

Chapter 3

Background and the Current Management Situation for the California Spotted Owl

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The administrative history of the California spotted owl is closely tied to that of the northern spotted owl. Detailed research first began in 1969, with studies on the northern subspecies (Forsman 1976). Forest Supervisors in California were first alerted in 1972 by the Pacific Southwest Regional (R5) Office of the U.S. Department of Agriculture, Forest Service (FS) about concern for the owl in Oregon, based on logging-related habitat changes. Wildlife biologists were advised to seek information on the presence of spotted owls in their respective forests.

Administrative Events

1972-1980

Shortly before passage of the Endangered Species Act (ESA) of 1973, the spotted owl was designated by the U.S. Department of Interior, Fish and Wildlife Service (FWS) as a "threatened species," including the California subspecies. This designation was intended to stimulate interest, impart knowledge, and solicit information about wildlife that appeared to be endangered. With passage of the ESA, however, an official list of Threatened and Endangered Wildlife and Plants did not include the spotted owl (USDI, FWS 1973).

In 1973 and 1974, the PSW Region, the California Department of Fish and Game (CDFG), and the U.S. Department of Interior, National Park Service (NPS) jointly financed the first survey for spotted owls in California. Locations of historical observations and selected late-successional forests were chosen for surveys. Spotted owls were located on most National Forests (NFs) and were found to be much more abundant than previously known, with 159 owl locations documented within the range of the California spotted owl (Gould 1974).

The Oregon Endangered Species Task Force was formed in 1973, at a time when spotted owls had been located at only about 100 sites in that state. The Task Force recommended that 300 acres of old-growth be retained around each northern spotted owl location, as interim protection until permanent guidelines could be adopted. FS Region 6, Pacific Northwest Region (R6) and the Oregon State Office of the U.S. Department of Interior, Bureau of Land Management (BLM) rejected the recommendation (Thomas et al. 1990).

Concern over the status of the California spotted owl was slow in developing compared to that for the northern spotted owl in the Pacific Northwest. During the mid-1970s, additional surveys were done on individual Forests and Ranger Districts in the Sierra Nevada but not in response to Regional direction or policy.

Passage of the National Forest Management Act (NFMA) in 1976, and regulations pursuant to that Act, established the basis for maintaining well-distributed, viable populations of all native vertebrate species on NF lands. NFMA also required the use of Management Indicator Species (MIS) to guide management for certain wildlife groups or critical habitats. The spotted owl was designated as an MIS for wildlife requiring large areas of late-seral-stage conifer forests by all NFs in the western Sierra Nevada.

Early in 1977, the Oregon State Director of BLM and the Regional Forester for R6 agreed to protect northern spotted owl habitat in accordance with interim recommendations of the Oregon Endangered Species Task Force. This included protection of habitat where spotted owls and their nest sites had been found. Late in 1977, agency administrators agreed to the Oregon Spotted Owl Management Plan, which recommended clusters of 3-6 pairs, 300-acre core areas for each pair, pairs in a given cluster no more than 1 mile apart, and clusters no more than 8-12 miles apart, edge-to-edge. The plan was to be implemented through the land-management process and individual land-management plans for NFs and BLM Districts (Thomas et al. 1990).

In 1978, the Oregon-Washington Interagency Wildlife Committee replaced the Oregon Endangered Species Task Force with the Spotted Owl Subcommittee, to represent both Oregon and Washington. In 1979, a Washington Spotted Owl Working Group was established, and in 1980 the FS afforded the same protection to spotted owls in Washington that had already been provided in Oregon.

Because of the rapidly growing issue of logging vs. habitat management for the northern spotted owl, surveys to locate owls increased sharply in 1978 on NFs in Oregon, Washington, and northern California, but FS surveys in the range of the California spotted owl did not begin in earnest for another 3 years. The initiation of systematic surveys in the Sierra Nevada responded to the need to verify designated spotted owl territories for land management plans, as well as to provide wildlife input to planned timber sales. Designated spotted owl territories were later called Spotted Owl Habitat Areas, or SOHAs.

The spotted owl was designated a "Sensitive Species" on NFs throughout FS R5 in the late 1970s (Carrier pers. comm.).

CDFG, with jurisdictional boundaries almost identical to R5, classified both subspecies as "Species of Special Concern" in 1978 (Remsen 1978).

1980-1991

Based on study results by Forsman (1980, 1981), the Spotted Owl Subcommittee revised the Oregon Spotted Owl Management Plan in 1981, recommending that 1000 acres of old-growth forest within a 1.5-mile radius of the nest area be maintained for each pair. R6 agreed to the new recommendations only to the extent that they would "maintain the option" to manage for 1000 acres if further research proved it to be necessary. The BLM in Oregon continued to protect only 300 acres for managed pairs (Thomas et al. 1990).

In early 1981, R5 initiated a meeting on spotted owls that brought interested State and Federal agencies together for the first time. This included BLM, NPS, California Department of Forestry and Fire Protection (CDF), CDFG, and both the administrative and research branches of the FS. The purpose of this meeting was both to share information and to discuss development of management policies and research needs.

FS Regional planning direction for both subspecies of spotted owl in California was issued in June 1981 and closely followed the Oregon Spotted Owl Management Plan. The final revised direction issued in 1984 included the concept of replacement habitat, explained below. In July 1981, the Regional Office, R5, notified Forests with the California spotted owl to provide a strategy for maintaining viability in their Land Management Plan (LMP). This led to the development of designated SOHAs in a grid configuration or "network" on each of the seven westside Sierra Nevada NFs, and prompted those NFs to verify occupancy of the designated sites.

The Portland Regional Office of the FWS conducted a status review of the northern spotted owl in 1981 because of concerns about the effects of the decline of old-growth forest (USDI, FWS 1982). Although the species was described as "vulnerable," the FWS review concluded that the species did not meet the listing requirements of the ESA.

In 1982, the Washington Office of the FS analyzed and clarified existing national policy for management of Sensitive Species on NF lands. This policy was seen as a visible, preventive strategy with the following key objectives: (1) identify plant and animal populations that currently or potentially qualify for Federal or State listing as a result of NF management activities, and (2) develop a consistent, systematic, biologically sound strategy to manage these species and their habitats to provide for viable populations so Federal listing as Threatened or Endangered would not be required.

In cooperation with the BLM, R6 initiated the Old-Growth Wildlife Research and Development Program in 1982, which entailed field studies of old-growth wildlife species and their forest habitats in western Washington and Oregon.

In 1982, R5 recognized differences in vegetation patterns between the Sierra Nevada and Pacific Northwest forests. Considering these differences and the observed use of habitats by spotted owls, R5 speculated that home ranges of the California

subspecies might be smaller and owls might be using younger and more diverse timber stands than in areas where research had been done to date. Based on this concern, the FS and CDFG planned the first research studies for the California spotted owl. The first of these studies began on the Eldorado NF in 1982.

Throughout 1984, the R5 Regional Office approved the final spotted owl habitat networks for proposed LMPs on most NFs in northern California and the western Sierra Nevada. The policy was to implement Regional standards and guidelines for the networks in advance of LMP approvals to avoid losing management options. No Regional policy was set, however, for management of spotted owls outside of approved networks. Some NFs provided protection for 1000-acre "non-network" SOHAs to maintain options for full spotted owl management, but most provided minimal or no protection.

In 1985, the Deputy Assistant Secretary of Agriculture upheld an appeal against the R6 planning guide. The successful appeal contended that the standards and guidelines for northern spotted owls were inadequate and that an environmental impact statement (EIS) was required. Work on a supplemental EIS (SEIS) began in 1985 and was completed in 1988 (USDA, FS 1988).

The National Audubon Society established a "Blue Ribbon" Advisory Panel in 1985 to review the status of the spotted owl in Washington, Oregon, and northern California. The Panel's report was issued in 1986, with findings and recommendations for the northern spotted owl throughout its range, and for the California spotted owl in the Sierra Nevada portion of its range (Dawson et al. 1987). Recommendations on numbers, home ranges, and distribution relevant to the California spotted owl were: (1) Maintain no fewer than 1,500 pairs in the combined range of the northern subspecies and the Sierra Nevada portion of the California subspecies and discard the earlier view that 500 individuals could represent an effective breeding population; (2) maintain the current distribution with a network system similar to that being used by the agencies, but with maximum emphasis on having networks comprised of SOHAs with verified reproduction; and (3) provide at least 1,400 acres of late-seral forest habitat for each pair home range in the Sierra Nevada. Maintaining the population linkage through Shasta County, where the California and northern subspecies come together, was emphasized to be critically important. The Audubon Panel also recommended a well-designed program of intensive and extensive research on a sample basis to obtain reasonable estimates of the proportion of network home ranges supporting breeding pairs of spotted owls and to document reproductive rates in relation to population maintenance.

