harvest in southern California—The four southern California National Forests are currently operating under Forest Land and Resource Management Plans that were completed in the late 1980s. As discussed further in Factor D, these plans are in the process of revision. There is not an Allowable Sale Quantity or Proposed Sale Quantity proposed in the Southern California Conservation Strategy. The prolonged mortality of vegetation has resulted in significant build-up of fuels in the San Bernardino National Forest. In order to reduce both a fuel hazard and risk of fire, the San Bernardino National Forest has a number of salvage harvest timber sales currently under contract. Additional sales are being planned and the sale program will respond to continuing and projected mortality (M. Gertsch, USFS, pers. comm. 2002). Timber harvest on these forests will be conducted with California spotted owl protection measures (M. Gertsch, USFS, pers. comm. 2002).

In summary, available information suggests that U.S. Forest Service timber harvest levels in the Sierra Nevada and southern California are not expected to increase substantially above current levels. In addition, the SPI MSP is expected to provide an increasing amount of habitat on that large industrial ownership over the next few decades. Other private lands have not been specifically evaluated, but will be governed under the FPRs, further described below.

Risk of Catastrophic Fire—Weatherspoon *et al.* (1992) identified the following major factors of concern in habitats of California spotted owls in the Sierra Nevada that pertained to fire risk: (1) Ingrowth of shade-tolerant tree species, creating unnaturally dense stands with ground-to-crown fuel ladders; (2) excessive accumulation of surface fuels; and (3) change in composition of tree species from fewer pines and black oaks to more firs and incense-cedar. Such conditions create a tendency towards crown fires that kill most or all trees in an area, which may result in direct mortality of California spotted owls or make the burned habitat unsuitable for the species.

Approximately 39 percent of the California spotted owl sites on national forest lands in the Sierra Nevada occur in areas with high fire hazard risk (USFS 2001a). However, as stated above, the actual loss of owl sites to wildfire has been small in recent years, perhaps due to effective suppression and environmental factors. The annual rate of loss has been only 0.2 percent of the known national forest owl sites in the Sierra (Service 2001). Thus, based on recent rates of loss to catastrophic fire, it could be argued that the risk to the subspecies is not particularly high. Effects at some local levels have been larger; the Plumas National Forest lost 5 percent of protected activity centers (PAC, protected owl nest and surrounding habitat) per year over a recent two-year period (USFS 2001a). It is also argued that the steadily increasing amount of forest fuel creates an ever-increasing risk of large catastrophic fires (Weatherspoon *et al.* 1992).

The Forest Service currently believes that wildfire effects, particularly those associated with large, stand replacing wildfires, are a major source of risk to spotted owl populations (USFS 2001b). This is based on analysis of recent trends in fire occurrence and on the explicit assumption that the recently-observed high rate of large severe fires will continue. Also, the growing concern over the potential for disastrous wildfire effects on human communities has strongly influenced management direction toward reducing fuels in forests in proximity to human communities in the so-called Wildland Urban Interface (WUI). Response to this concern is manifested in nationwide activities under the National Fire Plan (National Interagency Fire Center (NIFC) 2002), which established general guidance and funding for land management agencies and communities involved in fire suppression and fuels reduction.

This recently increased focus on reduction of forest fuels has substantial implications for the California spotted owl, and raises difficult questions about the potential benefits and risks to the subspecies that may result from reduction of forest fuels. In general terms, the situation may be described as follows: In today's forests, the high canopy-cover stands currently much-used by spotted owls are largely a product of sustained fire suppression in stands regenerating after high levels of harvest that occurred several decades ago. The large numbers of small and medium-sized understory trees that create high degrees of canopy cover also act as a potential fuel ladder that can carry fire into the forest crown, where, under some conditions, the fire can spread rapidly and create extensive tree mortality. The competition among many small trees suppresses the rate of growth of the stand into the larger trees that are an important component of high quality habitat for owl nesting and forage production. More mature habitat features a high degree of foliage volume and canopy cover that begins high above the ground and is not as vulnerable to fire. Thus, the primary technique of fuels reduction, thinning understory trees with mechanical equipment and/or prescribed fire, may have detrimental effects on owl habitat in the short term (10 to 20 years), but may favor development of habitat in the longer term, and may reduce the likelihood of catastrophic fire that could substantially degrade or eliminate habitat.

Tradeoffs between owl habitat lost through treatments versus projected losses to wildfire events are complex and difficult to assess. The effects of vegetation treatments upon owl habitat are mostly immediate and relatively easy to quantify, but reductions in the acreage and intensity of future wildfires due to vegetation treatments will be realized over much longer periods. In addition, due to the random nature of wildfire events, projections regarding future wildfire have greater amounts of uncertainty and are heavily dependent upon assumptions that are difficult to quantify.

In the Record of Decision for the SNFPA, the Regional Forester stated ''Two factors of greatest concern to me are: (1) Ensuring the long term protection and recovery of old forest conditions and the spotted owl and other species (2) being able to ensure that the risk of wildfires within the Sierra Nevada can be managed to protect ecosystems, property and communities' (USFS 2001b). The objective of the SNFPA's conservation strategy for California spotted owls was to provide the environmental conditions needed to establish a high likelihood of maintaining viable populations of the California spotted owl, well distributed across the national forests within the Sierra Nevada planning area. This strategy sought to maintain habitat capable of supporting existing owl populations, stabilize current population declines, and provide increases in owl habitat over time. It was based on providing and improving fundamental components of spotted owl habitat such as: a high foliage volume and complex vegetation structure at nest sites; a high percentage of home ranges in forests with moderate to high cover that are concentrated near nest sites; and habitat for primary prey species, especially the northern flying squirrel.

This objective is to be accomplished through a multi-scale landscape strategy to: (1) Protect and manage allocations called ''Old Forest Emphasis Areas'' to provide large area reserves of high quality spotted owl habitat; (2) conduct surveys for owls where vegetation treatments would occur; (3) establish PACs comprising known and suspected nest stands and the best available 121 ha (300 ac) of habitat around owl activity centers; (4) establish limited operating periods within approximately 0.4 km (0.25 mi) of California spotted owl nest sites during the breeding season (March 1 through August 31); (5) protect and manage individual spotted owl home range core areas (972 ha (2,400 ac) on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest; 405 ha (1,000 ac) on the Almanor Ranger District of the Lassen National Forest, Modoc, Inyo, Plumas, Tahoe, Eldorado, Lake Tahoe Basin Management Unit, and portions of the Humboldt-Toiyabe and Stanislaus National Forests; and 243 ha (600 ac) on the Sequoia and Sierra National Forests) in the ''general forest'' forested areas outside of Old Forest Emphasis Areas; (6) manage the general forest outside of owl core areas to maintain and increase the amount of suitable spotted owl habitat; and (7) address fire hazard and risk by reducing surface and ladder fuels within strategically placed area treatments focusing on the urban wildland intermix zone and Old Forest Emphasis Areas of high hazard and risk (USFS 2001a and b).

Based on the explicit assumption that the California spotted owl was in some degree of population decline, the SNFPA incorporated numerous Land Allocations and Standards and Guidelines (S and Gs) that protect existing owl habitat across the landscape and in the course of implementation of fuels treatments. In general, these measures apply to four landscape level designations. In order of increasing intensity of potential fuels treatment, these designations are old forest emphasis areas, general forest, the urban threat zone, and the urban Defense zone. The most important features of the S and Gs that relate to conservation of California spotted owls are summarized below, based on discussion in the SNFPA Record of Decision (USFS 2001b). More detail is given in the FEIS (USFS 2001a).

Important aspects of the SNFPA allocations and S and Gs include the following:

(1) In forests west of the Sierra crest (westside), all live conifer trees with a dbh of 76 cm (30 in) or greater will be retained. East of the crest, where trees generally do not grow as large or as rapidly, all trees 61 cm (24 in) or greater in the eastside pine forest type will be retained. Montane hardwoods with a dbh of 30 cm (12 in) or greater within westside forest types will be retained. Prescribed burn prescriptions and techniques will be designed to minimize the loss of large trees and down material. The largest down logs will be retained for coarse woody debris outside of the Defense zone of the urban wildland intermix. Forested stands over 2 ha (5 ac) with the largest trees will be maintained to perpetuate their current conditions. Generally, in these stands no trees greater than 30 cm (12 in) dbh will be removed and canopy cover will not be reduced more than 10 percent below current conditions when applying necessary fuels reduction treatments.

