United States Department of the Interior
FISH AND WILDLIFE SERVICE
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IN REPLY REFER TO

July 12, 2000

Memorandum

To: Director, U.S. Fish and Wildlife Service
Washington, D.C.

From: Acting Regional Director, Region 1
Portland, Oregon

Subject: Administrative 90-day Finding on Petition to List the California spotted owl (*Strix occidentalis occidentalis*)

Section 4(b)(3)(A) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), requires that the U.S. Fish and Wildlife Service (Service) make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. To the maximum extent practicable, this finding is to be made within 90 days of the receipt of the petition, and the finding is to be published promptly in the Federal Register. If the finding is that substantial information was presented, the Service is required to promptly commence a review of the status of the species involved.

On April 3, 2000, the Service received a petition to list *Strix occidentalis occidentalis* (California spotted owl) as either threatened or endangered under the Act. The petition, dated April 2000, clearly identified itself as a petition and was submitted by the Center for Biological Diversity, Tucson, Arizona and Sierra Nevada Forest Protection Campaign, Sacramento, California. 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 the Service designate critical habitat for the California spotted owl concurrent with listing. They also requested emergency listing and emergency designation of critical habitat claiming owl populations are declining rangewide; existing regulations are inadequate to protect the owl; and management guidelines being developed by the Forest Service will potentially affect the owl for at least a decade. Emergency listing and designation of critical habitat are not petitionable actions under the Act.

The petitioners asserted the California spotted owl is threatened by destruction, modification, or curtailment of habitat or range by logging through: (1) loss and reduction of key attributes of owl habitat (e.g., large trees, snags, downed logs, high total canopy cover, multi-layered canopies), (2) habitat fragmentation, (3) adverse effects to owl habitat and owls from logging under the Forest Service's 1993 interim guidelines for managing habitat for the California spotted owl, and (4) logging on private lands. In addition to logging, the petitioners identified urban development responsible for significant habitat loss, particularly at low elevations in the Sierra Nevada and southern California. They also claimed that livestock grazing, mining, recreation, and road construction have contributed to the past and present loss and degradation of owl habitat.

The petitioners contended logging may increase predation on spotted owls by creating openings, resulting in the increase of spotted owl predators such as great horned owls and red-tailed hawks. They claimed that logging, livestock grazing, and fire suppression have altered fire regimes over much of the Sierra Nevada resulting in changes in forest structure and accumulation of fuels, putting some stands at increased risk of catastrophic fire. They also noted that weather (e.g., heavy precipitation) may exacerbate owl population declines. Finally, the petitioners cited the existing interim guidelines for managing California spotted owl habitat on Forest Service lands and the California Forest Practices Code as inadequate regulatory mechanisms to protect the owl and its habitat.

The Service reviewed the petition, supporting documentation, and information on file to determine if substantial information is available to indicate that the petitioned action may be warranted and to determine if an emergency situation that could result in the imminent extinction of the species existed . We also contacted the California Department of Fish and Game and Native American tribal leaders within the range of the California spotted owl. Based on the information presented in the petition, the habitat loss and other threats to the species have been long-standing and ongoing for many years. There are no imminent, devastating actions that could result in the extinction of the species. Therefore, we find that an emergency situation does not exist. The petition cited many credible sources of scientific information pertaining to the California spotted owl, including articles from peer-reviewed journals. In review of the petition, the Service found several statements and/or conclusions that were not supported by the literature cited. We believe the petitioners incorrectly reported, failed to completely report, inappropriately synthesized, misinterpreted, or exaggerated results or discussion of certain studies. As a result, the following discussion focuses on literature and interpretations the Service believes are salient to the petitioned action.

The California spotted owl is one of three recognized subspecies of spotted owls, including the northern spotted owl, (*Strix occidentalis caurina*) and the Mexican spotted owl (*Strix occidentalis lucida*) (AOU 1957). The northern spotted owl was listed as threatened under the Endangered Species Act in 1990 (USDI 1990) and the Mexican spotted owl was listed as threatened in 1993 (USDI 1993). The northern spotted owl ranges from southwestern British Columbia through western Washington, western Oregon, and northern California south to San Francisco Bay (USDI 1990). The ranges of the California and northern subspecies abut near the

Pit River in Shasta County (Verner et al. 1992b). Barrowclough et al. (1999) found evidence of gene flow between northern and California spotted owls, but concluded that it is a recent and uncommon phenomenon. The Mexican spotted owl ranges from southern Utah and Colorado south through Arizona and New Mexico, and discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau (USDI 1993) and its range is disjunct from the other subspecies.