In 1987, the Old-growth Wildlife Research and Development Program of 1982 was supplemented by the Spotted Owl Research, Development and Application Program (the RD&A Program) for a period of 5 years. This was a cooperative effort of R6, R5, and the Pacific Northwest (PNW) and Pacific Southwest (PSW) Research Stations. The new spotted owl RD&A program, funded as a line item by Congress, had a mission to develop, apply, and integrate new and improved information into guidelines and procedures needed to manage suitable spotted owl habitat to assure maintenance of viable populations in California, Oregon, and Washington. Under the auspices of this

program, numerous studies of spotted owls, associated habitats, and old-growth wildlife species were done in Oregon, Washington, and California (Thomas et al. 1990), but most research funds went to studies of the northern spotted owl. The monitoring phase of the RD&A Program included the Sierra Nevada portion of the California spotted owl's range.

In early 1987, the FWS received a petition to list the northern spotted owl as an endangered species under the ESA. A new status review was done and the FWS determined that listing was not warranted. That decision was litigated by conservation groups in 1988 in the Seattle Federal Court. The court ruled that the FWS's decision was not biologically based and ordered the FWS to reconsider listing (Thomas et al. 1990).

In December of 1988, the Chief of the FS approved the SETS for spotted owls in R6. The selected alternative maintained the existing concept of network owl reserves but increased the sizes of the SOHAs in Washington and portions of Oregon to range from 1,000 acres in southern Oregon to 3,000 acres on the Olympic Peninsula (USDA, FS 1988).

In 1989 the California State Legislature passed AB 1580 to improve the analysis of the cumulative impacts of logging. The measure directed the CDF to develop a system to better track how harvest planning decisions are made, and to develop a scientific database on timberland habitats and wildlife species (Thomas et al. 1990).

In response to Federal court action, the FWS initiated another status review of the northern spotted owl in January 1989 to supplement the 1987 review. That review team concluded that the northern spotted owl warranted protection as a Threatened Species under the ESA (USDI, FWS 1989). As required under Section 7 of the Act, FS and BLM immediately began to confer with FWS regarding evaluation of timber sales. A FWS listing team began a review in 1989 of the proposal to list the owl. Its final recommendation, released in June 1990, was to designate the northern spotted owl a Threatened Species throughout its range. The listing became official on 23 July 1990 (Thomas et al. 1990).

An Interagency Agreement among Agency heads of the BLM, FS, FWS, and **NPS** was signed in August 1988; the intent of this agreement was to enable these four Federal Agencies to work together toward a common goal of population viability for the spotted owl throughout its range. Under authority of this agreement, the Agency heads acted upon a 1989 recommendation from the FS to establish an Interagency Scientific Committee (ISC) to address the issue of the northern spotted owl. The committee was officially chartered in October 1989 and given 6 months to "develop a scientifically credible conservation strategy for the northern spotted owl." The ISC's final report was released to Agency heads and Congress on 1 April 1990 (Thomas et al. 1990). It concluded that existing management for northern spotted owls on NF and BLM lands would lead to increasing loss and fragmentation of suitable owl habitat and imperil the continued existence of the owl. The ISC recommended an alternative conservation strategy that would designate large reserves, called Habitat Conservation Areas (HCAs), to be well-distributed over the range of the owl. Ideally, each HCA should provide sufficient suitable habitat for at least 20

pair-sites, with the lands between managed to facilitate -movement (dispersal) of owls among HCAs.

The implications of the ISC report for management of the California spotted owl became apparent immediately. In May of 1990, the R5 Regional Forester requested assistance from PSW Research Station in additional data collection and analysis for the California subspecies. Emphasis on Sierra Nevada NFs was changed from conducting a third year of RD&A monitoring to inventory of presumed owl habitats not previously surveyed. These habitats were primarily low-elevation oak woodlands, pine-oak forests, and high-elevation red fir forests.

In April of 1991, R5 and PSW Research Station began a cooperative venture with CDF and other State and Federal agencies to assess current information on the California spotted owl. A Steering Committee with representatives from various State and Federal agencies and other interested parties was formed to oversee the entire effort (Chapter 1). The Steering Committee established two teams. A Technical Assessment Team was designated to synthesize and interpret all current information available on the California spotted owl, and to evaluate various management alternatives for the subspecies. A Policy-Implementation Team was designated to evaluate impacts of the Technical Assessment Team's recommendations, to determine whether they fall within existing policies and regulations, and to propose least-cost/low-impact ways to implement them. The Steering Committee will make final recommendations to the responsible agency heads based on reports from the two teams. This report is the product of the Technical Assessment Team.

Current Management

The range of the California spotted owl is considered to include the southern Cascades south of the Pit River in Shasta County, the entire Sierra Nevada province of California, all mountainous regions of the southern California province, and the central Coast Ranges at least as far north as Monterey County (Grinnell and Miller 1944, Gould 1977). Within this range, the owl occurs on 13 NFs, the Lake Tahoe Basin Management Unit (LTBMU) administered by the FS, four National Parks (NPs), several State Parks and Forests, private timber lands, scattered BLM lands, and other minor ownerships (fig. 4A, 4B, and 4C). This includes a portion of the Toiyabe NF, which is administratively a part of the Intermountain Region of the FS.

One of two major subdivisions of the total California spotted owl population occupies the southern Cascades and the Sierra Nevada, an area roughly 400 miles long by 50 miles wide. The other occupies mountains of southern California, primarily the San Bernardino Mountains and isolated mountains southward nearly to the Mexican border, the San Gabriel Mountains, the Tehachapi and nearby mountains westward to the coast, and the central coastal mountains (fig. 9A).

Sierra Nevada Province

The Sierra Nevada Province, as used here, includes the conifer forests and foothill riparian/hardwood forests of the Sierra Nevada and the southern end of the Cascade Mountains. Most known California spotted owls and suitable habitat occur on public lands on the west slope of the Sierra Nevada, primarily in seven NFs and in Yosemite and Sequoia/Kings Canyon NPs. Spotted owls also occur on scattered BLM lands along the Sierran foothills, but few surveys have been done on those lands. Large blocks and scattered parcels of private timberland occur within most NFs within the range of the owl in the Sierra Nevada. Recent surveys by timber companies indicate considerable spotted owl use on some of those lands.

Since 1973, agency and public concern for the status of the California spotted owl has been in regard to timber management on the seven westside Sierra NFs and on private industrial timberlands. Even though the NPs experience high recreation impacts in local areas, NP management has not been an issue because the emphasis of the NPS generally is believed to be compatible with maintaining habitats needed by the owls.

The Sierra Nevada owl population is contiguous throughout the mountain range's 400-mile length but is probably poorly linked to the southern California population through the Tehachapi Mountains and the Liebre/Sawmill area east of Interstate Highway 5. The California spotted owl connects to the northern spotted owl in eastern Shasta County.

Forest Service, Pacific Southwest Region (R5)

From north to south, the Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, and Sequoia NFs in the Sierra Nevada all have major populations of California spotted owls. These NFs have a

total land base of 6,978,900 acres, about 73 percent of which (5,093,600 acres) is forested. About 50 percent of this land base, or 3.5 million acres, are forest types considered current or potential spotted owl habitat (USDA, FS 1986b, 1988a, 1988c, 1988e, 1990, 1991a, 1991b). The major forest types comprising known and potential habitat are Sierran mixed-conifer, red fir, ponderosa pine/hardwood (montane hardwood), eastside pine, and foothill riparian/hardwood (Chapters 5 and 6) (descriptions in Chapter 1). Mixed-conifer is the most abundant type with the most owl sites; the others are less abundant and have far fewer owl occurrences (table 3A).

The LMP directions for Sierran Forests resulted in the designation of 264 SOHAs in approved or draft Forest LMPs (Lassen 40, Plumas 54, Tahoe 33, Eldorado 32, Stanislaus 36, Sierra 29, and Sequoia 40) (table 3B). Of the 264, 249 are on lands suitable and otherwise available for timber production. The other 15 are on lands unavailable for timber production, either because of Congressional classification (Wilderness or Wild Rivers) or because of other Forest LMP allocations. The total land allocation for these 264 SOHAs is about 454,000 acres, of which about 110,000 would be managed under low-yield, even- or uneven-aged management (USDA, FS 1986b, 1988a, 1988c, 1988e, 1990, 1991a, 1991b).