(2) Spotted owl PACs will be applied in all designations except the Defense zone of the urban wildland intermix. PACS are to include at least 121 ha (300 ac) of the best available habitat. Total acreage in spotted owls PACs (including non-habitat acreage within the PACs as presently designated) is currently estimated at 243,258 ha (601,116 acres) (K. Barber, USFS, pers. comm. 2003), which is about 12 percent of the forested acreage on national forest lands in the Sierras. Stand-altering activities in spotted owl PACs will be limited to reduction of surface and ladder fuels through prescribed fire treatments. Prior to prescribed burning, known nest trees and trees in the immediate vicinity will be protected by hand line construction, tree pruning, and cutting of small trees within a surrounding 0.4 to 0.8 ha (one to two ac) area. Activities that could disturb nesting would be prohibited within 402 meters (0.25 mi) of nests within the breeding season unless it is demonstrated that nesting is not occurring. Vegetation treatments will occur in no more than 5 percent per year and no more than 10 percent per decade of the California spotted owl PACs.

(3) Spotted owl home range core areas will be applied around all PACs, except in the Threat zone as described below. Generally, fuel treatments in home range core areas will be limited to prescribed fire or low intensity mechanical treatments for the removal of material necessary to reduce surface and ladder fuels sufficient to achieve an average flame length of 2 m (6 ft) or less if the stand were to burn under 90th percentile fire weather conditions. Fuels treatment measures will be similar to those described in the following discussion of Old Forest Emphasis Areas (USFS 2001a and b).

(4) Old Forest Emphasis Areas will be established, totaling over 1,618,712 ha (4,000,000 ac). Currently, about 70 percent of the acreage in these areas is suitable owl habitat (USFS 2001a and b); thus, about 65 percent of the

estimated 1.7 million ha (4.3 million ac) of existing habitat on national forests in the Sierras is within the Old Forest Emphasis Areas. About 49 percent of the California spotted owl sites known on national forest lands in the Sierras lie within old forest emphasis and wilderness areas. Additionally, all stands of high quality habitat outside old forest emphasis areas (*i.e.,* California WHR types 5M, 5D, and 6) will also be identified and protected.

Several protective prescriptions apply in old forest areas, based on their location with respect to other management needs. Where possible, managers are directed to avoid applying the ''strategically placed landscape fuel treatments'' in Old Forest Emphasis Areas. However, placement of these strategic fuel treatments may be required within Old Forest Emphasis Areas to minimize the risks to human life and property, sensitive resources, or protect the Old Forest Emphasis Area from loss to wildfire. In Old Forest Emphasis Areas (as in spotted owl home range core areas), fuel treatments will be limited to the removal of material necessary to reduce surface and ladder fuels sufficient to achieve an average flame length of 1.8 m (6 ft) or less if the stand were to burn under 90th percentile fire weather conditions.

When treatments are necessary within Old Forest Emphasis Areas, prescribed fire is the first priority to achieve the fuels objectives, rather than mechanical treatment. When prescribed fire will not achieve fuels objectives, mechanical thinning of understory trees less than 30 cm (12 in) dbh will be used to achieve the fuels objectives. However, in some instances those treatments will not achieve the fuels objectives due to existing stand conditions. In those situations incidental mechanical thinning of trees up to 51 cm (20 in) dbh and canopy reductions of up to 20 percent may be conducted in 28 to 61 cm (11 to 24 in) dbh stands with greater than 40 percent canopy cover. An additional analysis of suitable owl habitat will be conducted before applying the mechanical thinning of up to 51 cm (20 in) dbh and canopy reductions of up to 20 percent prescription in Old Forest Emphasis Areas. This prescription may only be utilized when sufficient suitable owl habitat exists to satisfy the requirements of a home range core area within 2.4 km (1.5 mi) of the nest site or activity center. This site specific analysis will be documented in the project environmental assessment. A minimum of 50 percent canopy cover will be retained on the westside and 30 percent will be retained on the eastside following any mechanical fuel treatments in Old Forest Emphasis Areas;

(5) The General Forest designation is that area outside of other designations. It consists of about 1.69 million ha (4.17 million ac) (after subtraction of overlapping allocations with higher priority). In the General Forest lands, spotted owl home range core areas and PACs are protected as described in the previous paragraphs. Within General Forest that is outside spotted owl PACs and home range core areas, no trees greater than 51 cm (20 in) dbh will be removed and canopy cover will not be reduced more than 20 percent below current conditions. A minimum of 50 percent canopy cover will be retained on the westside and 30 percent will be retained on the eastside following mechanical treatments. The four largest snags per acre over 38 cm (15 in) dbh will be retained.

(6) The threat zone of the urban wildland intermix consists of all areas on Forest Service lands that are between 0.4 km (0.25 mi) and 2.4 km (1.5 mi) of human structures. Recent analysis indicates that this area contains over 849,823 ha (2,100,000 ac) or about 18 percent of the national forest lands in the Sierra Nevada (K. Barber, USFS, pers. comm. 2003). The FEIS stated that about 32 percent of the known activity centers occurred within the threat zone (USFS 2001a). The threat zone overlaps about half of the California spotted owl PACs (an indication of the extensive spread of human development in the region), and about 29 percent of the total PAC acres are overlapped by the threat zone. Generally, no trees greater than 51 cm (20 in) dbh will be removed, and canopy cover will not be reduced more than 20 percent below current levels in the threat zone. A minimum of 50 percent canopy cover will be retained on the westside and 30 percent will be retained on the eastside. The four largest snags per acre over 38 cm (15 in) dbh will be retained. Strategically placed landscape treatments will be implemented to achieve fuels objectives within the Threat zone. Spotted owl PACs will be established and managed as described in (2) above, but, in an effort to balance the need for effective fuels reductions treatments with conservation of owl habitat, the S&GS did not establish home range core areas in the Threat zone. Instead, site-specific analysis will determine whether sufficient suitable habitat exists to satisfy the requirements of a home range core area within 2.4 km (1.5 mi) of the nest site or activity center. Where sufficient habitat will remain within that area, fuels treatments that remove trees up to 51 cm (20 in) dbh and reducing canopy cover by up to 20 percent, but resulting in no less than 50 percent canopy cover post-treatment, may be utilized outside of PACs in 28 to 61 cm (11 to 24 in) dbh stands with greater than 60 percent canopy cover. Otherwise, the treatment will be constrained to removal of trees less than 30 cm (12 in) dbh. The site-specific analysis will be documented in the project environmental assessment.

(7) The Defense zone of the Urban Wildland Intermix includes those areas of national forest land that are within 0.4 km (0.25 mi) of human structures. The most recent available estimate indicates that the Defense zone totals about 137,995 ha (341,000 ac) of national forest lands (K. Barber USFS pers comm. 2003), representing about three percent of the national forest lands in the Sierra Nevada. About 4.0 percent of the California spotted owl activity centers in the Sierra Nevada occur within the Defense zone (USFS 2001a). The Defense zone overlaps portions of about half of all California spotted owl PACs on Sierra national forest lands, but, based on experience in early implementation of the SNFPA, the Defense zone includes only about 4 percent of the total PAC acreage, as a result of its narrow, linear form (K. Barber USFS pers comm. 2003). This area is the highest priority for fuel treatments, and the relatively intensive treatments allowed in this zone may result in stands that are not suitable for California spotted owls. In the Defense zone, mechanical treatments will be prohibited within a 152 m (500-foot) radius buffer around a spotted owl nest site or activity center.

(8) Vegetation treatments will occur on no more than 30 to 40 percent of each watershed. These vegetation treatments will result in stand conditions meeting the definition of suitable owl habitat.

Effects of The Quincy Library Group Pilot Project—In 1998, the HFQLG designated areas on the Lassen, Plumas, and Tahoe National Forests that would be treated for creation of a landscape-based fuels reduction program. The Record of Decision for the SNFPA (USFS 2001b) directed that all SNFPA S and Gs applying to California spotted owls will be implemented in the HFQLG pilot project, resulting in the inability to carry out about ten percent of the Defensible Fuel Profile Zones that had been proposed in the original HFQLG Environmental Impact Statement (USFS 2001b). As stated earlier, the expected harvest volume of 138 mmbf per year from the HFQLG area would be less than the amount harvested on the three forests during the late 1990s. However, in the first two years of implementation, the project has harvested a total of about 60 mmbf (M. Carroll-Martin, USFS, pers. comm. 2003), so anticipated effects described in the FEIS, which included a decrease in owl habitat of 5 to 8 percent (USFS 2001a), may be occurring at a slower rate than anticipated.

