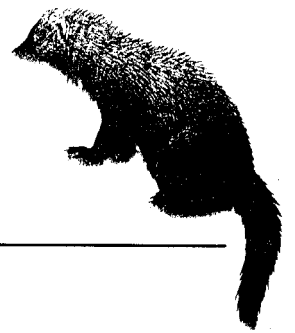




**STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
NONGAME BIRD AND MAMMAL SECTION**



**SPOTTED OWL DISTRIBUTION AND ABUNDANCE IN YOSEMITE NATIONAL PARK,
1988-89**

by

Gordon I. Gould, Jr. and Kathleen M. Norton

March 1993

**TECHNICAL REPORT 1993 - 3
NONGAME BIRD AND MAMMAL SECTION REPORT**

State of California
THE RESOURCES AGENCY
Department of Fish and Game

SPOTTED OWL DISTRIBUTION AND ABUNDANCE IN YOSEMITE NATIONAL PARK, 1988-1989¹

by

Gordon I. Gould Jr. and Kathleen M. Norton
California Department of Fish and Game
Nongame Bird and Mammal Section
1416 Ninth Street
Sacramento, CA 95814

ABSTRACT

Surveys and inventories to determine the distribution and abundance of Spotted Owls (*Strix occidentalis*) were conducted in Yosemite National Park from April through August of 1988 and 1989. Surveys covered 577.4 km² of forest habitat at elevations between 1220 m and 2465 m. Owls were seen or responded to imitated Spotted Owl calls at 58 sites over the two seasons. This included finding owls at 12 of 15 previously known sites. U.S. Forest Service protocol was used to establish pair occupancy at 10 of 13 sites checked in 1988 and at 12 of 18 sites checked in 1989. Reproductive activity was observed serendipitously. Two nest trees and four sites with young were observed in 1988, and four nest trees and two sites with young were observed in 1989. There was a greater rate of presence of Spotted Owls at elevations from 1295 m to 2055 m than at higher and lower elevations. Combined crude densities were estimated to be 0.18 owls/km² and 0.10 territories/km².

¹ Supported by California Environmental License Plate Fund, Nongame Bird and Mammal Section, Wildlife Management Division, Job II.A.2. Progress Report (March 1993).

TABLE OF CONTENTS

	Page
LIST OF FIGURES . . . . .	.ii
LIST OF TABLES . . . . .	.ii
INTRODUCTION . . . . .	.1
STUDY AREA . . . . .	.2
METHODS . . . . .	.2
RESULTS . . . . .	.4
Surveys . . . . .	.4
Inventories . . . . .	.8
Distribution . . . . .	.8
Density . . . . .	.10
DISCUSSION . . . . .	.11
ACKNOWLEDGEMENTS . . . . .	.13
LITERATURE CITED . . . . .	.14
APPENDIX 1 . . . . .	.16
APPENDIX 2 . . . . .	.20
APPENDIX 3 . . . . .	.27

LIST OF FIGURES

	Page
Figure 1. Yosemite National Park Study Area and Vicinity, 1988 and 1989	3
Figure 2. Survey Routes within Yosemite National Park Study Area during 1988 and 1989	5
Figure 3. Locations of 48 Spotted Owl Territories within Yosemite National Park Study Area during 1988	6
Figure 4. Locations of 27 Spotted Owl Territories within Yosemite National Park Study Area during 1989	7
Figure 5. Number of inventory visits to determine pair occupancy of Spotted Owls in Yosemite National Park during 1988 and 1989	9
Figure 6. Elevational Distribution of survey sites checked for the presence of Spotted Owls within Yosemite National Park during 1988 and 1989	9

LIST OF TABLE

	Page
Table 1. Occupancy status of areas surveyed and inventoried for Spotted Owls, Yosemite National Park, 1988 and 1989	8
Table 2. Crude density estimates of survey and inventoried areas for Spotted Owls in Yosemite National Park, 1988 and 1989 combined	10
Table 3. Comparison of nest tree characteristics of Spotted Owls in Yosemite National Park during 1988 and 1989	10
Table 4. Success of relocating Spotted Owls with one visit at known sites	11
Table 5. Crude density comparisons of various studies, including Yosemite National Park	12
Table 6. Proportion of inventoried California Spotted Owl populations which were determined to be paired	12

INTRODUCTION

The California Department of Fish and Game (DFG) initiated a two year study in 1988 to gain better understanding of the distribution and quantity of Spotted Owls (*Strix occidentalis*) on National Park Service (NPS) lands. This study was conducted in Yosemite National Park (YONP) and was designed to be a companion study to one being conducted in Sequoia and Kings Canyon National Parks. Hopefully information from this study can be used to compare owl abundance and distribution on NPS lands with U.S. Forest Service (USFS) land. Also, the information gathered from this study would help verify the protocol procedures created by the USFS to determine site occupancy, establish a standard rate of occurrence for the Spotted Owl for NPS lands, and aid the USFS in the management planning for Spotted Owl Habitat Areas (SOHAs).

The Spotted Owl is a forest dweller and is known to depend heavily on old-growth and mature forests. Much of this habitat has been subject to logging pressures and its amount has been greatly reduced. For this reason the Spotted Owl was classified by the DFG as a species of special concern in 1978 (Remsen 1978). This classification does not add to the owl's legal protection, but recognizes that it has the potential to become endangered if current conditions continue.

Yosemite was discovered in 1851, designated a state park in 1864, and became a national park in 1890 (U.S. Dept. of Interior 1953). Within the National Park the Spotted Owl is not threatened by habitat loss due to logging. Federal regulations prohibits such action (Drury 1949) and it appears that no logging historically occurred in the park. Therefore, YONP lands provide pristine habitats of old-growth forest for the Spotted Owl.