The management direction for SOHAs is to maintain at least 1,000 acres of suitable spotted owl habitat within a 1.5-mile radius of the known or potential spotted owl nest site. Suitable habitat is described as mature timber stands having (1) multi-storied canopies with 70 percent or greater total cover, (2) 40 percent or more of the total canopy in trees 21 inches or more in d.b.h., and (3) well-developed decadence (USDA, FS 1984).

Further, the direction calls for replacement of the suitable habitat over time, based on the certainty that forest stands un-

Table 3A—Known California spotted owl sites, by habitat type on National Forests and National Parks in the Sierra Nevada, 1987-1991.

Location	Eastside pine	Red fir	Mixed-conifer	Ponderosa pine/montane hardwood	Riparian/hardwood	Number sites sampled ¹	Breeding pairs found ²
National Forests							
Lassen		8	97			105	36
Plumas	3	9	195	15		222	56
Tahoe		11	135	8		154	38
Eldorado		10	149	1		160	53
Stanislaus		11	97	10		118	26
Sierra		41	86	23	10	160	25
Sequoia	3	9	95	12	9	128	22
Inyo		1				1	1
Lake Tahoe Basin Management Unit		2	1			3	
National Parks							
Yosemite		9	46	1		56	6
Sequoia/Kings Canyon		3	58	9		60	12
Grand total	6	114	959	79	19	1,177	275
Percent	<1	10	81	7	2	100	

¹ Data based on NF and NP information for all known owl sites where habitat information was available. (This included some single owl sightings not considered to be "owl sites.") Table 3B should be used for official, total count of spotted owl sites, as it is based on interpretation of NF data along with information from private lands to avoid duplication.

² Data on sites where young were produced provided by NFs and NPs.

Table 3B-Estimated numbers of California spotted owl sites in the Sierra Nevada, by ownership.

Land	Total known sites (known pairs)				SOHAs				Sites in reserved areas	
	1970-91		1987-91		Estimated additional sites	Total per National Forest	Number with pairs ¹	Total number of pairs ²	1970- 1991	1987- 1991
National Forests	Federal Lands									
Lassen	111	(73)	111	(73)	26-31	40	36	42	23	1
Plumas	228	(113)	228	(112)	38-50	54	39	46	5 3	4
Tahoe	150	(83)	118	(75)	46-57	33	28	33	2	2
Eldorado	180	(125)	177	(123)	10-21	32	28	41	0	0
Stanislaus	131	(47)	118	(49)	15-25	36	23	23	3	3
Sierra	175	(86)	157	(81)	50-52	29	16	20	153	12
Sequoia	127	(77)	114	(71)	32-41	40	27	31	22 3	17
Lake Tahoe Basin Management Unit	3	(1)	2	(1)	?	0	0	0	0	0
Toiyabe	2	(0)	0	(0)	?	0	0	0	0	0
Inyo	5	(3)	3	(1)	0	0	0	0	2	1
Subtotal	1112	(608)	1028	(586)	217-277	264	197	236	51	40
National Parks										
Lassen	5	(2)	4	(2)	?				5	4
Yosemite	56	(17)	56	(16)	26-41				56	56
Sequoia/Kings Canyon	60	(42)	60	(41)	20-22				60	60
Subtotal	121	(61)	120	(59)	46-63				121	120
Bureau of Land Management										
All Lands	6	(3)	1	(1)	?				0	0
Total Federal	1239	(672)	1149	(646)	263-340				172	160
State of California										
State Parks	1	(1)	1	(1)	?				1	1
Other State	2	(1)	2	(0)	?				1	1
Private Lands										
Industrial forests	58	(32)	49	(29)	?					
Other private	67	(26)	49	(21)	?					
Total Sierra Nevada	1367	(732)	1250	(697)					174	162

¹ Number of SOHAs with at least one pair.

² Total number of pairs in all SOHAs (counting all pairs in each SOHA).

³ Indicates that FS data were augmented by information from CDFG's database.

dergo natural events such as fire, insect and disease attack, and windthrow that may render them unsuitable for spotted owls. The Forests were given a choice of three strategies for replacement: (1) no scheduled harvest, (2) uneven-aged management and (3) even-aged management. An option of no scheduled harvest requires that 650 additional acres of suitable or near-suitable habitat be designated to supplement the 1,000 acres, for a total of 1,650 acres for each SOHA. SOHAs selected for uneven-aged management must have replacement habitat of 1,000 acres and all 2,000 acres can be managed using selection harvests and an implied rotation period of 300 years. SOHAs selected for even-aged management must have 1,650 acres of replacement habitat, and the entire 2,650-acre SOHA is to be managed using clearcut and shelterwood prescriptions and an implied rotation of 240 years (USDA, FS 1984).

Most NFs have already designated management of their SOHAs, but a few will designate the management system as timber sales are planned. Essentially all SOHAs on the Lassen, Eldorado, Stanislaus, Sierra, and Sequoia NFs will be managed as "no scheduled harvest." SOHAs on the other NFs will be a

combination of management strategies. The Inyo NF and LTBMU have the same direction as westside NFs, but they were not required to establish SOHA networks because the LTBMU has no regulated timber program and the Inyo timber program is small. Both units have 1-3 spotted owl sites, and essentially all suitable habitat at these sites is protected. The Toiyabe NF, which is adjacent to the Inyo NF and LTBMU on the east slope of the Sierra Nevada is part of Region 4 of the FS. It has only 1-3 spotted owl sites and essentially all suitable habitat is protected (Coburn pers. comm.)

From 1981 to 1987, most spotted owl surveys done on NFs in the Sierra Nevada focused on verification of pairs in network SOHAs. Prior to 1987, this was generally done using a three-visit method without rigid survey requirements. In 1987, however, the Spotted Owl RD&A Program established strict protocols for monitoring SOHAs in R5 and R6. These protocols require up to six visits, methodical coverage of the SOHA and special nest-detection techniques that markedly increased the information acquired. In 1988 and 1989, NFs in the western Sierra Nevada participated in the RD&A Program by monitoring ran-

dourly selected SOHAs and Random Sample Areas (RSAs). Seventy-two SOHAs and 86 RSAs were selected as part of the sample in the Sierra Nevada. Verification of other SOHAs with little or no occupancy history was also made a high priority during this period. Many of those other SOHAs, especially at remote sites, had not been surveyed previously.

In 1988, RD&A monitoring of RSAs began to add information to a meager database of owl locations outside network SOHAs. In 1989, RS direction specified that field surveys be done for the preparation of biological evaluations for spotted owls in proposed timber sales. Surveys in 1989 and 1990 included improved coverage of project areas, similar to the RD&A monitoring method, but they required only three visits. Because of an extended drought affecting the Sierra Nevada, most NFs have had extensive insect mortality among conifers in the last few years, resulting in a much-expanded salvage sale program that involved large portions of the NFs. Spotted owl surveys for proposed green and salvage sales since 1989 have covered much more land outside SOHAs, and to a higher standard, than all previous surveys combined. In 1991 the protocol for project surveys for spotted owls was changed to match that used for the northern spotted owl. This entailed six visits with longer time periods between visits, ensuring a higher likelihood of detecting owls that might be present.

Protecting owl habitat in network SOHAs has been the policy since 1982 except where natural events have impacted the habitat to the extent that management actions to benefit the owl are justified. Direction for management of, spotted owl habitat outside network SOHAs, however, has not been as static. Sites outside network SOHAs received little or no protection before 1989. FS direction in 1989 on field surveys and biological evaluations for owl sites outside network SOHAs created concern and controversy in the NFs. Most Forests were hurrying to complete LMPs based on Regional Guidelines for networks intended to ensure viability. Emerging research on the northern and California subspecies cast doubt on the adequacy of that approach, however, and many biologists preparing biological evaluations concluded that many non-SOHA habitat areas might be needed to maintain viability of the California spotted owl. Release of the ISC report (Thomas et al. 1990) further eroded confidence in the efficiency of the SOHA network.

Protection was given to non-network spotted owls on a case-by-case basis in 1989 and 1990. Generally, more protection was given to pairs and nest sites than to single owls, but policies varied among Forests, Districts, and cases. Where extra measures were afforded, they usually involved habitat protection ranging from 40 to 300 acres and exclusion of sale-related activities between 1 March and 30 August for pairs known to be nesting. For insect salvage sales, protection entailed snag retention in the protected zone comparable to network SOHA standards. Occasionally, similar protection was given to some single birds where pairs were suspected.