Effects of future habitat modification by fuel treatments and wildfire—Under the SNFPA, fuel treatments will be applied on a relatively small portion of the Sierra Nevada. Prescribed fire treatments would be used on less than six percent of the forested area; prescriptions thinning trees below 30 cm (12 in) dbh on about three percent; thinning of trees 30 to 51 cm (12 to 20 in) dbh on less than one percent; and thinning of trees over 51 cm (20 in) dbh on less than one half of one percent (derived from data in USFS 2001a and K. Barber, USFS, pers comm. 2003) However, because spotted owl habitat is in a condition that favors the spread of intense wildfire, many of the treatments will be focused on spotted owl habitat.

According to a database of treatments projected to occur over the next 20 years provided to us by the Forest Service (Service 2001), SNFPA mechanical treatments will treat approximately 25 percent of suitable owl habitat in the Sierras. However, these treatments will not be equally distributed among the forests. Mechanical treatments on the Lassen, Plumas, and Tahoe National Forests (forests comprising the QLG pilot project area) will treat 31, 28, and 31 percent, respectively, of spotted owl habitat.

According to the SNFPA FEIS (USFS 2001a), only a small amount of spotted owl habitat is expected to be rendered completely unsuitable by fuels treatments and wildfire. The total habitat area projected to be lost to both causes in the first decade is about 26,304 ha (65,000 ac) and in the second decade, about 23,876 ha (59,000 ac). The projection for the second decade is less because the most intense fuels treatments will take place in high risk areas in the first decade. In total, this loss would represent about three percent of the estimated existing habitat over the next twenty years. On a landscape basis, this loss will be overcome by a projected overall increase in high quality habitat of about 13 percent over the next fifty years (USFS 2001a). This increase is expected to occur as today's young and mid-aged stands mature into larger size classes, assisted by the thinning and reduction in intense wildfire that are among the objectives of the SNFPA. Habitat suitability for the primary prey species, the northern flying squirrel and dusky-footed woodrat, is also projected to increase (USFS 2001a).

The primary area where fuel treatments would remove large trees and reduce canopy cover to the point of unsuitability for owls would be the Defense zone of the wildland/urban interface. The FEIS estimated that about four percent of the known spotted owl activity centers fell within the Defense zone (USFS 2001a). More recent analysis indicates that the Defense zone overlaps some portion of 21 percent of all PACs; and Defense zone prescriptions could apply on an average of 35 ha (86 ac) of those affected PACs. However, only about four percent of the overall PAC acreage in the Sierra Nevada occurs within the Defense zone (Klaus Barber, USFS, pers. comm. 2003), so this effect should be limited.

While the S and Gs provide some protection for a 152 m (500-foot) radius (about 7 ha (18 ac)) around known activity centers that are found in the Defense zone, canopy cover in the remainder of the Defense zone could potentially be reduced to the point that it will probably be unsuitable for nesting, roosting, or foraging by spotted owls. The portion of those PACs that will actually be changed from suitable to unsuitable is unknown; this will depend on the original condition and the site-specific treatment. This effect could lead to reduced productivity on these sites through reduction of foraging habitat (Blakesley *in litt.* 2002a, Bart 1995a). While the fuel treatment prescription for the Defense zone could potentially be applied on over 137,591 ha (340,000 ac) only about seven percent of the Defense zone area overlaps PACs. The Defense zone treatments will also affect foraging areas that are associated with other more distant PACs, but this effect should be limited to a relatively small proportion of the foraging area by the narrow linear nature of the Defense zone.

During the early decades of SNFPA implementation, less severe habitat modification by fuel treatments and wildfire outside the Defense zone will be considerably more extensive. This habitat modification will probably be the most important factor affecting California spotted owl populations in the next few decades, and such, needs careful evaluation in this finding.

In general, treatments that remove habitat features such as large trees, snags, logs, and woody debris or that reduce canopy cover may be detrimental to California spotted owls, at least until these features can be regenerated by continuing growth of forest stands. As described in previous sections, large trees, high degrees of canopy closure, and large snags and logs are associated with owl nesting, roosting, and foraging habitat, and with the habitat of their primary prey in much of the Sierra, the northern flying squirrel. Alternately, treatments that retain sufficient canopy cover and habitat features to support California spotted owls, while at the same time reducing the risk of catastrophic fire, may benefit the species (Weatherspoon *et al.* 1992, Larry L. Irwin and Jack Ward Thomas, National Council for Air and Stream Improvement, Inc., *in litt.* 2002).

The primary aspects of fuel treatments that would potentially affect spotted owl habitat are (1) removal of trees larger than 51 cm (20 in.) diameter, which may reduce numbers of existing and potential nesting trees and large diameter snags and logs, with an accompanying reduction of canopy cover; and (2) removal of trees 30 to 51 cm (12 to 20 in.) in diameter, with resultant reduction in canopy closure, and perhaps to a lesser degree, reduction in numbers of existing nest trees and recruitment of potential nesting trees and large diameter snags and logs.

Throughout the area of the SNFPA, a general S&G precludes the removal of any tree over 76 cm (30 in.) dbh. The prescriptions that would allow any extensive harvest of trees of over 51 cm (20 in.) dbh (except for incidental removal for operability) are confined to the Defense zone. In addition, outside the Defense zone, removal of trees over 51 cm (20 in.) dbh would be limited to moderate quality habitat (*i.e.*, CWHR 4M and 4D) in the threat zone where this zone overlaps Old Forest Emphasis areas or where home range core areas exceed a habitat quantity standard. Thus, except for possible eventual long-term effects on recruitment of large trees that might result from continued extensive thinning of small understory trees (Franklin and Fites-Kaufmann 1996), most effects of the SNFPA on large trees are confined to the Defense zone and, with limitations, to other areas outside PACs only if their removal is necessary to allow mechanical treatments.

Therefore, since effects on large trees are limited, most of the effects of the SNFPA would be anticipated to result from the harvest of trees in the 30 to 51 cm (12 to 20 in.) size class. A small minority of spotted owl nests have been found in trees in this size class (USFS 2001a), but all known nest sites will be protected, so loss of existing nest trees is not expected. Trees in this size class also contribute to roost sites, but most breeding season roost sites would be expected to be contained within PACs, where no mechanical treatments will be allowed. Thus, loss of these trees in breeding season roost sites would be confined to the Defense zone and to effects of prescribed fire in those areas of PACs where managers could use fire without important effects.

As a result of the above protections, the primary effect of removal of trees 30 to 51 cm (12 to 20 in.) dbh will be in foraging areas, rather than at nest sites. Because the home range core areas receive the heaviest foraging use, the effects could be most important there, but everywhere outside the Defense zone, except in the threat zone outside home range core areas and PACs, trees 30 to 51 cm (12 to 20 in.) dbh will only be removed when sufficient habitat exists within 2.4 km (1.5 mi) to meet the core area habitat requirements. Thus, effects on spotted owls due to removal of trees 30 to 51 cm (12 to 20 in.) dbh are expected to be limited.

Another important effect of fuel treatments may be reduction in canopy closure. In the Defense zone, the canopy closure could be reduced to a level below the 40 percent threshold that defines habitat suitable for use by spotted owls, although according to the Forest Service, this area is often left at about 40 percent to obtain the benefits of shade in the fuel break (K. Barber, USFS pers. comm. 2003). In the threat zone, canopy cover may be reduced not more than 20 percent below current levels, and not below 50 percent cover; and in home range core areas in that zone, may not be reduced unless sufficient habitat exists within 2.4 km (1.5 mi) to meet the core area habitat requirements. In General Forest that is outside PACs, home range core areas, and patches of high quality habitat (where cover could be reduced by no more than 10 percent), canopy may be reduced by 20 percent, but generally not to lower than 50 percent cover. In westside home range core areas, and in Old Forest Emphasis areas, canopy cover may be reduced not more than 10 percent from existing levels unless habitat standards are met, and not below 50 percent cover overall.

As a result of the above measures, opportunities for reduction of canopy closure by more than 10 percent outside the Defense zone would be limited to areas outside home range core areas unless the habitat standards are met. Where the habitat standard is met, the degree of reduction would not exceed 20 percent, and would not go below 50 percent overall unless the stand was already below 50 percent canopy closure. Reduction of canopy closure by 20 percent would potentially reduce opportunities for nesting in areas where nesting does not currently occur, at least for the short term, but these prescriptions would not apply in areas designated as PACs or in any home range core areas that do not exceed the habitat standard. In all areas except the Defense zone, habitat that currently has a degree of canopy closure suitable for foraging use would retain that character after treatment.