The California subspecies occurs on the west side of the Sierra Nevada from Shasta county south to the Tehachapi Pass (Beck and Gould 1992). 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 were also identified as places where the overall owl distribution was broken, narrow, or low based on an analysis of known owl sites conducted by the petitioners. Approximately 1500 sites of territorial owls have been observed in the Sierra Nevada (USDA 2000).

The California subspecies also occurs in a few sites on the east side of the Sierra Nevada, in the central Coast Ranges as far north as Monterey County, and in 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. 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). Approximately 600 individual California spotted owls (about 300 sites) have been found in southern California in 15 populations comprised of 3-270 individuals, and separated from each other by 10-72 km (6-45 miles) (Verner et al. 1992a, Gutiérrez 1994).

The elevation of known nest sites of California spotted owls ranges from about 305 m (1,000 feet) to 2,348 m (7,700 feet), with approximately 86 percent of sites occurring between 915 m (3,000 feet) and 2135 m (7,000 feet) (USDA 2000). In conifer forests mean elevation of nest sites was 1,160 m (5,300 feet) in the northern Sierra Nevada and 1,830 m (6,000 feet) in southern California (Gutiérrez et al. 1992). The California spotted owl occurs on 15 national forests/management units administered by the Forest Service, four national parks, several state and local parks and forests, lands administered by the Bureau of Land Management, and private timberlands (Beck and Gould 1992). Owls are known to occur on lands of at least four tribal reservations and near three other tribal lands (Gordon Gould, California Department of Fish and Game, pers. comm., 2000). In the Sierra Nevada, 99 percent of owl sites occur on the Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, and Sequoia National Forests. However, greater than 15 percent of these sites have greater than 15 percent of their home range on private lands (USDA 2000). Approximately 135 sites have been reported on private lands (Verner 1999, USDA 2000).

In the Sierra Nevada, 80 percent of spotted owl sites have been found in mixed conifer forests (sugar and ponderosa pine, white fir, Douglas-fir, giant sequoia, incense-cedar, black oak, and

red fir), 10 percent in red fir forests (red and white fir, lodgepole pine, and quaking aspen) 7 percent in ponderosa pine/hardwood forests (ponderosa pine, interior and canyon live oak, black oak, incense-cedar, white fir, tanoak, and Pacific madrone), and 3 percent in other forest types such as east-side pine (ponderosa and Jeffrey pine), and foothill riparian/hardwood (cottonwood, California sycamore, interior live oak, Oregon ash, and California buckeye) (Verner et al. 1992a, USDA 2000). In the coast range, the owls occupy redwood/California-laurel forests (coast redwood, California-laurel, tanoak, Pacific madrone, red and white alder, coast live oak, Santa Lucia fir, and bigleaf maple). Owls in southern California inhabit live oak/ bigcone Douglas-fir (coast and canyon live oak and bigcone Douglas-fir), mixed conifer (ponderosa, Coulter, and sugar pines; white fir; bigcone Douglas-fir; and incense-cedar) and riparian/hardwood forests (coast and canyon live oak, cottonwood, California sycamore, white alder, and California-laurel) (Verner et al. 1992a).

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 former 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 (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 quantification of 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) 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 inches) diameter at breast height (dbh)) (Call 1990, Gutiérrez et al. 1992, Zabel et al. 1992a, Moen and Gutiérrez 1997, USDA 2000), 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 Gutiérrez 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 1989, Bias and Gutiérrez 1992, LaHaye et al. 1992a, 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.

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 inches) 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 inches) dbh (Gutiérrez et al. 1992). Although old, large trees are important to California spotted owls, intermediate-sized (28-61 cm (11-24 inch)) trees were also selected by nesting (LaHaye et al.1997; trees 51-76 cm (20-30 inches) dbh), roosting (Moen and Gutiérrez 1997), and foraging (Laymon 1988) owls. 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. However, 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.

California spotted owls are also 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, which includes mammals, birds, and insects (Barrows 1980, Hedlund 1996, Marshall 1942, Smith et al. 1999, Trailkill and Bias 1989). In the upper elevations of the Sierra Nevada, the primary prey is the northern flying squirrel (*Glaucomys sabrinus*) (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). 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). As of 1992, approximately 25 percent of known owl sites were found where woodrats are the primary prey species and 75 percent of sites were found where flying squirrels are the primary prey species (Verner et al. 1992b).