In 1991, commensurate with higher standards for field surveys, RS established interim policy for evaluating and mitigating effects of timber sales on spotted owls not otherwise protected in the Sierra Nevada. The direction to NFs was to see that projects did not directly or indirectly affect spotted owls by removing

nesting or foraging habitat. This involved the use of home-range study data on the California spotted owl to estimate the territorial needs of known and potential owl pairs. The objective of the policy was to assure a full range of options for managing spotted owls by maintaining the population at current levels until the agencies could consider new directions based on recommendations of the Steering Committee.

Since 1970 biologists have identified California spotted owls at 1,112 sites (an area with either a pair or a single where a pair could be supported—see glossary) in NFs in the Sierra Nevada province. In the last 5 years (1987-1991) 586 pairs have been verified at 1,028 of these sites (table 3B). The NFs estimate a potential for approximately 250 more sites. Of the 264 network SOHAs identified in the LMPs that are managed exclusively for California spotted owls, pairs have been verified at 197 sites, including 107 sites where reproduction has been documented.

National Park System, Western Region

Four NPs are located in the southern Cascades and Sierra Nevada, within the range of the California spotted owl. Sequoia/Kings Canyon NPs, Yosemite NP, and Lassen Volcanic NP have land bases of 863,710 acres, 749,031 acres, and 106,298 acres, respectively, for a total of 1,719,039 acres. Thirty-six percent (315,933 acres) of Sequoia/Kings Canyon NPs is forested and within the elevational range of the owl, and 15 percent (133,561 acres) is considered suitable for foraging or nesting. In Yosemite NP, 75 percent (564,500 acres) is forested, and 35 percent (263,126 acres) is considered suitable for foraging or nesting by owls (Steger pers. comm.). Lassen NP is approximately 94 percent (100,100 acres) forested, but few surveys have been done there; about 60 percent (64,600 acres) of that is in yellow pine and fir forests (Husari 1990), and may be suitable spotted owl habitat.

The NPS manages the Parks to emphasize preservation and maintenance of natural communities and ecological processes. Their policy states that "Natural processes will be managed with a concern for fundamental ecological processes as well as for individual species and features. Managers and resource specialists will not attempt solely to preserve individual species (except threatened or endangered species) or individual natural processes; rather, they will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of the plants and animals" (USDI, NPS 1988).

In addition, the NPS "will identify all state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to and present in the parks, and their critical habitats. These species and their habitats are considered in NPS planning and management. Based on an analysis of the status of state and locally listed species throughout their native ranges and throughout the national park system, the National Park Service may choose to control access to critical habitats or to conduct active management programs similar to activities conducted to perpetuate the natural distribution and abundance of federally listed species."

The spotted owl is recognized as a special status species by the NPS, but specific management direction has not been devel-

oped. Resource management plans for the NPs will be revised as each unit determines what special management, if any, is needed (van Wagtenonk pers. comm.).

Known owl sites since 1986 total four in Lassen Volcanic NP, 56 in Yosemite NP (Roberts et al. 1988), and 60 in Sequoia/Kings Canyon NPs (Roberts 1989, Steger pers. comm.) (table 3B). We estimate that the NPs may contain owls at another 55 sites. Most of the information for Yosemite and Sequoia/Kings Canyon NPs was obtained by the CDFG and PSW Research Station in special surveys and studies done since 1988. Yosemite and Sequoia/Kings Canyon NPs are considered critical by the CDFG and FS as reserves for maintaining population viability and for movement by spotted owls between NFs in the Sierra Nevada.

Bureau of Land Management, California Office

The BLM administers scattered public lands along the foothills and lower slopes of the southern Cascades, Sierra Nevada, Transverse Ranges, central Coast Ranges, and southern California mountain ranges. Some of these support forest, woodland, and foothill riparian/hardwood habitats that are potentially suitable for California spotted owls. Commonly, potential owl habitat on BLM land occurs in small tracts (less than a section) and may be located adjacent to NFs or intermingled with private timberlands. Along the Merced, Tuolumne, American, Yuba, Stanislaus, and Mokelumne Rivers, however, their lands are concentrated in blocks of several thousand acres (Saslaw 1991).

In the northern Resource Areas, forest management includes green timber sales, thinning for timber stand improvement, fire and insect salvage, and forest sanitation. Forested lands of the BLM in California are managed primarily under uneven-aged prescriptions that remove 40 to 60 percent of the volume and up to 30 percent of the stems. Between 1981 and 1990, 25,691 acres were logged under a partial-cut prescription, and 238 acres (1 percent) were logged as clearcuts, generally between 2 and 4 acres in size. Many unharvested locations were within riparian buffer areas, usually 100 feet on each side of the stream, and may be within special recreation management areas along major streams. Future management in the Folsom Resource Area is expected to be custodial, with forest management prescriptions designed to meet wildlife and vegetation objectives. Emphasis will be on managing for old-growth, special wood products, and stand maintenance. Logging will be directed to fire and insect salvage and forest sanitation. Forest management on the Redding, Alturas, and Eagle Lake Resource Areas will continue to use uneven-aged methods.

Potential suitable habitat has been mapped based on BLM forest operation inventories, Timber Production Capability Classification maps, CDF oak woodland maps, BLM vegetation surveys, and records of owls from the CDFG and nearby NF lands. About 68,500 acres of BLM land are considered to be potential habitat for the California spotted owl, based on habitats they are known to use elsewhere in the Sierra Nevada (Saslaw 1991) (table 3C).

Inventories for California spotted owls on BLM lands were initiated in 1989 for forest management or land exchange proposals that could potentially affect spotted owl habitat. Because the BLM has only recently begun systematic inventories for

spotted owls, information on their distribution and numbers is unavailable. This precludes an estimate of the number of California spotted owls inhabiting BLM lands. They have been observed at six sites on BLM lands in the Sierra Nevada, however, and we believe there is potential for more.

California State Parks

Seven units of the California Department of Parks and Recreation with known or potential spotted owls occur in the Sierra Nevada. Management on State Park (SP) lands is similar to that of the NPs. All wildlife and plants are protected and sensitive species receive special care. Most units are designated as State Parks (SPs) and State Historical Parks (SHPs), with a total area of 16,580 acres. The SPs with the most potential for spotted owl are Plumas-Eureka SP with about 3,000 acres of conifer forest, Malakov Diggins SHP with 1,500 acres of conifer forest, South Yuba River Project with 1,500 acres of conifer and oak habitats, and Calaveras Big Trees SP with 5,750 acres, mostly in old-growth conifer forest (Bakken pers. comm.). Spotted owls have been found on adjacent NFs and Calaveras Big Trees SP (2 pairs), Malakov Diggins SHP (single owl) and Growers Hot Springs SP (single owl). Surveys, none of which are recent, have been conducted only at Calaveras Big Trees and Growers Hot Springs SPs and the potential exists for owls at the other larger units.

California State Forests

Mountain Home State Forest (SF) and Latour SF are State-owned forests managed by the CDF for demonstration of forestry practices and to support cooperative research with other agencies. Uneven-aged silviculture is featured in both SFs, including both single-tree and group-selection methods on a sustained yield basis. Other multiple uses are also emphasized, primarily recreation. Known owl activity centers would be protected from planned projects through review and advice from the CDFG.

Located in Tulare County, Mountain Home SF includes 4,807 acres, with Sierran mixed-conifer and giant sequoia stands that provide potential owl habitat on the entire property. About 960 acres of old-growth forest remain. Surveys have been done only around the edges of this SF by FS biologists, but they provide evidence of use by spotted owls. Probably two or three pairs occur there (Dulitz pers. comm.).

Table 3C--Potential suitable habitat for California spotted owls on Bureau of Land Management lands.

BLM District Resource Area	Acres
Susanville	
Alturas	13,337
Eagle Lake	18,936
Ukiah	
Redding	12,250
Bakersfield	
Folsom	24,000
Total	68,523

Latour SF is located in Shasta County and encompasses 9,033 acres. It was surveyed for spotted owls in 1990 and 1991, with one pair discovered in 1990 (McNamara pers. comm.). This SF has 7,000 acres of mixed-conifer and fir forest that are potential owl habitat, but only 2,000 acres have significant large-tree components (6+ trees per acre at least 32 inches in d.b.h.).

University of California

Blodgett Forest Research Station, located in Eldorado County within the Eldorado NF, is a 3,000-acre facility owned and operated by the University of California, Berkeley. It provides a setting for research on all aspects of forest management in Sierra Nevada mixed-conifer forests, especially research done as part of the forestry program at the University. Blodgett Forest has approximately 2,000 acres of suitable habitat for California spotted owls and typically one or two pairs nest in the area (Heald pers. comm.).