Reduction in canopy closure might potentially have important effects on survival and reproduction of spotted owls, especially related to effects of exposure to weather and modification of forage species habitat. Potential effects of weather on adult and juvenile survival (Franklin *et al.* 2000, North *et al.* 2000) would be largely avoided in 121 ha (300-ac) PACs around all known nest sites and activity centers, where only prescribed fire is allowed to treat surface and ladder fuels, and where effects to overstory canopy would be expected to be minimal. Fuel treatments in PACs would occur only in 5 percent of PACs per year and 10 percent per decade.

In addition, reduction in canopy closure might have effects on occupancy and reproductive success of California spotted owls. North *et al.* (2000) reported on the positive influence of high foliage volume around nest sites on owl reproduction. Effects on this attribute would not be anticipated from fuel treatments under the S and Gs. Hunsaker *et al.* (2002) reported that California spotted owl reproductive success was correlated with degree of canopy cover within several radii around nests, and thus, it might be inferred that even relatively small reductions in canopy cover by fuel treatments in foraging areas could reduce reproductive success. However, prior to publication of Hunsaker *et al.* 2002, during the process of publication of that study, analysis of the data by another Forest Service scientist (Lee 2001) found that the statistical methodology of Hunsaker *et al.* (2002) was flawed, and thus, the above inference cannot be supported. The analyses of the data by both Hunsaker *et al.* (2002) and Lee (2001) found that canopy cover of at least 50 percent was desirable; that level would be maintained by the S and Gs in all areas but the Defense zone. Blakesley (2002a) reported that amount of habitat above 40 percent canopy cover was positively correlated with owl reproduction, but did not evaluate differences between increments of canopy cover. Outside the Defense zone, treatments would not reduce higher degrees of cover to below the 40 percent level.

In many cases, the renewed growth of the crowns of the remaining stand after thinning would be expected to fill in the canopy cover within one to two decades, so effects of reduction in canopy closure due to thinning of understory trees might be temporary. Additionally, the extent of such effects would be tempered by the limitation on fuel treatments to less than 40 percent of watersheds (outside the Defense zone), and by the direction to focus treatments on the upper two-thirds of slopes.

The Service concludes that no available data firmly indicate that the removal of trees and the reduction in canopy cover as prescribed by the SNFPA S and Gs and described above would have substantial negative effects on California spotted owl reproduction and occupancy, except in the Defense zone. This does not mean that negative effects would not occur. Such effects are possible, and researchers have suggested that subtle effects could be important if they occur on a wide scale (Noon *et al.* 1992). Substantial scientific uncertainty remains regarding the effects of fuel treatments in PACs and foraging areas. However, in the absence of demonstrated effects, and considering that the potential negative impacts are also accompanied by the positive effects of fire risk reduction and faster development of high quality habitat, we find that the timber harvest and fuel treatments proposed under the SNFPA do not constitute a significant threat to the California spotted owl at this time.

Fire on nonfederal Lands—The California Department of Forestry and Fire Protection (CDF 2002) reported that over 47,347 ha (117,000 ac) of nonfederal lands burned in 2002 and that for the most recent 5 year period (1998 to 2002) an average of 47,347 (117,000 ac) of nonfederal lands burned per year (CDF 2002). However, these statistics are not broken down by habitat type and, thus, do not provide an indication of losses for forest lands or spotted owl habitat.

In general, risk of catastrophic fire is probably lower on industrial timber lands than on many Federal forest lands, as a result of more active management, especially thinning, in recent decades. Risk varies on timber lands in other private ownership, according to the degree of timber harvest and fuel reduction.

Threats From Urbanization

Residential development, both through growth of communities and construction of dispersed residences, poses a threat to California spotted owls by removing and fragmenting suitable habitat for the spotted owl and can remove habitat for prey species, especially woodrats. Residential developments also introduce and increase urban adapted predators (cats, dogs, skunks, racoons, ravens, crows) into spotted owl habitat; these predators may kill fledgling spotted owls in the nest or on the ground before they are capable fliers. Fires within the range of the California spotted owl, which could result in the loss of habitat, are more likely to be human caused, especially at the urban interface (NIFC 2002).

Development that is most likely to result in the loss of spotted owl habitat is occurring on private land in the lower elevation foothill areas of the Sierra Nevada and in southern California (Verner *et al.* 1992a). Statistics for nine of fifteen Sierra Nevada counties within the range of the California spotted owl show these counties are currently experiencing varying degrees of urban expansion, and have projected population growth rates from 0.7 percent in Sierra county to 6.2 percent in Calaveras county (Sierra Business Council 1997). The amount of private versus public lands in the Sierra Nevada and southern California portions of the range varies widely by county. The Sierra Nevada Ecosystem Project (1996) core analysis area encompassed almost 8.5 million ha (21 million ac) in the Sierra Nevada, of which 61 percent is Federal and 38 percent is nonfederal lands. Estimates from the Sierra Business Council (1997) indicate that for the nine Sierra Nevada counties in the range of the spotted owl they analyzed, an average of 46 percent is private land. These studies do not identify specific habitat types within ownerships; however, we assume higher elevation (greater than 3,000 ft) lands that are predominately in Federal ownership are at a lower risk of loss due to urbanization, while lower elevation (less than 3,000 ft) lands, in private ownership are more likely at risk of habitat loss. Some information is available on the ''projected'' amount of land planned for development by county as specified in their General Plans, however, these accounts are not sufficiently detailed to identify habitat types that are planned for development. McBride *et al.* (1996) looked at the impacts of development in specific habitat types in selected areas in five counties in the Sierra Nevada. Their results indicated there was a decrease in crown cover and tree density and an increase in impervious surface; however, no estimates were given for the rate or amounts of habitat lost overall.

Direct and indirect loss and degradation of habitat of California spotted owls and their prey is expected to continue in mid and lower elevation zones of the Sierra Nevada and southern California ranges through residential development (Laymon 1988, Verner *et al.* 1992b), harvest of hardwoods for firewood production (Laymon 1988, Verner *et al.* 1992b), human disturbance, and other consequences of development because these are among the fastest growing areas in California (Laymon 1988, McKelvey and Weatherspoon 1992). Suitable habitat scattered among houses and housing developments was not found to be occupied by California spotted owls in southern California, although areas adjacent to these developments contained dense and productive populations of the subspecies (Gutiérrez 1994). As a result, development has the potential to further impair effective dispersal among isolated populations (Ruth and Standiford 1994). In the San Bernardino Mountains, development is likely to first occur at low elevations. Urbanization has similar negative implications for Sierra Nevada spotted owls that migrate to lower elevations in the winter (Laymon 1988, Verner *et al.* 1992b).

In southern California, the mountain ranges occupied by California spotted owls probably act as habitat islands with limited dispersal between them. Under natural conditions, if the spotted owl population of one island were reduced or eliminated, that population could be sustained or reestablished through immigration from another island. As a result, a concern is that individual populations of California spotted owls, for example, those in southern California, could become isolated from other parts of the subspecies' range, for example the Sierra Nevada. As urbanization between mountain ranges continues, habitats there may be made unsuitable to support dispersing California spotted owls, eliminating immigration and potentially leading to extirpation of one or more subpopulations (Verner *et al.* 1992).

It is evident urbanization and loss of spotted owl habitat is occurring, especially in the Sierra Nevada foothills and in southern California. This development is occurring within a variety of habitat types including agricultural, grassland, as well as woodlands, and conifer forest types used by spotted owls. Development is limited in some respects by county general planning efforts that guide development for a specified planning period. Based on the limited amount of information available we cannot conclude the loss of spotted owl habitat is significant nor are the threats from urbanization immediate.

Miscellaneous Habitat Factors. There are several minor or lesser known factors that may influence spotted owl survival. Each is discussed below.

Riparian forests are important habitats for California spotted owls in southern California (Verner *et al.* 1992a). Diversion of surface waters and pumping of groundwater depletes water from streams upon which such habitats depend. Therefore, such development may lead to loss of habitat in some areas and therefore extirpation of California spotted owls in those areas (Verner *et al.* 1992a).

During the late 1800s, heavy grazing of surface fuels by livestock may have reduced the influence or extent of wildfires (University of California 1996), and subsequent ingrowth of vegetation on denuded soils may have contributed to the heavy fuel loading and tendency towards catastrophic fire now found in much of the California spotted owl's range. Currently, livestock grazing may impact spotted owls by removing cover used by prey species, especially brush used by woodrats (Verner *et al.* 1992b).