Spotted owls are territorial; however, home ranges may overlap. Non-territorial owls ("floaters") may also exist in populations and occupy territories after they are vacated (Gutiérrez 1994, LaHaye et al. 1994). Estimates of home ranges of territorial California spotted owl pairs vary with season, location, and method used to measure the home range. Based on 100 percent minimum convex polygon methods, home ranges of pairs ranged between approximately 202 ha (500 acres) in the breeding season in oak habitats of the Sierra National Forest to 6,885 ha (17,000 acres) in the non-breeding season in Lassen National Forest (Zabel et al. 1992a). Call (1990) estimated 42 percent of the home range to be medium timber 28-53 cm (11-21 inches)

dbh, and 55 percent large timber greater than 53 cm (21 inches). 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 (Zabel et al. 1992a). California spotted owls may seasonally migrate from high elevations to low elevations (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.

Spotted owls as a species have apparently evolved high adult survival rates associated with irregular and unpredictable reproduction (Noon and Biles 1999), where a long life span allows eventual recruitment of offspring even if recruitment does not occur each year (Franklin et al. in press). Spotted owls are long-lived (owls in the wild have been known to be 17 years old) and adult survival rates in the Sierra Nevada are relatively high (greater than 0.80; Noon et al. 1992, Blakesley and Noon 1999, Steger et al. 1999), indicating the species may be able to persist over the short-term even with extensive reduction in the amount of its suitable habitat (Noon et al. 1992).

Demographic models of spotted owls are mathematically sensitive to small changes in adult survival (Lande 1988, Noon and Biles 1990), but variation in population growth rates may be more closely associated with attributes that are naturally more variable than with attributes that are less variable but to which growth rate is mathematically more sensitive (Noon et al. 1992). Adult survival rates of California spotted owls have shown little variation when compared to reproductive parameters (Blakesley and Noon 1999). Spotted owls do not nest each year, and when they do, they usually lay one or two eggs and are not always successful (Gutiérrez et al. 1995). As a result, based on analysis of northern spotted owl models, Franklin et al. (in press) argued that rates of population change are at least as sensitive to variation in recruitment. Franklin et al. (in press) hypothesized that once a territory with suitable habitat is selected, territory holders have high survival rates and the potential of the habitat to influence fitness is through habitat configurations that control reproductive output. However, this assumes habitat configurations associated with high survival are maintained. Demographic responses of spotted owls in southern California may be different than those in contiguous populations due to the insular nature of available habitat (Gutiérrez and Pritchard 1990).

The distribution and abundance of California spotted owls before intensive surveys were initiated in the late 20th century is largely unknown. As summarized in the petition, measures of population change, such as λ (lambda), the finite rate of population change, however, suggest populations of California spotted owls in study areas in the Lassen, Eldorado, and Sierra National Forests and in the San Bernardino Mountains of southern California have been significantly declining over the past several years. Calculations of λ for a population of owls in the Sequoia/Kings Canyon National Park indicate rates not significantly different from a stable population (Steger et al. 1999). Differences in the rate of population change between this

population and the population of owls in the adjacent Sierra National Forest were attributed to higher rates of adult survival in the park (Steger et al. 1999).

Where owls are declining, λ estimates indicate annual declines of 7-10 percent, but because these estimates are determined through models they may not reflect true rates of declines for several reasons as discussed by Noon et al. (1992), Verner (1999) and USDA (2000). However, declining trends of California spotted owls suggested by λ are generally corroborated by declines in occupied sites (Gordon Gould, California Department of Fish and Game, pers. comm., 2000). Most or all researchers studying the demography of California spotted owls agree that populations are declining, but uncertainty exists as to whether the declines are as steep as λ indicates (Verner 1999). For the Sierra Nevada, the Forest Service (USDA 2000) concluded "In summary, the demographic studies strongly suggest population declines in California spotted owls. The declines are sufficient to warrant concern, even in light of uncertainties in the magnitude of the declines".