Whitaker Forest is a 320-acre unit located between the Sequoia NF and the General Grant area of Kings Canyon NP. Most of it is suitable owl habitat including giant sequoia stands. The property is used for research, with emphasis on sequoia natural history (Gasser pers. comm.). This unit has a long history of spotted owl observations and has supported at least a single owl over the last 5 years.

Private Lands

Private lands in the Sierra Nevada that are classified as timberland and have the potential to grow forest habitats used by California spotted owls encompass about 2.4 million acres, much of which is currently in suitable condition. Of this, 1.45 million acres are owned by industrial private timber companies (IPs) and

0.96 million acres are owned by miscellaneous private parties (MPs) not primarily engaged in commercial timber production (Colclasure et al. 1986, Hiserote et al. 1986, Lloyd et al. 1986) (table 3D). The latter group includes both large landowners, such as utilities and water districts, and many small landowners.

NFs in the Sierra Nevada include approximately 1.4 million acres of private land within their administrative boundaries (USDA, FS 1986b, 1988a, 1988c, 1988e, 1990, 1991a, 1991b) (table 3E). The other 1 million acres of IP lands are outside of NF boundaries. NF inholdings are much greater in extent in northern NFs (especially the Lassen, Plumas, and Tahoe) than in the southern Sierra Nevada. The Tahoe NF, with about 375,000 acres, includes the most private inholdings, and the Sequoia NF (with about 54,000 acres) has the least.

The spatial arrangement of private lands within NFs varies. Much of the private lands within the boundaries of the Lassen, Plumas and Stanislaus NFs tend to be in contiguous blocks, leaving NF lands also fairly contiguous. Most private lands on the Tahoe NF are in "checkerboard" ownership-alternating sections of private and NF ownership-and the Eldorado NF has a combination of checkerboard and contiguous block patterns. The checkerboard pattern is a vestige of Federal land policies used to stimulate development of the Nation's railroad system prior to establishment of the NFs. The Sierra and Sequoia NFs have relatively little interior private lands, and the four NPs have negligible amounts.

Except for historical railroad holdings, most lands belonging to IP companies were acquired with consideration for growth and yield potential. Therefore, they occupy most of the best tree-growing lands in the Sierra Nevada. Most IP timberlands are at middle elevations, in the mixed-conifer zone, but some are higher and farther east, in red fir and eastside pine zones. Almost all are within the elevation and geographic ranges of the California spotted owl. About 12 major companies have relatively large holdings in timberlands of the Sierra Nevada with eight owning at least 75,000 acres (Swing pers. comm.) Table 3D shows the total amount of IP and MP timberlands by county.

Systematic surveys for owls have not been done on most private lands, although several timber companies conducted surveys, using established FS protocols, starting in 1989, 1990, or 1991. Locations of owls found are not always available from timber companies, but it appears that some IP lands with a long

Table 3D--Acres of forest lands owned by commercial timber industries and miscellaneous private parties in the Sierra Nevada, by county, within the range of the California spotted owl.¹

County	Forest industry	Miscellaneous private
Shasta	194,000	54,000
Lassen	267,000	42,000
Tehama	120,000	19,000
Plumas	215,000	82,000
Butte	135,000	92,000
Yuba	26,000	23,000
Sierra	49,000	44,000
Nevada	60,000	137,000
Placer	95,000	79,000
El Dorado	121,000	117,000
Amador	25,000	31,000
Calaveras	68,000	71,000
Tuolumne	60,000	50,000
Mariposa	1,000	40,000
Madera	5,000	12,000
Fresno	10,000	22,000
Tulare	Trace	16,000
Kern	0	26,000
Total	1,451,000	957,000

¹ From Colclasure et al.1986, Hiserote et al. 1986, and Lloyd et al. 1986.

Table 3E---Approximate acres of private lands within National Forest boundaries (data from Forest LMPs as listed in references)

National Forest	Private land
Lassen	230,000
Plumas	226,000
Tahoe	375,000
Eldorado	190,000
Stanislaus	195,000
Sierra	109,000
Sequoia	54,000
Total	1,379,000

history of logging have a substantial number of owls, comparable in density to adjacent NF lands. We also know from one study that some IP lands with a history of intensive logging lack nesting owls, even though nest sites occur in adjoining NF lands (Bias and Gutiérrez 1988).

The public has recently attempted to pass forestry-reform initiatives for California, and the Legislature and Board of Forestry are also moving to provide new rules for logging on private lands. Emergency Regulations were recently in effect for IP timberlands in California, with the expectation they would be replaced with permanent policies. These policies will probably include requirements for sustained yield, less clearcutting, riparian protection, and special requirements for older forest stands. Although we cannot now assess the effects of new forestry regulations on the capability of private lands to support spotted owls, we believe those regulations will be more beneficial than past policies.

At the north end of the Sierra Nevada, a relatively continuous block of private timberlands in eastern Shasta County provides the habitat linkage for movement between populations by both northern and California spotted owls. Maintaining this connection is considered to be critical to the long-term conservation of both subspecies of spotted owls (Dawson et al. 1987, Thomas et al. 1990).

Owls are known to inhabit dense stands of hardwoods along stream channels at low elevations on the western edge of the Sierra and Sequoia NFs. These habitats resemble, in most respects, habitats used by many spotted owls in southern California. Similar habitats, with sparse stands of digger or ponderosa pine over denser stands of mixed hardwoods, occur along riparian zones west of NF boundaries from the Stanislaus NF north. Generally, these areas are not classified as commercial timberland. Livestock grazing has been the primary activity in these low-elevation habitats in the past, and type conversions, firewood cutting, and logging in and adjacent to riparian zones have also occurred. An increase in residential developments in the Sierra Nevada foothills is now impacting many of these potential owl habitats. The combination of residential development and indirectly related increased fire potential represent growing threats to habitat for both year-round and wintering spotted owls (Chapter 13). These areas have not been adequately surveyed for owls, although we suspect that they support many pairs.

Over the last 20 years, spotted owls have been located at 58 sites on IP lands and at 67 sites on MP lands in the Sierra Nevada. Twenty-nine and 21 pairs have been verified on IP and MP lands, respectively, in the last five years (tables 3B and 3F). There is no estimate of the potential number of spotted owl sites on private lands because of the small percent of those lands which have been surveyed and the lack of specific habitat information which could be used to estimate the distribution and numbers of spotted owls in lower elevation habitat types. We expect that these areas contain many owl sites but we estimate, based on the gross mapping of hardwood types, that number to be no more than one-third the total number of sites in conifer types.

Areas of Concern: Sierra Nevada

Spotted owl distribution in the Sierra Nevada Province is characterized by its continuity and relatively uniform density (fig. 4B). The ability of existing habitat to support owls does not appear to be a major problem except at the peripheries of the subspecies' range. This condition is normal for animal populations, however, and is not a concern unless the range begins to shrink. Five conditions give rise to some concern for the integrity of the California spotted owl's range in the Sierra Nevada: (1) bottlenecks in the distribution of habitat or owl populations; (2) gaps in the known distribution of owls; (3) locally isolated populations; (4) highly fragmented habitat; and (5) areas of low crude density of spotted owls. Areas occur throughout the length of the Sierra Nevada where one or more of these conditions currently limit the owl population; it might be of critical concern if conditions were exacerbated, or if they limit our knowledge of the owls there. This might lead to erroneous or more risky management decisions (fig. 3A, table 3G). These conditions may be caused solely or jointly by fire, land-ownership patterns, natural or human-caused fragmentation of suitable habitat, and by natural geographic features that control vegetation patterns. Rather than reflecting current negative effects on spotted owls, areas of concern identified in figure 3A simply indicate potential areas where future problems may be greatest if the owl's status in the Sierra Nevada were to deteriorate.

Areas A and B (fig. 3A) are bottlenecks in distribution where even relatively small losses of habitat could sever the interchange between adjacent populations of owls. In Area A, this would decrease the likelihood of interchange between the California and the northern spotted owl populations. This area of concern was identified for its importance by the Audubon Society's Spotted Owl Advisory Panel (Dawson et al. 1987) and by the Interagency Scientific Committee for the northern spotted owl (Thomas et al. 1990).

Areas A, B, 1, 4, 5, 7, and 8 are characterized by habitat fragmentation that decreases the density of owl pairs, makes successful dispersal more difficult, and reduces the likelihood of quick replacement of owls in vacated habitat.