Recreation is the fastest growing use of the national forests (USFS 2001a). The construction of facilities used for recreation, including campgrounds, trails (foot, horse, and off highway vehicle), roads, ski resorts, and cabins has likely contributed to the destruction and fragmentation of California spotted owl habitat. In addition to habitat loss, recreational activities have the potential to disturb spotted owls and thereby adversely affect their survival and reproduction (Service 2001). The effect of recreation on owls is poorly understood and may be an increasing threat to California spotted owls, especially in southern California (Noon and McKelvey 1992).

Sudden oak death is a tree disease caused by the pathogen *Phytophthora ramorum.* It infects a variety of trees, including true oaks (*Quercus* spp.), California bay laurel, tanoak, and madrone (CDF 2002). Some trees are killed by the disease, while others survive but serve as hosts. The disease can be found in 11 coastal counties outside the range of the California spotted owl and only one within the range (Monterey) (CDF 2002, UC Berkeley, *in litt.* 2002, Endicott 2002). The extent to which the disease may spread and the number of tree species it may affect remain undetermined. California spotted owls are forest species, thus, tree deaths caused by this pathogen may pose a threat to owls or their prey species.

In summary, threats affecting the California spotted owl's habitat by themselves, or in combination with other factors, do not seem to pose now or in the foreseeable future a significant threat to the continued existence of the California spotted owl such that it warrants listing.

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

We found no evidence that overutilization for commercial, recreation, scientific, or educational purposes is a threat to the California spotted owl. Research by Federal and State agencies, and various public institutions and private groups is conducted on the California spotted owl, but such research is not known to have a negative effect on the species. We are aware that northern spotted owl sites are visited by ecotourists (Sacramento Bee, October 27, 2002) and photographers, but we are not aware of such visits to California spotted owls. Therefore, we believe that overutilization for commercial, recreation, scientific, or educational purposes does not pose a threat to the continued existence of the California spotted owl.

C. Disease or Predation

Little is known regarding disease in California spotted owls (Verner *et al.* 1992b, Gutiérrez *et al.* 1995). They have a high infection rate by blood parasites, with 76 individuals examined showing 100 percent infection with one or more of *Haemoproteus noctuae, H. syrnii, Leucocytozoon ziemanni, Trypanosoma avium,* microfilariae, and/or *Atoxoplasma spp* (Verner *et al.* 1992b, Gutírrez *et al.* 1995). However, survival rates are high even where blood parasite infection rates are high (Verner *et al.* 1992b, Gutírrez *et al.* 1995). Infection by parasitic worms has been documented in northern spotted owls, including round worms, flat worms, and spiny-headed worms (Verner *et al.* 1992b, Gutírrez *et al.* 1995); and similar infections are likely in the California subspecies. External parasites have also been recorded in California spotted owls, including louse flies (*Icosta americana*) and chewing lice (*Strigiphilus spp*).

In 1999, a strain of the West Nile Virus (WNV) that has a high fatality rate in some birds was discovered in the eastern United States and more recently has infected humans in California (Russell 2002 and CDC 2002). WNV has been detected in dead birds of at least 138 species, although cause of death was not conclusively attributed to WNV (CDC 2002). Although birds, particularly crows and jays, infected with WNV can die or become ill, most infected birds do survive (CDC 2002). WNV is amplified during periods of adult mosquito blood-feeding by continuous transmission between mosquito vectors and bird reservoir hosts. Infectious mosquitoes carry virus particles in their salivary glands and infect susceptible bird species during blood-meal feeding. Bird reservoirs can sustain an infectious viremia (virus circulating in the bloodstream) for one to four days after exposure, after which these hosts develop life-long immunity. A sufficient number of vectors must feed on an infectious host to ensure that some survive long enough to feed again on a susceptible reservoir host.

In 2002, WNV activity has spread to most eastern and mid-western states, with 113 cases and 5 human deaths as of August 8, 2002 (United States Geological Service (USGS) 2002). We are not aware of any infection of spotted owls by the virus, but WNV has been found to infect the closely related barred owl (USGS, *in litt.* 2002), and may pose a threat to spotted owls.

Natural predators are discussed under Natural Mortality in the Life History section, above. Natural predation probably has little effect on healthy populations. However, as populations become smaller and more fragmented, the impacts of natural predation may also become significant. Also, the invasion of a new competitor and possible predator, the barred owl, is discussed in Factor E.

In summary, disease or predation factors by themselves, or in combination with other factors, do not seem to pose now or in the foreseeable future a significant threat to the continued existence of the California spotted owl such that it warrants listing.

D. The Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms that could provide some protection for the California spotted owl include: (1) Federal laws and regulations including the Migratory Bird Treaty Act (16 U.S.C. 703–712), the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528–531), the Wilderness Act of 1964 (16 U.S.C. 1131–1136), the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C 1601–1614, §§ 1641–1647), and the Sierra Nevada Forest Plan Amendment (USFS 2001a and b); and (2) State laws including the California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 *et seq.*), the California Forest Practice Rules (14 C.C.R. § 895 *et seq.*), and the California Fish and Game Code §§ 1 *et seq.* Local land use processes and ordinances are subject to CEQA.

Federal

The Migratory Bird Treaty Act (MBTA) prohibits ''take'' of any migratory bird. ''Take'' is defined as to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect . However, no provisions in the MBTA prevent habitat destruction except that causing direct mortality or destruction of active nests.

The Wilderness Act of 1964 established a National Wilderness Preservation System made up of federally owned areas designated by Congress as ''wilderness areas'' for the purpose of preserving and protecting designated areas in their natural condition. Commercial enterprise, road construction, use of motorized vehicles or other equipment, and structural developments are usually prohibited within designated wilderness areas. The Wilderness Act has protected some California spotted owl habitat from development or other types of habitat conversions; however, it does not have any provisions specific to the protection of the species.

The National Environmental Policy Act of 1969, as amended (NEPA), requires all Federal agencies to formally document and publicly disclose the environmental impacts of their actions and management decisions. NEPA documentation is provided in either an environmental impact statement, an environmental assessment, or a categorical exemption, and may be subject to administrative or judicial appeal. The Forest Service considers the California spotted owl a species of concern. Therefore, part of the analysis generated by the Forest Service to direct management decisions under NEPA may include a biological evaluation that discloses potential impacts to species of concern on a project by project basis.

The Multiple-Use Sustained-Yield Act of 1960, as amended, (MUSY) provides direction that the national forests be managed using principles of multiple use and to 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. Land management for multiple uses has inherent conflicts.

However 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 wildlife, including the California spotted owl, is a value that must be managed for, though discretion is given to each forest when considering the value of this species relative to the other uses for which it is managing. Although MUSY could provide some protection for the owl, it does not have any provisions specific to the conservation of the owl or its habitat.

The Forest Service also manages national forests under the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) as amended by the National Forest Management Act of 1976 (NFMA). Implementing regulations for NFMA (36 CFR 219.20(b)(i)) require all units of the National Forest System to have a land and resource management plan (LRMP). The purpose of the LRMP is to guide and set standards for all natural resource management activities over time. NFMA requires the Forest Service to incorporate standards and guidelines into LRMPs, including provisions to support and manage plant and animal communities for diversity, and the long-term range-wide viability of native and desired non-native species. Standards and guidelines are based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives.

Beginning in 1991 and culminating with the signing of the Record of Decision for the Sierra Nevada Forest Plan Amendments in 2001, the Forest Service initiated several Sierra Nevada-wide planning efforts to maintain viability of California spotted owls on national forest land. These efforts gathered and analyzed technical information as well as developed and refined management direction. These efforts included a technical assessment of the current status of the California spotted owl and issuance of interim guidelines (Verner *et al.* 1992a) for protecting California spotted owl habitat in January of 1993. The guidelines were adopted as the 1993 California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment and incorporated as amendments into the Forest Service's Land and Resource Management Plans.

These guidelines were intended to maintain management options and short-term population viability for the California spotted owl in the short term (maximum of five years; Verner 1999) until a conservation strategy for the owl was developed. The primary objectives of the interim guidelines were to protect known nest stands, protect large old trees in timber strata which provide suitable owl habitat, and reduce the threat of stand-destroying fires. However, they allowed degradation of suitable nesting and roosting habitat by allowing timber harvest (except in protected activity centers and some acreage in spotted owl habitat areas) to reduce canopy cover to 40 percent in timber types selected by owls and below 40 percent in other types used by owls according to their availability on the landscape. The estimated time of recovery of these treatments was five years. Under the interim guidelines, no mechanism existed to evaluate cumulative impacts of timber harvest on California spotted owls in national forests. After 1993 when baseline surveys for the species were completed within Forest Service managed lands, forest management continued without further requirements to survey for the owl.