No studies have been designed to test cause and effects of population declines of California spotted owls (Verner 1999). Gutiérrez (1994) stated that logging has caused the greatest loss of habitat for all subspecies of spotted owls. 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 1800's; (2) logging beginning in the late 1800's, which removed basic elements of owl habitat; and (3) recent logging of stands that regenerated following initial entry (Gutiérrez 1994). According to the Forest Service (USDA 2000), it is unlikely that timber harvest on National Forests has caused recent declines in spotted owl populations, although the possibility exists that declines are due in part to latent effects of past timber harvest. Declines in territory occupancy can lag behind the decline in total population size because changes in the numbers of territorial birds may by masked by the presence of floaters who fill territorial vacancies (Gutiérrez 1994, LaHaye et al 1994). Due to this and the long lifespans of spotted owls, significant time lags may occur in responses of spotted owl populations to declining environmental carrying capacity (Noon et al.1992).

Approximately 15 percent of coniferous forests in the Sierra Nevada remain in old growth (Beardsley et al. 1999) or high quality old growth/late successional stands (stands making high contributions to late-successional forest functions and the best remaining examples of old-growth forests), most of which are in high elevations and national parks (Franklin and Fites-Kaufmann 1996). Timber harvest for over a century has resulted in reduced number of large trees, snags, and downed logs (Verner et al. 1992a, Franklin and Fites-Kaufmann 1996), attributes used or selected by California spotted owls. 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 impacted. Major factors of concern pertaining to timber harvest in habitats of California spotted owls in the Sierra Nevada identified by Verner et al. (1992a) included: (1) decline in abundance of very large, old trees; (2) long recovery period for spotted owl habitat after logging; (3) loss of

large-diameter logs from the decaying wood source on the ground; and (4) decline in snag density. In response to the decline of key spotted owl elements, Verner et al. (1992a) recommended interim guidelines to preclude the additional loss of habitat on Forest Service lands while a conservation strategy for the species was developed.

Most of the remaining high quality late successional/old growth habitat in the Sierra Nevada is in public ownership; less than two percent of 121,500 ha (3 million acres) of private land was classified as high quality late successional/old growth habitat (Franklin and Fites-Kaufmann 1996). Bias and Gutiérrez (1992) attributed low use of private timberlands by roosting and nesting California spotted owls to sanitation and high-grade logging that removed potential nest trees. California spotted owls, however, have been known to use selectively harvested stands, although the quantity of suitable habitat required is unknown (Zabel et al. 1992b). 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). Habitat loss on public and private lands has prompted spotted owl biologists to advocate conservative management to retain or restore California spotted owl habitat (Bias and Gutiérrez 1992, Gutiérrez et al. 1992, Blakesley and Noon 1999).

Management activities that reduce population density by lowering habitat quality or increasing fragmentation increase the uncertainties associated with successful dispersal and mate finding (Blakesley and Noon 1999). Fragmentation of habitat can increase mean nearest neighbor distances among suitable owl sites, which can pose risks to dispersing owls (Thomas et al. 1990). Several authors have observed that unlike forests of the Pacific Northwest, forests of the Sierra Nevada have not been fragmented by timber harvest (Franklin and Fites-Kaufmann 1996, North et al. 2000). This is primarily because selection timber harvest has been the dominant type of silviculture in the Sierra Nevada. As a result, timber harvest has not created high contrast fragmentation between forested and non-forested areas, but a low contrast gradient of habitats (Verner et al. 1992a, Franklin and Fites-Kaufmann 1996). Although forest continuity in the Sierra Nevada is high, the forest structure has been greatly simplified relative to presettlement conditions (Franklin and Fites-Kaufmann 1996).

Timber harvest in southern California (McKelvey and Johnston 1992) has occurred, but has not resulted in the loss of spotted owl habitat to the extent as it has in the Sierra Nevada or Pacific Northwest (Gutiérrez and Pritchard 1990, LaHaye et al. 1994). For spotted owls in southern California and the foothills of the Sierra Nevada, urbanization is primarily responsible for habitat loss and degradation, especially at low elevations (Gutiérrez 1994). Direct and indirect loss and degradation of habitat of California spotted owls and their prey is expected to continue in these areas 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). Houses and housing developments scattered through otherwise suitable habitat were 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 where the owls have been found to be the most productive (LaHaye et al. 1997). Urbanization has similar negative implications for California spotted owls in the Sierra Nevada that migrate to lower elevations in the winter (Laymon 1988, Verner et al. 1992b).