Area 2 is a gap in the known distribution of spotted owls from the western to the eastern edge of the owl's range in the northern Sierra Nevada. If few birds and little habitat exist in this area, north-south dispersal could be impeded. This area and others (for example, areas 4 and 5) where few surveys have been done are, however, capable of producing owl habitat and may not be breaks in distribution.

Areas 5 and 6 also have low population densities. As in areas with fragmented habitat, low densities make dispersal more difficult and less likely to result in reoccupation of vacated sites.

Area 8 is characterized, in part, by small isolated populations that are more vulnerable to extinction by local stochastic or catastrophic events.

Table 3F—Estimated numbers of owl sites (confirmed pairs) on private lands in the Sierra Nevada, by county.

County	Industrial lands				Other private			
	1970-1991		1987-1991		1970-1991		1987-1991	
Shasta	5	(0)	5	(0)	4	(0)	3	(0)
Lassen	0		0		3	(1)	3	(1)
Tehama	6	(4)	6	(4)	0		0	
Plumas	8	(5)	7	(4)	10	(4)	10	(5)
Butte	9	(0)	5	(0)	7	(4)	5	(4)
Sierra	3	(2)	3	(2)	2	(0)	2	(0)
Yuba	0		0		3	(1)	1	(0)
Nevada	7	(6)	7	(6)	3	(2)	3	(1)
Placer	3	(3)	3	(3)	5	(1)	2	(1)
El Dorado	13	(8)	9	(6)	8	(3)	7	(2)
Amador	0		0		1	(0)	1	(0)
Calaveras	0		0		5	(0)	1	(0)
Tuolumne	4	(4)	4	(4)	7	(3)	3	(0)
Mariposa	0		0		4	(2)	3	(2)
Madera	0		0		0		0	
Fresno	0		0		4	(4)	4	(4)
Tulare	0		0		0		0	
Kern	0		0		1	(1)	1	(1)
Totals	58	(32)	49	(29)	67	(26)	49	(21)

Southern California Province

Spotted owls in southern California occur in 11 major mountain ranges and mountain complexes, predominantly on NF lands. These ranges and areas are the Santa Ana, San Diego (including the Laguna, Cuyamaca, Pine Hills/Vulcan, and Palomar mountain areas), San Jacinto, San Bernardino, San Gabriel, Liebre/Sawmill, Tehachapi, Tecuya Mountain area, Los Padres, southern Santa Lucia Mountains, and northern Santa Lucia Mountains (fig. 9A). Movement between these major ranges and complexes may be uncommon to nonexistent (Stephenson 1991). Within a given range, however, separate blocks of suitable habitat are relatively close together. For instance, the San Diego ranges include five of the mountain ranges mentioned above with populations 4.5 to 8 miles apart, but distances from the San Diego to the San Jacinto ranges and Santa Ana Mountains are 18 and 33 miles, respectively (Stephenson 1991). Historic records from the turn of the century documented spotted owls in riparian areas on the coastal lowlands, but their occurrence there today is unlikely because of the extensive loss of habitat to urbanization (Bloom pers. comm.).

Besides our concern that successful movement by owls among some of these relatively isolated islands of habitat may be declining or no longer possible, the southern California populations of owls may be isolated from the southern Sierra Nevada because of the nature of available connecting habitat. The Tehachapi Mountains, Liebre/Sawmill and Tecuya Mountain areas are critical for maintaining this linkage, if it still exists, and they are relatively distant from the nearest other known spotted owls in the San Gabriel Mountains and the southern Los Padres ranges.

Estimated owl sites, numbers of pairs, pair status, and distances from nearest neighboring populations of California spot-

ted owls for each of the 11 mountain areas are summarized in table 3H (Stephenson 1991).

Forest Service, Pacific Southwest Region (R5)

Most known spotted owl populations in southern California are on the Angeles, San Bernardino, Cleveland, and Los Padres NFs, with a total land base of 3,643,927 acres. The primary habitat types used are riparian/hardwood, live oak/bigcone Douglas-fir, and mixed-conifer (Chapter 5) (types described in Chapter 1), but in different proportions on the four NFs (table 3I). On the Angeles and San Bernardino, most spotted owls are found in live oak/bigcone Douglas fir at elevations of 2,000 to 5,000 feet and mixed-conifer (mostly Jeffrey pine) at elevations from 5,000 to 8,000 feet. These types cover 137,000 acres on the Angeles NF (20 percent of the landbase) and 308,000 acres on the San Bernardino NF (37 percent of the landbase). On the Cleveland NF most owls are found in similar habitats, including a total of 40,000 acres (9.6 percent of the landbase) but we believe that additional owls will be found in riparian/hardwood habitats when they are surveyed. These habitats make up 1-2 percent of the landbase on all four NFs (USDA, FS 1986a, 1987, 1988b, 1988d).

On coastal portions of the Monterey District of the Los Padres NF, large stands of redwoods on north slopes also provide owl habitat, but population surveys there are incomplete. Most owls on the Los Padres NF, especially in the southern block, are in narrow riparian corridors, where mixed hardwoods are closely flanked by chaparral.

Regional direction for the four NFs in southern California is to protect all known spotted owl sites and to manage the habitat based on local information about suitability and availability (USDA, FS 1984). FS surveys for occupancy and suitable habitat in southern California lags behind the Sierra Nevada Prov-

Table 3G—Areas of concern for California spotted owls in the Sierra Nevada.

Area ¹	General location (major ownership) ²	Reasons for concern
A	Eastern Shasta County (FS, IP)	A natural bottleneck between northern and California spotted owls; habitats are fragmented and owl densities low.
B	Central Tulare County (NPS)	Apparently a natural bottleneck in north-south distribution of owls because steep terrain provides only a narrow band of suitable habitat.
1	Lassen County (FS, NPS, IP)	Habitat in this area is discontinuous, naturally fragmented, and poor in quality due to drier conditions and lava-based soils.
2	Northern Plumas County (FS, IP, Pvt.)	A gap in known distribution, mainly on private lands, extends east-west in a band almost fully across the width of the owl's range.
3	Northeastern Tahoe NF (FS, IP, Pvt.)	An area of checkerboard lands; much dominated by granite outcrops and red fir forests; both features guarantee low owl densities.
4	Northern Eldorado NF (FS, IP, Pvt.)	Checkerboarded lands and large, private inholdings; owl densities unknown on some private lands and very low on others.
5	Northwestern Stanislaus NF (FS, IP, Pvt.)	Has large private inholdings; owl densities unknown on most private lands.
6	Southern Stanislaus NF (FS)	Burned in recent years; the little remaining habitat is highly fragmented.
7	Northwestern Sierra NF (FS)	Habitat naturally fragmented, due partly to low elevations and dry conditions; fragmentation accentuated by logging.
8	Northeastern Kern County (FS)	Only small, semi-isolated groups of owls in the few areas at elevations where habitat persists at the south end of the Sierra Nevada.

¹ Location codes correspond to letters (gaps and bottlenecks) and numbers (population areas) on figure 3A.

² Ownership codes: FS = USDA Forest Service; NPS = National Park Service; BLM = Bureau of Land Management; IP = Private industrial lands; Pvt. = multiple, small, private ownerships.

ince because threats to the population from management appeared to be less imminent in southern California. Southern California was not included in the monitoring phase of the RD&A Program, and funding for other survey efforts has been inadequate.

Three hundred seventeen sites with pairs or single owls have been documented on the four southern California NFs since 1970, and 294 sites since 1986 (table 3J). Over the last 5 years, pairs have been verified at 214 of these sites with reproduction at 107 sites. About 42 percent of known sites were located in the San Bernardino Mountains (LaHaye and Gutiérrez 1990). This probably reflects a higher relative abundance of owls over a larger area than elsewhere in southern California. The NFs estimate that approximately 190 additional sites might currently exist. The 294 sites identified since 1986 are 85 percent of all sites located in southern California during that period.

Bureau of Land Management, California Office

BLM lands are relatively few and scattered in the mountain ranges between the coast and inland deserts of southern California. They are located down-slope from, and in more arid areas than, NF lands and they include drainages and riparian/hardwood forests that may provide spotted owl habitat. In the California Desert District and the Caliente Resource Area, potential spotted owl habitats are managed for wildlife, riparian habitat

quality, water quality, and dispersed recreation. Total potential owl habitat, based on vegetation, in these two management units is 7,560 acres, but surveys have not been done (Saslaw 1991). One spotted owl site has been located on BLM lands in the last 5 years, the result of survey work on adjacent NF lands.