In 1995 the Forest Service released a draft environmental impact statement (EIS) for a long-term management plan for California spotted owl habitat. Final direction was not issued due to new scientific information provided by the Sierra Nevada Ecosystem Project (SNEP) report released in 1996. In 1998 the Forest Service initiated a collaborative effort to incorporate new information from the SNEP report into management of Sierra Nevada national forests. This effort became known as the Sierra Nevada Framework for Conservation and Collaboration (Framework).

As part of the Framework, the Forest Service developed the SNFPA Environmental Impact Statement, for which a record of decision was issued on January 12, 2001 (USFS 2001b). This effort amended the land and resource management plans of Forest Service administered lands addressed by the Framework. 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 westside hardwood ecosystems. The SNFPA included a conservation strategy for California spotted owls, which replaced the interim guidelines.

Subsequent to the establishment of management direction by the Record of Decision of the SNFPA, Region 5 of the Forest Service has undertaken two efforts that may result in changes in the anticipated impacts of the SNFPA. The first is a management review of the SNFPA (USFS 2002b), and the second is planning for implementation of an Administrative Study on the Lassen and Plumas National Forests that would evaluate the effects of extensive fuels treatments on the California spotted owl (67 FR 72136). As of yet, neither of these efforts have formally established management direction, so their potential effects are uncertain and subject to change before implementation. Therefore, their potential effects are not included in the assessment of threats to the California spotted owl under this 12-month finding. However, because the outcome of each of these efforts could substantially affect California spotted owls, we will monitor the development of management direction, offer scientific assistance, and review the effects at a later date, if necessary.

The SNFPA applies only to national forests in the Sierra Nevada and Modoc Plateau. Spotted owls in southern California are protected by measures developed by each forest (Ruth and Standiford 1994), which are currently revising their LRMPs to include a strategy to manage habitat for the owl. As a result, no comprehensive strategy currently exists for the California spotted owl on national forests in southern California. The four Forests have completed an ecological assessment (Stephenson and Calcarone 1999) and in September 2001 published a Notice of Intent (NOI) to prepare a single Environmental Impact Statement and Record of Decision (USFS 2001c). The draft EIS is scheduled for release in 2003. Included in the Purpose and Need statement of the NOI is the intent ''To more adequately protect plant and animal species and their habitat.'' The Proposed Action also recognizes that one of the most compelling needs for change in Forest Plan direction is maintenance of viable populations of plant and animal species.

Other Federal agencies have general or specific policies and regulations that would apply to the owl. The National Park Service protects all species from collection, with exemptions only for scientific testing (36 CFR 2.5). The BLM has listed the owl as a Special Status Species that should be addressed prior to approval of actions that may impact the species on BLM lands (USDI 2001).

State. Section 3503.5 of the California Fish and Game Code (CDFG 2002) provides that it is unlawful to take, possess, or destroy any birds in the order Strigiformes (owls) or to take, possess, or destroy their nests or eggs. This restriction applies only to individual owls, their nests and eggs and does not place restrictions on inactive nests or habitats used by spotted owls.

The CDFG has identified the California spotted owl as a Species of Special Concern (CDFG 1978). This status applies to animals not listed under the Federal or the California Endangered Species Act but which appear to be vulnerable to extinction. The intent of this designation is to obtain special consideration for these species in the project planning process and to focus attention on the species to avert the need for listing under either State or Federal laws. CEQA requires that impacts to such species be mitigated. Although state and local agencies have discretion to approve projects that impact a Species of Special Concern, such impacts must be mitigated.

In 1970 the State of California enacted the CEQA (CEQA 1996a). CEQA requires a full disclosure of the potential environmental impacts of public or private projects carried out or authorized by nonfederal agencies within the state of California. The stated goals are to, ''identify the significant environmental effects of their actions; and, either avoid those significant environmental effects, where feasible; or mitigate those significant environmental effects, where feasible.'' The CEQA Guidelines provide criteria to the State or local public agency with permitting authority or jurisdiction over a project (lead agency) in determining whether a project may have significant effects (CEQA 2001b). Section 15065 of the CEQA Guidelines, as amended, requires a finding of significance if ''[t]he project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species' (CEQA 2001b).

CEQA requires review of any project that is undertaken, funded, or permitted by a State or local governmental agency. If a project with potential impacts on the California spotted owl were reviewed, CDFG personnel could determine that, although not listed, the spotted owl is a *de facto* endangered, threatened, or rare species under section 15380 of CEQA. Once significant effects are identified, the lead agency has the option of requring mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible (§ 21002) (CEQA 1996a), athough such an override requires justification and is rarely implemented.

The lead ageny is responsible for conducting a review of the project and consulting with the other agencies concerned with the resources affected by the project. If significant effects are identified by the lead agency, an Environmental Report (EIR) must be prepared that analyzes the effects of the action, proposed mitigation, and explains why any potential mitigation measure is not feasible. After review of the EIR by the public and relevant agencies, the lead agency has the option of disapproving the project, requiring mitigation for effects through changes in the project, or to decide that overriding considerations make mitigation infeasible and allow the project to go forward.

If a project with potential impacts on the California spotted owl were reviewed, CDFG personnel could determine that, although not listed, the spotted owl is a *de facto* endangered, threatened, or rare species under section 15380 of CEQA. Once significant effects are identified, the lead agency has the option of requiring mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible (§ 21002)(CEQA 1996a). CEQA analysis and subsequent requirements for mitigation (*e.g.*, legacy hardwoods) would result in protection of spotted owl habitat components. However, CEQA does not compel a comprehensive strategy for protection of this species.

Under provisions of CEQA, an independent regulatory program can be certified by the Secretary of the Resources Agency, and allow submission of a plan in place of an EIR. In 1973 the State of California enacted the Z'berg-Nejedly Forest Practice Act of 1973 (CDF 2000), to ensure that timber harvest was done in a manner that would preserve fish, wildlife, forests, streams and other water sources. Additional rules, called Forest Practice Rules (FPR) (CDF 2002), were promulgated by the State Board of Forestry and Fire Protection and are administered by the California Department of Forestry and Fire Protection (CDF) to carry out the intent of the Forest Practice Act. CDF ensures that private landowners abide by the FPRs when harvesting trees. Although there are specific exemptions in some cases, compliance with the Forest Practice Act and Board rules apply to commercial harvesting operations for landowners of all sizes. The FPRs require landowners prepare and submit for approval by CDF, a Timber Harvesting Plan (THP). A THP is the blueprint outlining what timber will be harvested, how it will be harvested, and the steps that will be taken to prevent damage to the environment. A THP functions as the equivalent of an EIR under CEQA.

THPs are prepared by Registered Professional Foresters (RPF) who are licensed to prepare detailed plans pursuant to California's Professional Foresters Law (PFL) of 1972 (CDF 2002). A RPF is defined as ''..a person who, by reason of his or her knowledge of the natural sciences, mathematics, and the principles of forestry, acquired by forestry education and experience, performs services, including, but not limited to, consultation, investigation, evaluation, planning or responsible supervision of forestry activities when [such] professional services require the application of forestry principles and techniques''. A person must have seven years experience in forestry work and may substitute a Master of Forestry or Bachelor of Science of Forestry degree in lieu of four years of forestry work experience and must pass a comprehensive examination administered by the Professional Foresters Examining Committee.

The FPRs provide that a THP must contain information on the presence and protection of known habitat or individuals of any listed species and information on the presence and protection of non-listed species that may be impacted by the timber operation. If information provided in a proposed THP is incorrect, incomplete or misleading in a material way, or is insufficient to evaluate significant environmental effects, the FPRs require disapproval of the THP. Under the FPRs, a species can be classified as a ''sensitive species'' if it is found that the California population requires timberland as habitat for foraging, breeding, or shelter, the California population is in decline or there is a threat from timber operations, and continued timber operations under the current rules of the Board will result in a loss of the California population viability. The California spotted owl is not currently listed as a sensitive species. The FPRs require a cumulative effects assessment to address any significant known wildlife or fisheries concerns where there is a substantial reduction in required habitat or the project will result in significant interference with the movement of resident or migratory species. The CDF requires measures including, but not limited to, a buffer that protects the nest, screening, perch, and replacement trees if a spotted owl nest is sighted during the planning or operations phase of a THP (Cunningham, CDF, pers. comm. 2002).