The petitioners claimed that livestock grazing, mining, recreation, and road construction have also contributed to the past and present loss and degradation of California owl habitat. Cattle grazing in Sierra Nevada foothill woodlands can have negative impacts on woodrat populations and on the cover value of the habitat for owls (Verner et al. 1992b), but the effects of grazing on spotted owls remain a research topic to be addressed (Gordon Gould, California Department of Fish and Game, pers. comm., 2000). The effects of recreation on owls is also poorly understood, but was identified as an increasing threat to California spotted owls, especially in southern California (Noon and McKelvey 1992). In southern California, direct surface water diversion and "mining" of ground water for human uses was also identified as a threat because these activities are likely to result in the loss of riparian owl habitat (Verner et al. 1992a).

Beck and Gould (1992) identified several areas of concern in the Sierra Nevada where there were: (1) bottlenecks in the distribution of habitat or owl populations; (2) gaps in the known distribution of owls; (3) locally isolated owl populations; (4) highly fragmented habitat; or (5) low density of spotted owls. These areas indicated potential areas where future problems may be greatest if the owl's status in the Sierra Nevada were to deteriorate. At the time these areas were identified, none of the populations of spotted owls were thought to be in decline as most of them are now. An analysis of known owl sites conducted by the petitioners confirmed that these were of concern. In addition, the petitioners identified areas of concern at the southern end of the Sierra National Forest near the Kings River Canyon, where an almost complete east to west gap in owl distribution occurs, and an area in Sequoia National Park where the distribution of owl habitat is narrow.

Timber harvest, in conjunction with fire suppression, has changed the structure of Sierra Nevada forests from one dominated by large, old, widely-spaced trees to one characterized by dense, fairly even-aged stands in which the larger trees are 80-100 years old (McKelvey and Johnston 1992). The species composition of these forests has also changed from shade intolerant, fire-hardy species such as ponderosa pine and black oaks to shade intolerant, fire sensitive species such as white fir and incense-cedar (Verner et al. 1992b, Weatherspoon et al. 1992). Similar increases in density and changes in species composition were documented for coniferous forests of the San Bernardino Mountains (Minnich et al. 1995). As a result, these forests are prone to large, catastrophic fires (Verner et al. 1992a). Verner et al. (1992a) 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.

According to the Forest Service (USDA 2000), approximately three percent of known owl sites on national forest lands in the Sierra Nevada occur in areas of high fire risk. Weatherspoon et al. (1992) characterized forests selected by spotted owls as having the structural components for crown fires. Because fire suppression has increased density of stands in the Sierra Nevada, it is possible 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). However, relatively few California spotted owl protected activity centers (PACs), 121-ha (300-acre) areas around spotted owl sites, and spotted owl habitat areas (SOHAs), areas that maintain at least 405 ha (1,000 acres) of suitable habitat within a 2.4 km (1.5-mile) radius of owl sites, have been destroyed by wildfire (USDA 2000). This possibly is because the success of initial attack on wildfires is greater in owl habitat in Sierran mixed conifer types (Weatherspoon et al. 1992) or because California spotted owls often occupy relatively moist areas such 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). The risk of catastrophic fire strongly influenced the choice of interim guidelines recommended by Verner et al. (1992a). To reduce the risk of catastrophic loss of California spotted owl habitat to wildfire, Weatherspoon et al. (1992) proposed making prescribed burning a priority in PACs or suitable nesting and roosting habitat where timber harvest would not occur.

Franklin and Fites-Kaufmann (1996) and Beardsley et al. (1999) found most of the old growth remaining in national forests in the Sierra Nevada is in areas available for timber harvest. Timber harvests in national forests in the Sierra Nevada are conducted under the Forest Service interim guidelines developed by Verner et al. (1992a) before the majority of California spotted owl populations were known to be declining (Blakesley and Noon 1999). These guidelines were developed to maintain management options for the California spotted owl in the short term (maximum of five years; Verner 1999) until a conservation strategy for the owl was developed for the long term. The interim guidelines were implemented in January 1993, and now have been in effect for over seven years. In 1992, Noon and McKelvey stated: "We must be able to target for preservation those habitats needed today for the species' persistence and learn how to manage for such habitats in the future. Only by understanding the relations between demographic rates and the structure and composition of vegetation at the stand level can we be certain of maintaining habitat that provides for a stable or growing population". The Forest Service has made several attempts to develop a conservation strategy for the California spotted owl, including the Sierra Nevada Forest Plan Amendment Draft Environmental Impact Statement (DEIS) through the Sierra Nevada Framework for Conservation and Collaboration (USDA 2000). One of two preferred alternatives of this DEIS contains provisions to manage habitat for spotted owls after determining relationships between demographic results and vegetation. However, to

date a conservation strategy for California spotted owls has not been implemented and the interim guidelines remain in effect.