U.S. Department of Defense

Camp Pendleton Marine Base occupies about 125,000 acres on the coastal plain between the Santa Ana Mountains and the Pacific Coast in northern San Diego County. The higher part of the Base, with a small amount of potential habitat, abuts the Trabuco Ranger District of the Cleveland NF, but no owls have been found there recently (Buck pers. comm.). Spotted owls were observed about the turn of the century at several locations in riparian habitats on the coastal plain, including San Onofre Creek in what today is Camp Pendleton, but none is there today (Bloom pers. comm.). Santa Margarita Creek is another major drainage bisecting the Camp that probably had spotted owls historically, based on remnant bigcone Douglas-fir in the upper reaches, but the habitat has been too degraded by fire to support owls now (Bloom pers. comm.). The Base has a natural resource management program, including wildlife conservation, but long-term effects of training activities have degraded habitat for spotted owls to an extent that very little exists today (Buck pers. comm.).

Table 3H-Owl sites¹, number of pairs and status of pairs at those sites, pair status, and nearest-neighbor distances of California spotted owls in southern California²

Area	Owl sites (all years)	Pairs since 1987	Breeding since 1987	Potential population (no. sites)	Nearest neighbor distances ³
San Diego Ranges	37	18	6	76	18 -33 miles
Santa Ana Mountains	2	1	-	12	30 -40 miles
San Jacinto Ranges	20	16	9	29	11 -18 miles
San Bernardino Mountains	124	114	66	125	6 -11 miles
San Gabriel Mountains	54	22	5	95	6 -20 miles
Liebre/Sawmill Mountains	14	10	2	20	12 -20 miles
Tehachapi Mountains	4	0	-	12	unknown
Tecuya Mtn area	5	3	-	10	9 -12 miles
Los Padres	65	32	17	100	8 -12 miles
So. Santa Lucia Mountains	12	6	2	19	32 -45 miles
No. Santa Lucia Mountains	39	22	1	80	45 miles
Total	376	244	108	578	

¹ See definition of "owl site" in glossary (Appendix B).

² Based on Stephenson (1991) and California Department of Fish and Game database.

³ Where two distance values are shown (for example, 12-20 miles), they represent the distances to the two closest neighboring populations.

California State Parks

Five units of the SP system, totalling 58,182 acres, are in the vicinity of the Angeles, San Bernardino, and Cleveland NFs. Those with significant owl habitat are San Jacinto SP (about 12,500 acres of conifer and pine-oak forests), Cuyamaca Rancho SP (about 11,000 acres of conifer and hardwood forests), and Palomar Mountain SP (1,000 acres of conifer and hardwood forests) (Bakken pers. comm.). All three of these SPs have been surveyed for spotted owls in recent years. Based on research, existing habitat, and nine known sites, they could support 13 to 15 pairs of spotted owls (Stephenson pers. comm.).

Four additional SP units with a combined total of 300 acres of coastal conifer and hardwood habitats are on the central California coast and have potential for a limited number of spotted owls. These are Julia Pfeiffer Burns SP, Pfeiffer-Big Sur SP, Andrew Molera SP in Monterey County and Gaviota SP in Santa Barbara County (Bakken pers. comm.). Nojoqui Falls County Park is a 98-acre park which is part of the Santa Barbara County park system not far from Gaviota SP. It has had records of a spotted owl site since the early 1970s in riparian/hardwood habitat along Nojoqui Creek (Jimenez pers. comm.).

National Audubon Society

Starr Ranch, a 4,000-acre wildlife sanctuary owned and managed by the National Audubon Society, is located on upper Bell Canyon in Orange County, adjacent to the Trabuco Ranger District of the Cleveland NF (DeSimone pers. comm.). This area occasionally has nonbreeding spotted owls that move onto the property from NF lands, but they apparently do not nest there (Bloom pers. comm.).

Native American Tribal Lands

Several Native American Tribal Reservations are located in southern California; these have potential spotted owl habitat and a few documented sightings. The Pala, La Jolla, Santa Ysabel,

Mesa Grande, Los Coyotes, and Cuyapaipe Reservations all have potential habitat that has been identified by FS biologists from the Cleveland NF. Sightings indicate a population of at least four pairs, and known potential habitat could support a higher number. Activities and potential threats to spotted owls on these lands are unknown.

Other Private Lands

Major activities that threaten spotted owls on private lands in southern California are recreation, urbanization, fire, and water extraction from stream systems (Chapter 13). Both the San Bernardino and Cleveland NFs include significant areas of private land—about 145,000 and 120,000 acres, respectively (USDA, FS 1986a, 1988d). The San Bernardino NF surrounds the popular and rapidly growing mountain resorts of Big Bear Lake, Lake Arrowhead, Forest Falls, and Idyllwild. This is causing a loss of owl habitat, especially near Lake Arrowhead (Stephenson 1991). The situation on included lands on the Cleveland NF is not so severe, but expanding development and recreation on these lands pose long-term risks for the owl. Direct risks are caused by continual loss of suitable nesting habitat from these activities which fragments the already meager quantity of suitable habitat. An indirect risk is the decreasing ability of the FS to use prescribed burning to reduce fuel accumulations that can lead to stand-destroying fires, because of the potential risk of prescribed fires to residential areas as well as local air pollution regulations.

Urbanization and wildfires also affect owl habitat outside of and surrounding all four NFs. The Angeles and the Los Padres NFs do not have major problems with private inholdings, but they are experiencing residential development around their edges. Loss of habitat in these areas outside the forests reduce the quantity of suitable habitat around the edge of the isolated parcels of NF lands and occasional tracts of habitat on private lands. Additional impacts of urbanization are effects of fire management policies, recreation patterns, and diversions of wa-

Table 3I-Known California spotted owl sites, by habitat type, on and in the vicinity of National Forest lands in southern California, 1970-1991.

	National Forests				Total sites	Percent
	Angeles	San Bernardino	Cleveland	Los Padres		
Habitat types						
Riparian/hardwood		2	4	110	116	32
Live oak/bigcone	48	73	26		147	41
Douglas-fir						
Mixed-conifer	11	72	6	6	95	26
Redwood				2	2	>1
Total Sample¹	59	147	36	118	360	100
Reproductive sites						
Breeding pairs ²	10	82	7	8	107	

¹ Data provided by NFs for all sites with available information on habitats. Actual total counts of sites for southern California are given in Table 3J, based on CDFG's database.

² Data provided by NFs for sites where young were produced.

Table 3J-Estimated numbers of California spotted owl sites (pairs) in southern California.

Location	Total known sites (known pairs)				Sites in reserved areas		Estimated additional sites
	1970-1991		1987-1991		1970-1991	1987-1991	
Federal Lands National Forests Los Padres Angeles San Bernardino Cleveland Bureau of Land Management All lands Subtotal State and Local Lands State Parks Other State Local Parks Subtotal Private Lands Indian Nations Other (by county) Monterey San Luis Obispo Santa Barbara Ventura Kern Los Angeles San Bernardino Riverside Orange San Diego Subtotal Overall total							
	Federal Lands						
	111	(62)	94	(61)	45 ¹	41	58-100
	59	(31)	56	(28)	9 ¹	7	40-80
	126	(114)	126	(114)	8	8	30-45
	21	(14)	18	(11)	3	3	14
	1	(0)	1	(0)			
	318	(221)	295	(214)	65	59	142-239
	State and Local Lands						
	7	(4)	7	(1)			13-15
	1	(0)	0				
	1	(1)	0				
	9	(5)	7	(1)			13-15
	Private Lands						
	4	(3)	4	(3)			
	2	(1)	1	(1)			
	2	(1)	0				
	3	(2)	2	(1)			
	0		0				
	5	(1)	4	(0)			
3	(2)	3	(1)				
16	(14)	16	(13)				
7	(6)	7	(6)				
0		0					
7	(5)	4	(4)				
45	(32)	41	(29)				
Overall total							
376	(261)	343	(244)				

¹ Data from FS were augmented by information from CDFG's database for historical sightings only.

ter from streams for local residential use. These development; also accentuate the barriers separating owl populations. They also have the effect of reducing dispersal between blocks and the chance for population support from adjacent areas.

Over the last 5 years spotted owls have been found at 37 sites on private lands in all counties along the southern California coast except Ventura, Orange, and San Luis Obispo (table 3J). We expect these numbers to be low because most private lands are at elevations lower than "traditional" spotted owl habitat. Some surveys have been done in the gaps between NF lands and on NF lands with habitats similar to those found on private lands. Spotted owls have been located in local situations and at relatively low densities. We do not expect that further surveys will document additional, extensive populations that would dramatically change our current understanding of the species' distribution and density in southern California.