The implementation of the FPRs can take several forms from development of smaller individual site specific THPs to the so called Option B—landscape scale Sustained Yield Plans (SYPs). Currently there are two approved SYPs that cover approximately 73,700 ha (182,000 ac) of California spotted owl habitat north of Lake Almanor. This is approximately 8 percent of the estimated acres of potential suitable habitat on private timberlands (Verner *et al.* 1992a).

Another way to comply with the FPRs is development of the so called Option A-Maximum Sustainable Production (MSP) plan which provides a broad set of criteria that guides the individual THP process for the ownership (FPRs §§ 913.11, 933.11, 953.11)(CDF 2002). The primary goal of the MSP is to document and provide for the long term sustained yield of timber products.

Sierra Pacific Industries (SPI) is the largest private commercial timberland owner within the range of the California spotted owl. SPI owns approximately 376,351 ha (930,000 ac) of timberland within the range of the spotted owl. All of SPI's commercial timberland is harvested under two CDF approved MSPs (one for the north and one for the south) (SPI 1999 a & b). SPI continuously collects and maintains an inventory of vegetation/habitat over the entire ownership. The ownership is inventoried in 1.6 ha (4 ac) plots with detailed information on tree species, overstory, understory, size class, snag class, etc. Thus, SPI continuously maintains information on over 350,000 plots with 10 percent of the land ownership inventoried each year and all plots are inventoried each decade. Information is also collected on wildlife including location of California spotted owl nest sites. SPI uses the baseline inventory to model growth and yield of timber stands. This sophisticated modeling projects forest conditions for a 100 year planning horizon with a mix of silvicultural and cultural practices. SPI models project an increase of large tree/closed canopy conditions from about 20 percent of the landscape in year one (current condition) to 65 percent in year 80 and stabilizing to 55 percent in year 100. The average diameter of trees increases from 18 in class (current condition) to 32 in class and projections anticipate maintenance of the higher proportion of larger tree class over time with harvest practices.

The implementation of the FPRs focus primarily on sustainable timber harvest with a secondary focus on fish and wildlife. With no requirements to implement strategies to specifically manage and protect habitats that spotted owls use, some habitat elements may not be protected adequately. For example the FPRs do not require retention of structural elements such as downed woody debris that provide habitat for spotted owl prey species. However, the FPRs provide that all snags within the logging area be retained to provide wildlife habitat. There are exceptions, such as allowing harvest of merchantable snags in any location, snags whose felling is required for insect or disease control or safety reasons, and snags proposed for harvest by an RPF, where there is justification that there will not be a significant impact to wildlife. These exceptions provide discretion to timber operators on the ground to remove snags without specific review of the potential effects on owl habitat, unless addressed through late successional forest stands regulation. If a nest site is only discovered and buffered during harvest operations, impacts that have already occurred to the foraging and roosting habitat surrounding the nest site may not be adequately addressed. Furthermore, if planning or harvest operations occur outside the nesting season, nests may not be detected at all, and those habitats will receive no protection. Certain timber operations can be exempt from the THP process, including the harvest of dead and dying trees in amounts less than 10 percent of the volume of timber per acre.

The FPRs provide that in preparing a THP, the RPF may conduct the cumulative impacts assessment based on information that is reasonably available before submission of the THP. The effects of timber harvest in a watershed could be determined, cumulatively, to result in impacts not assessed on a site by site basis. CDF with support from CDFG for fish and wildlife species, determines the sufficiency of the assessment based on information in its files or on comments received during the notice and comment period. However, less than 25 percent of THPs are field checked by the CDFG, and most THPs do not adequately assess cumulative impacts (Berbach pers. comm. 2002). This level of review accounts for approximately 50 to 60 percent of the acres in THPs submitted, where the focus is often exclusively on listed species due to budget, priorities, and staffing issues (Garrison, CDFG, pers. comm. 2002). In smaller, non-industrial THPs, a complete cumulative effects analysis of past, present, and reasonably foreseeable actions at the watershed scale is not always provided by the land owner or the RPF preparing a THP. This is due to factors such as lack of funding to perform adequate watershed level analysis, lack of information about other private parcels in the watershed, and sometimes lack of knowledge of available resources, including studies conducted on larger public and private ownerships that would provide such information (Cunningham, CDF, pers. comm. 2002).

Approximately 80 percent of habitat for the California spotted owl on private lands is in the ownership of SPI timberlands and accounts for approximately 10–12 percent of the range of the spotted owl. All of SPI properties operate under a State required long term plan for timber production and resources management. As part of the requirement by the State, SPI's MSP does provide a sophisticated projection for long term increases in habitats characterized as suitable for nesting, roosting, foraging and dispersal by spotted owls. These habitats are projected to be well distributed across the landscape. SPI has taken steps to collect and analyze information on spotted owl nest locations, breeding success, and habitat use to support their conclusion that long term projections include an increase in habitat for spotted owls.

The timber management plans in place on private lands are not developed or implemented with the purpose of protecting habitat for California spotted owls. However, it appears that the State FPRs and the plans in place over a significant portion of the range of the spotted owl on private lands would result in some benefits to spotted owls. These plans would benefit from further evaluation and peer review to verify their contribution to spotted owl viability in the Sierra Nevada.

Therefore, we believe there is no substantive information that indicates there are significant or immediate threats to California spotted owl viability because of the lack of regulatory mechanisms.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Climate and Climate Change. Climate may influence vital rates (survival, fecundity, and recruitment) of spotted owls directly, or through indirect means such as effect on prey populations (LaHaye *et al.* 1994, Verner 1999, Franklin *et al.* 2000, North *et al.* 2000). In southern California, drought was postulated to affect spotted owl population dynamics through its effects on prey (LaHaye *et al.* 1994), and statistical modeling showed that drought is associated with reduced fecundity (LaHaye *et al.*, *in litt.* 2002). North *et al.* (2000) found synchronous low reproductive success of owls in the Sierra National Forest and Sequoia and Kings Canyon National Parks correlated to high spring precipitation (as was found for northern spotted owls by Franklin *et al.* (2000)) and lower spring temperatures, presumably due to effects of weather on prey species. Statistical modeling indicated lower fecundity in years with higher spring precipitation in spotted owls in southern California (LaHaye *et al.*, *in litt.* 2002). Results of a modeling study conducted by Franklin *et al.* (2000) suggested that northern spotted owl populations may experience periods of decline solely due to climatic variation; *i.e.*, even if habitat conditions remain unchanged, northern spotted owl populations may decline. The synchronous declines in reproduction observed by North *et al.* (2000) are of concern because as populations decline, the effects of catastrophes, especially those having a synchronous effect on populations, will have an increasing importance in determining rates of population change (Peery 1999, Franklin *et al.* 2000).

Climate may have greater impacts on spotted owls when working in concert with habitat degradation. Studies by Franklin *et al.* (2000) for northern spotted owls and by North *et al.* (2000) for California spotted owls indicate the important role habitat may play in buffering against the negative effects of climate. Franklin *et al.* (2000) found that the best model to predict adult survival included interactions between climate and habitat. Habitat quality, as defined by an optimal mix of edge and interior habitat, appeared to buffer the effects of climatic variation on survival, presumably because such habitats provided sufficient prey resources. North *et al.* (2002) found that the characteristics of nest site structures can modify microclimate conditions. Despite synchronous low reproduction, certain nests consistently exhibited higher reproductive success. In oak woodlands, these nests were on shrubby, north-aspect slopes in trees or snags surrounded by a well-developed canopy and in conifer forests they were overtopped by a canopy with a high foliage volume. The authors concluded that reproduction is influenced by both regional weather conditions and nest-site canopy structure, which protects fledglings from detrimental weather. Thus, if habitat features that buffer the effects of weather are removed, climate may have greater negative effects on spotted owls.

The last century has included some of the most variable climate reversals, at both the annual (extremes and high frequency of El Niño and La Niña events) and near decadal scales (periods of five to eight year drought and wet periods) documented (USFS 2001b). These events may have negative effects on California spotted owls. Modeling of population response to climate in northern spotted owls by Franklin *et al.* (2000), suggests that cold high precipitation springs, as would be expected in California during El Niño years, lead to higher mortality. Alternately, low precipitation (as expected during La Niña years) may have negative effects on prey populations (Verner *et al.* 1992a).

Changes in climate that occur faster than the ability of endangered species to adapt could cause local extinctions (United States Environmental Protection Agency (USEPA) 1989). Analysis of the Antarctic Vostok ice core has shown that over the past 160,000 years, temperatures have varied with the concentrations of greenhouse gasses such as carbon dioxide and methane (Harte 1996). Since the pre-industrial era, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide (another greenhouse gas) levels have risen approximately 15 percent (USEPA 1997). The burning of fossil fuels is the primary source of these increases (USEPA 1997). Global mean surface temperatures have increased 0.3–0.7 Celsius (0.6–1.2 Fahrenheit) since the late 19th century (USEPA 1997).