California spotted owls occur in the Angeles, Los Padres, Cleveland, and San Bernardino National Forests, but the interim guidelines only apply to national forests in the Sierra Nevada (Verner 1999) in west-side habitat types. Spotted owls in southern California are protected by measures developed by each forest (Ruth and Standiford 1994). The interim guidelines were not proposed to be implemented in east-side pine forests because these areas were thought to be population sinks (where reproduction generally insufficient to replace local losses, so maintenance of the population requires immigration from other area; Gutiérrez et al. 1992), although Gutiérrez and Harrison (1994) found no published evidence that the east side of the Sierra Nevada is a sink for the subspecies.

The primary objectives of the interim guidelines were to protect known nest stands, protect large old trees, and reduce the threat of stand-destroying fires (USDA 1996). They were intended to retain the elements (primarily large, old trees) used by owls that were the most difficult to replace (Verner et al. 1992a) and therefore recommended no harvest of trees greater than 76 cm (30 inches) dbh. Franklin and Fites-Kaufmann (1996) believed simple diameter-limit guidelines were not adequate to achieve long-term objectives. The interim guidelines did not specifically address management of habitat in areas of concern discussed above.

The interim guidelines proposed to protect known nest stands by maintaining 121-ha (300-acre) PACS where no stand altering activities except light underburning was allowed and SOHAs where at least 405 ha (1000 acres) of suitable habitat was maintained within 2.4 km (1.5 miles) of owl sites. Suitable habitat was defined as mature stands having: (1) multi-storied canopies with 70 percent or greater total cover; (2) 40 percent or more of the total canopy in trees equal to or greater than 53 cm (21 inches) dbh; and (3) well developed decadence (Verner et al. 1992a). Of 183,870 ha (454,000 acres) designated in SOHAs, 44, 550 ha (110,000 acres) were available for low-yield timber harvest (Beck and Gould 1992).

The purpose of the limits on logging in suitable habitat in portions of owl home ranges not protected by PACs or SOHAs in the interim guidelines was to reduce the time needed for suitable habitat to be restored in treated areas to 5-20 years (Verner 1999). The objective for harvest in select strata (strata that were selected by spotted owls for nesting) was to maintain strata in or near structural condition corresponding to suitable foraging habitat after harvest (Verner et al. 1992a). Therefore, the interim guidelines allow timber harvest (except in PACs and some acreage in SOHAs) to reduce canopy cover to 40 percent in select strata and less than 40 percent canopy cover in other strata (timber strata that were used, but not selected by owls for nesting). 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".

The amount of timber harvest that has occurred in select and other strata since implementation of the interim guidelines was not calculated by the petitioners. However, the petitioners found the Forest Service made a "may affect individual owls" determination for 310 timber sales representing at least 150, 867 ha (372, 512 acres) and 822 million board feet in the Sierra Nevada National Forests between 1993 (when the interim guidelines were implemented) and 1998. Approximately half of these are documented in the petition as planned under the interim guidelines. The petitioners identified at least 45 sales that were exempted from the interim guidelines because they were planned or sold before the guidelines were in effect, were experimental sales, or were in east-side pine forests.

An HCA (Habitat Conservation Area) approach where larger blocks of habitat would be reserved was rejected when the interim guidelines were developed primarily due to the risk of the loss of HCAs to catastrophic fire (Verner et al. 1992a). However, Andersen and Mahato (1995) compared SOHA and HCA reserve designs for California spotted owls and concluded that a SOHA strategy may be adequate as an interim measure, but in the long term an HCA approach was preferred due to the effects of catastrophes such as wildfire. Thomas et al. (1990) suggested that SOHAs could be degraded by small fires. They preferred an HCA strategy over a SOHA strategy for northern spotted owls due to the potential for habitat fragmentation within and among SOHAs. SOHAs strategies were regarded as flawed by Thomas et al. (1990) because timber harvest could subject dispersing owls to increasingly unsuitable habitat and make it more difficult for owls to find mates. Verner et al. 1992a acknowledged that SOHAs by themselves were not a viable conservation strategy for the California spotted owl.