Areas of Concern: Southern California

Our concern for spotted owl populations in southern California is much greater than is the case for the Sierra Nevada, because processes are at work there that we believe will further isolate populations from one another and reduce the sizes of individual populations. These processes are likely to reduce the interchange of owls between populations (Chapter 9), lowering our estimates of the stability of the metapopulation in southern California. The likelihood of local extinction resulting from stochastic processes will increase if local populations are further isolated and suitable owl habitat declines.

Concern about the stability and persistence of the California spotted owl population in southern California centers on four factors: (1) Every population is separated from neighboring populations by unsuitable habitat; (2) even within mountain ranges, gaps occur in the known distribution of owls; (3) suitable habitat is highly fragmented; and (4) some areas have low crude densities of spotted owls. Whereas the Sierra Nevada contains one relatively contiguous population of spotted owls, southern California contains at least 11 populations separated from their nearest neighbors by at least 6 miles (figs. 3A, 9A; tables 3H and 3K). The gaps, in all but two cases, contain major highways, often urban development, and hotter, drier, lower elevations unsuitable for nesting, foraging, or dispersal.

The owl's habitat in the Sierra Nevada most often consists of relatively large areas with a fairly high proportion of suitable habitat. In southern California, even in areas with owls, the habitat is often restricted to narrow riparian strips separated from adjacent and similar habitat by open expanses of 1/2 mile or more of chaparral (Areas 10,11, 12, 15,17, 19, and 20 in fig. 3A, table 3K). The intervening areas are not amenable to changes that might result in their having suitable owl habitat.

Areas 9, 10, 11, 13, 17, 19, and 20 also have low crude densities, given the potential habitat that might be present. Estimates of low crude densities of owl pairs and individuals in many of these populations may be a result of insufficient survey work.

Conclusions

Diverse in character and geography, habitats of the California spotted owl are managed by several State and Federal agencies and various private landowners, most with different objectives and mandates. The FS has implemented policies to provide for conservation of the California spotted owl, but these policies have been challenged recently as a result of recommendations by the ISC for the northern spotted owl (see Thomas et al. 1990).

The extensive and nearly continuous nature of Federal land ownership in primary habitats of the California spotted owl over the length of the Sierra Nevada makes it feasible to implement a coordinated and effective conservation strategy there. We also believe that lands held by commercial timber companies and other private owners could make a substantive contribution to maintenance of the spotted owl population in the Sierra Nevada. Private timber companies differ in their land-management objectives and policies, however, and it is uncertain the extent to which future management of their lands will maintain suitable spotted owl habitat. The final form of expected new State forestry rules cannot be fully predicted except that, at a minimum, they will change logging practices on some private lands and probably benefit spotted owls as a net effect.

In contrast to the case in the Sierra Nevada, populations of spotted owls in southern California occur in relatively isolated blocks, primarily on mountain tops and in wooded ravines extending down the mountain sides, and most of these populations are small (Chapter 9). This island-like nature of owl distribution in southern California makes it especially challenging to contrive a conservation strategy for the bird, based solely on public lands. For a variety of reasons, southern California is losing spotted owl habitat for breeding, foraging, and dispersal. Among the primary reasons are residential developments in previously remote valleys and mountains, stand-destroying fires, increasing concentration of recreational activities in prime owl habitat, and the "mining" of water from streams within the range of the owl. These impacts will continue, leading to increased insularization of owls in the relatively small mountain ranges where they now occur. These are the primary risks facing continued spotted owl distribution in southern California. It will probably be impossible to maintain a viable population of spotted owls in southern California without stabilizing the amount and distribution of suitable habitat on public lands and without changes in land-use policies on private lands, especially those that adjoin public lands.

Table 3K-Areas of concern for California spotted owls in southern California.

Area ¹	General location (major ownership) ²	Reasons for concern
Gaps in known owl distribution		
C	East-central Kern County (Pvt., BLM)	A gap of 30 miles in the known owl distribution; believed to contain little or no suitable owl habitat.
D	Tejon Pass (Pvt., FS)	Includes Interstate 5 and has little suitable habitat; most is grasslands and chaparral.
E	Northern Ventura County (FS)	Has little suitable habitat; most is chaparral or pinyon-juniper woodlands.
F	Western Antelope Valley (Pvt.)	High desert with no suitable habitat.
G	Piru Gorge (FS, Pvt.)	Has little suitable habitat and bisected by Interstate 5; most of the area in chaparral.
H	Santa Clara River (FS, Pvt.)	Has little suitable habitat; includes State Highway 14 and associated developed areas; most of the area in chaparral and desert scrub.
I	Cajon Pass (FS, Pvt.)	Consists mainly of chaparral; bisected by Interstate 15.
J	Banning Pass (BLM, FS, Pvt.)	Mostly desert scrub and chaparral at higher elevations; has Interstate 10 and developments.
K	Anza area (BLM, FS, Pvt.)	Mostly chaparral; includes some grasslands, limited riparian woodlands, and semirural housing.
L	Los Angeles Basin (Pvt.)	No owl habitat; fully urban sprawl with some grasslands and residual chaparral areas.
M	Temecula area (BLM, Pvt.)	Mostly chaparral; includes Interstate 5; urbanization is increasing.
N	Cuyama River (FS, Pvt.)	Has little suitable habitat; contains chaparral and some semidesert scrub.
O	Northwestern San Luis Obispo Co. (Pvt.)	May contain some suitable hardwood and riparian habitat, but very poorly surveyed.
P	San Joaquin Valley (Pvt.)	Has little suitable owl habitat; most land in crops, grasslands, or residual desert scrub.
Population problems		
9	Tehachapi Mountains (Pvt.)	Habitat is fragmented and known owl density is low. This small population is isolated from the population to the south and probably from the population to the west.
10	Tecuya Mountain (FS)	Owl density is low and habitat occurs only in north-slope drainages. This small population is probably isolated from populations to the south and east.
11	Ventura/Santa Barbara (FS)	This is a large area with varying owl densities and distributions of habitat. Except for the San Rafael Wilderness Area, populations are scattered in suitable habitat, mostly in north-slope drainages. The population here is probably isolated from other populations to the northwest, northeast, and east.
12	Liebre/Sawmill (FS)	Area has a limited population in suitable habitat on the north sides of mountains; owls are isolated from the population to the southeast and probably from the ones to the north and west.
13	San Gabriel Mountains (FS)	Large area varying in habitat distribution and owl densities; much habitat is mixed-conifer or bigcone Douglas-fir/oak. This population is isolated from the population to the northwest and probably from the one to the east.
14	San Bernardino Mountains (FS)	Contains the largest population and most extensive owl habitat in southern California; at least partially isolated from the population to the west and maybe totally from the one to the south.
15	Mount San Jacinto (FS)	Most habitat here is bigcone Douglas-fir/oak on south and west sides of the mountain. The limited population is isolated from populations to the north and southwest.
16	Palomar Mountain (FS, IP)	The mountain-top habitat is mixed-conifer and bigcone Douglas-fir/oak. The owl population is isolated from populations to the northwest and northeast but is continuous with the population to the south.
17	Central San Diego County (FS, NATL, Pvt.)	This population is spread sparsely through the canyons at lower elevations south from Palomar almost to the Mexican border. It includes some smaller mountains and links Palomar with Area 18. Habitat is usually oak in canyons. Surveys here have been limited and local.
18	Cuyamaca/Laguna Mountains (FS, CA)	Area consists of two adjacent mountaintops, both with small, local populations. Habitat is mixed-conifer and oak-dominated canyons. This is southern-most population in California and only links to populations further north in San Diego County.
19	Santa Ana Mountains (FS)	This range contains the smallest known population (two sites), both in conifer/oak habitat at heads of canyons on the range's west slope. This population is isolated by the Los Angeles Basin from populations to the southeast and north-northeast.
20	Southern Santa Lucia Mountains (FS, Pvt.)	This limited population exists in canyons dominated mostly by oak habitats. It is probably isolated from populations to the southeast and northwest.
21	Coastal Monterey County (FS, Pvt.)	This is the northern-most population of the California Spotted Owl on the coast. It occurs in a variety of habitats including the southern-most groves of coast redwood. It is isolated from the northern spotted owl by 100 miles of mixed habitat, including the highly developed San Francisco area. It is isolated from California spotted owls in the Sierra Nevada by the San Joaquin Valley.

¹ Location codes correspond to letters (gaps and bottlenecks) and numbers (population areas) on figure 3A.

² Ownership codes: FS = USDA Forest Service; BLM = Bureau of Land Management; CA = State of California; NATL = Native American tribal lands; Pvt. = multiple, small, private ownerships.

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