Climate modeling indicates that the overall effects of global warming on California will include higher average temperatures in all seasons, higher total annual precipitation, and decreased spring and summer runoff due to decreases in snowpacks (USEPA 1989, USEPA 1997). California spotted owls are susceptible to heat stress (Weathers *et al.* 2001) and are therefore likely to suffer from increased temperatures. Higher precipitation during the breeding season may increase mortality of spotted owls (Franklin *et al.* 2000). Decreased runoff from snowpacks may cause decreases in the extent or quality of riparian habitats, which are important for California spotted owls, especially in southern California (Verner *et al.* 1992a).

Southern California forests in San Bernardino, Riverside, and San Diego counties are experiencing the worst drought in more than 450 years (Loe *in litt.* 2002). Thus, the spotted owl population in these habitats may be at significant risk. Conifers stressed by drought, combined with overstocked conditions, pollution, mistletoe, root disease, and insect infestations are experiencing mortalities of up to 40 percent in some areas (Loe *in litt.* 2002). As larger older trees along with canopy layers are lost due to mortality, the effects to spotted owl prey and nesting habitat will likely continue for significant periods. As stated above, the San Jacinto Mountains are experiencing especially high mortality. It is anticipated that most of the nesting and roosting habitat in the San Jacinto Mountains will be lost. This area supports about 10 pairs of spotted owls, all of which could be lost (M. Gertsch, USFS, pers. comm. 2002). Response plans by the Forest Service and CDF include removal of dead and infected trees to reduce spread of disease, harmful insects, and fire; however, these agencies indicated the extent of the impacts far exceed their capacity to respond in the short term (Loe *in litt.* 2002). Planning efforts to address the drought mortality by the agencies are underway. As previously stated the population of spotted owls in southern California are geographically isolated from spotted owls in the north (Sierra Nevada range) and may warrant special management consideration.

Air Pollution. Nitrogen oxides and volatile organic compounds are emitted from industrial and automotive sources and transported by wind to California spotted owl habitat (USFS 2001a). These compounds react under sunlight to release ozone. Snow core samples from the Sierra Nevada contain a variety of other contaminants from industrial and automotive sources including; hydrogen ions (indicative of acidic precipitation), nitrogen and sulfur compounds (NH_4, SO_2, and SO_4), and heavy metals (Pb, Fe, Mn, Cu, and Cd) (Laird *et al.* 1986). These pollutants may directly harm California spotted owls. In addition to likely direct effects, pollutants can negatively affect California spotted owl habitat. Air pollution causes damage to trees, which may cause abnormalities and retard growth (USFS 2001a). Air pollution also contributes to tree deaths, especially by making them vulnerable to attack by insects (USFS 2001a). Damage and death of trees may reduce forest characteristics selected by California spotted owls, such as canopy cover, basal area, number of large trees, etc. Tree death also contributes to heavy fuel loading and the risk of severe fires (University of California 1996).

Human Induced Stress and Mortality. Spotted owls have died in collisions with vehicles (Verner *et al.* 1992b). They may also suffer from stress caused by human activities and habitat alteration. Wasser *et al.* (1997) measured levels of stress induced glucocorticoid hormones in field collected northern spotted owl feces, and found those levels to be significantly higher in males having territories centered within 0.41 km (0.25 mi) of roads or areas of recent timber harvest. Gutiérrez and Tempel (*in litt.* 2002) collected similar data on California spotted owls. They found significant variation between samples, but that variation was not significantly correlated with habitat condition, road proximity, or exposure to noise from chainsaws.

Barred Owl Invasion. Historically, the barred owl was native to eastern north America and absent from the range of the California spotted owl. Barred owls have expanded their range into western North America, moving into the range of the California spotted owl from the north. Barred owl populations in California are increasing, especially in northwestern California, and the species has now been detected as far south as Nevada County, California, in the Sierra Nevada (Dark *et al.* 1998).

Barred owls have been documented to displace spotted owls from their territories and to hybridize with spotted owls (Dark *et al.* 1998). There is also circumstantial evidence that barred owls will prey on spotted owls (Leskiw and Gutiérrez 1998).

The barred owl invasion of western North America has probably been facilitated by alteration of habitats by humans. The barred owl is a forest species, but does not rely on late successional forests as spotted owls do. The establishment of riparian forests and the planting of trees that occurred simultaneously with human settlement of the northern great plains may have created habitat used by dispersing barred owls as they moved west across the midwestern United States and southern Canada. Barred owls readily use disturbed habitats, and logging in the Rocky Mountains, Cascades, and Sierra Nevada has probably facilitated their colonization of forests there.

In 2002, researchers on the Lassen Study Area found three pairs with combinations of spotted owls and ''sparred owls'' (spotted owl/barred owl hybrids), and one pair of barred owls. None of these birds reproduced. No other barred owls or sparred owl combinations were reported from the Sierra Study Area or the Sequoia Study Area. Other reports had not yet been received as of late October 2002 (Stine 2002).

The existing population of barred owls in the Sierra Nevada remains at a level below one percent that of spotted owls. Although barred owls may pose a substantial threat to California spotted owls at some point in the future, by themselves, or in combination with other factors, they do not nor do other factors seem to pose now or in the foreseeable future a significant threat to the continued existence of the California spotted owl such that it warrants listing.

Finding

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species. We reviewed the petition, information available in our files, other published and unpublished information submitted to us during the public comment period following our 90-day petition finding, and consulted with recognized California spotted owl experts and other Federal and State resource agencies. On the basis of the best scientific and commercial information available, we find that listing the California spotted owl is not warranted at this time.

In making this finding, we recognize that there are indications that the California spotted owl may be experiencing an uncertain levels of decline in parts of its range based on demographic studies, and that the species may face threats from catastrophic fire and habitat modification related to reduction of the risk of catastrophic fire. We recognize the difficult trade-offs involving short-term risk of fuel treatments versus long term benefits of those treatments in reducing risks and improving habitat. We recognize other current threats to the species, its habitat, and its prey, including effects of drought and climate change on habitat; the potential spread of a new competitor/predator (the barred owl); and possible threats of disease.

We conclude that the overall magnitude of threats to the California spotted owl does not rise to the level that requires the protections of the Act. We will continue to monitor the status and management of the species. We will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding.

References Cited

A complete list of all references cited is available on request from the Sacramento Fish and Wildlife Office (see **ADDRESSES** above).

Author

The primary authors of this document are Phil Detrich of the Yreka Fish Wildlife Office, Kenneth Sanchez of the Sacramento Fish and Wildlife Office, and Darrin Thome of the Ventura Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authority

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

Dated: February 7, 2003.

Steve Williams,

Director, Fish and Wildlife Service.

[FR Doc. 03–3519 Filed 2–13–03; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Aquatic Nuisance Species Task Force Gulf of Mexico Regional Panel Meeting

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of meeting.

SUMMARY: This notice announces a meeting of the Aquatic Nuisance Species (ANS) Task Force Gulf of Mexico Regional Panel. The meeting topics are identified in the **SUPPLEMENTARY INFORMATION:**.

DATES: The Gulf of Mexico Regional Panel will meet from 9 a.m. to 5 p.m. on Wednesday, February 26, 2003, and 8:30 a.m. to noon, on Thursday, February 27, 2003.

ADDRESSES: The Gulf of Mexico Regional Panel meeting will be held at the Springhill Suites, 24 Via De Luna, Pensacola Beach, Florida 32561. Phone 850–932–6000.

FOR FURTHER INFORMATION CONTACT: Ron Lukens, Assistant Director, Gulf States Marine Fisheries Commission at 228–875–5912 or Sharon Gross, Executive Secretary, Aquatic Nuisance Species Task Force at 703–358–2308.

SUPPLEMENTARY INFORMATION: Pursuant to section 10(a)(2) of the Federal Advisory Committee Act (5 U.S.C. App. I), this notice announces meetings of the Aquatic Nuisance Species Task Force Gulf of Mexico Regional Panel. The Task Force was established by the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.

The Gulf of Mexico Regional Panel was established under the auspices of the ANS Task Force in 2000 with administration and coordination provided by the Gulf States Marine Fisheries Commission. The purpose of the Panel is to advise and make recommendations to the Aquatic Nuisance Species Task Force on issues relating to the Gulf of Mexico region of the Untied States that includes five Gulf