North et al. (2000) suggested that current national forest management practices may not adequately provide for spotted owl nest trees because conifers with broken tops or irregular crowns are the types of trees that are usually selected to remove defective trees from a stand. Because the mean age of nest trees in their study was 227 years, they also believed group selection, which manages forests in 0.8-ha (2-acre) blocks on a 200-year rotation, would reduce the potential number of nest trees.

The petitioners claimed that timber harvest in national forests included effects to home ranges surrounding PACs in 971 cases, to SOHAs in 185 cases and to individual owl territories in 183 cases. The Forest Service lacks and needs a regional program to track effects to California spotted owls (Verner 1999) and conserve their habitat. In the Notice of Intent for the Sierra Nevada Forest Plan Amendment Project environmental impact statement, the Forest Service stated: "Old forest ecosystems have declined in quality, amount and connectivity throughout the past hundred years. Habitats and/or populations of some animals associated with old forests

including forest carnivores and the California spotted owl have declined. No regionally consistent direction for old-forest conservation exists."

The California spotted owl is recognized as a sensitive species by the Forest Service and a species of special concern by the California Department of Fish and Game. The federal Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) prohibits the taking, pursuing, hunting, capturing, or killing of migratory birds, parts, nests, eggs or products and California Fish and Game Code Section 3503.5 makes it unlawful to take, possess, or destroy any bird, nest, or eggs of birds in the orders Falconiformes or Strigiformes (owls). However, no federal or state regulation, including the California Forest Practice rules and the National Forest Management Act (36CFR § 219.19), prohibits the removal of California spotted owl habitat (other than nests).

Climate may influence vital rates of spotted owls through direct and indirect means (LaHaye et al. 1994, Verner 1999, Franklin et al. (in press), North et al. (2000), such as its effect on prey populations. In southern California, drought was hypothesized to affect spotted owl population dynamics through its effect on prey (LaHaye et al. 1994). North et al. (2000) found synchronous low reproductive success of owls in the Sierra National Forest and Sequoia/Kings Canyon National Park correlated to high spring precipitation (as found for northern spotted owls by Franklin et al. in press) and lower spring temperatures, presumably due to effects of weather on prey species. Results of a modeling study conducted by Franklin et al. (in press) suggested that northern spotted owl populations may experience periods of decline solely 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. in press).

Studies by Franklin et al. (in press) 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. found the best model for adult survival supported 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. 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 form detrimental weather.

Blakesley and Noon (1999) concluded: "Both the northern and Mexican subspecies of spotted owls are currently listed as threatened subspecies under the federal Endangered Species Act.

Both these subspecies were listed on evidence of population declines that was less extensive and less reliable than that for the California subspecies." After reviewing the best scientific and commercial information available, the Service finds the petition presents substantial information that listing the California spotted owl may be warranted. The Service finds that California spotted owls have experienced significant population declines and their habitats are subject to present and future destruction or modification by timber management and related activities, urbanization and its consequences such as increased recreation and disturbance, and catastrophic fire. The Service finds that climate alone or in conjunction with habitat degradation may also contribute to declines of spotted owl populations. Finally, the Service finds that existing regulatory mechanisms and interim guidelines are inadequate to protect the California spotted owl and its habitat, warranting protection of the subspecies under the Act. In regard to the petitioner's request for emergency listing and designation of critical habitat, emergency listings and designation of critical habitat are not petitionable actions under the Act.

When the Service makes a positive finding, it also is required to promptly commence a review of the status of the species. Therefore, we are soliciting information on the species regarding the factors the Service uses to determine whether a species is threatened or endangered per section 4(a)(1) of the Act: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting its continued existence. Based on the available and any newly obtained information, the Service will issue a 12-month finding as required by section 4(b)(3)(B) of the Act.

A draft notice of our finding is attached for your review and prompt publication in the Federal Register. The petitioner will be notified of our finding upon its publication.

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Personal Communications

Gordon Gould. California Department of Fish and Game. June 2, 2000.

Attachments

Approve: _____ Date: 10/5/00

Director, U.S. Fish and Wildlife Service

Disapprove: _____ Date: _____

Director, U.S. Fish and Wildlife Service

~~(90-day finding: California Spotted Owl (Strix occidentalis occidentalis) = substantial)~~