A total of 1460 sites containing Spotted Owls were found in California between 1970 and 1985 (Gould 1985). In 1985 the Forest Service set a goal for managing 500 pairs of Spotted Owls in California (Carey 1985). Gould (1985) estimated that 89% of the known Spotted Owl sites occur on USFS lands and only 3% of the sites were on NPS lands. With habitat declining on USFS lands, it was estimated that by 2035, NPS lands will support 11% of the remaining Spotted Owl population (Gould 1985). This planned reduction establishes the importance and necessity of a sizeable and stable Spotted Owl population on NPS lands. These reserve populations could act to replenish owl populations that have been reduced due to habitat loss (USDA Forest Service 1986).

In 1973 and 1974 initial surveys conducted for Spotted Owls in California by the DFG, USFS, and the NPS established that owls inhabited much of the forested mountains of California (Gould 1974a). Owls were found in Muir Woods National Monument, Point Reyes National Seashore, Sequoia, Kings Canyon, and Yosemite National Parks as well as on commercial forest lands managed by the USFS and private timber companies. These surveys identified 26 sites with Spotted Owls on NPS lands (Gould 1974b). Five of these sites were in YONP: southeast of Ackerson Meadow, along Crane Creek, in Yosemite Valley, and at both Mariposa and Tuolumne Groves. Thirteen sites also were found in Sequoia and Kings Canyon National Parks, and four were identified in Redwood National Park. Sites were determined by areas where one or more owls were heard defending an area. In 1985 three sites in Redwood National Park, initially discovered by Gould in 1974, were resurveyed and six additional sites were found by LaHaye (1984). Six additional historical sites in YONP and ten in Sequoia National Park have been reported by other sources.

This report summarizes information obtained during a two year study in YONP which ran from 1 April to 31 August 1988 and 14 April to 25 August 1989.

STUDY AREA

YONP is located in Toulumne and Mariposa counties in the central Sierra Nevada, approximately 190 km (118 mi) southeast of Sacramento, California (Figure 1). Inventory and survey work was done in and adjacent to YONP. This work was conducted in the western portion (826 km²; 319 mi²) of the park within the elevational range of 915 m to 2135 m (3000-7000 ft). This elevation band extends in a north-south direction through the park and is from 2.4 to 12.8 km (1.5-8 mi) wide.

Mixed conifer forest is the primary vegetation type in the study area (Munz 1970, Scharff 1967). The major tree species are white fir (*Abies concolor*), red fir (*A. magnifica*), ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), Jeffrey pine (*P. jeffreyi*), and incense cedar (*Libocedrus decurrens*). In mesic areas at elevations from 1065 m to 2440 m (3500-8000 ft) white fir is common. Sugar pine is abundant throughout the forest up to 2285 m (7500 ft) in elevation (Scharff 1967). At the lower elevations, 610 m to 1830 m (2000-6000 ft) on the more xeric sites, chaparral and ponderosa pines are the dominant vegetation. Jeffrey pine ranges from 1830 m to 2745 m (6000-9000 ft) in elevation (Munz 1970). Incense cedar occurs from 730 m to 2500 m (2400-8200 ft). Other vegetative components in the study area include: Douglas-fir (*Pseudotsuga menziesii*) below 1525 m (5000 ft) and California black oak (*Quercus kelloggii*) from 915 to 1525 m (3000-5000 ft; Munz 1970). The giant sequoia (*Sequoiadendron giganteum*) occurs in the study area. Sequoias are thought to be among the largest and oldest living things on earth and only reside in 26 groves in the Sierra Nevada at elevations from 1220 m to 2440 m (4000-8000 ft; Munz 1970, Scharff 1967). Three of these groves occur in YONP: Tuolumne, Mariposa, and Merced.

The climate of YONP is greatly influenced by the Sierra Nevada (Munz 1970, Schaffer 1978). This region is usually dry and warm during the summer and the winter is cold with moderate precipitation. In the 1220 to 2375 m (4000-7800 ft) elevation range where Spotted Owls were found in this study, average summer maximum temperatures vary from 22°C to 32°C (72°-90°F) and winter minimums range from -8°C to -4°C (17°-25°F). This translates to an average annual temperature of 6°C to 12°C (43°-53°F). The growing season is from 4 to 6 months and some of the average precipitation of 94 cm to 115 cm (37-45 in) falls as snow.

METHODS

Surveys were conducted at night along roads and trails, and cross-country using the methods described by Forsman (1983). Vocal imitations of Spotted Owl calls were used to elicit a response from the owls. Usually night surveys began within two hours of sunset (approx. 1800 hrs) and seldom lasted beyond 0200 hrs, PDT.

Three types of survey methods were used: point, leapfrog, and cruise (Forsman 1983). Point surveys consisted of stopping at approximately 0.8 km (0.5 mi) intervals along a road and imitating Spotted Owl calls for 10 to 15 minutes at each stop. Both leapfrog and cruise methods involved continuously walking along a road or trail while calling. Imitated four-note, contact, agitated series and crowbark calls were given at 5 to 60 second intervals. When a Spotted Owl response was evoked, presence was determined. If no Spotted Owls were previously known from the area being surveyed, a unique site designation number was assigned to the area. Survey work was conducted strictly at night and no determination of pair verification was made during survey work, but the presence of more than one owl was noted. From one to four survey visits were made at each site (Appendices 1 and 2). The area covered during a survey was calculated by establishing a 1.6 km (1 mile) band that was centered along each survey route. Adjustments in total area covered were made for the overlap between surveys caused by the shape of the survey routes.

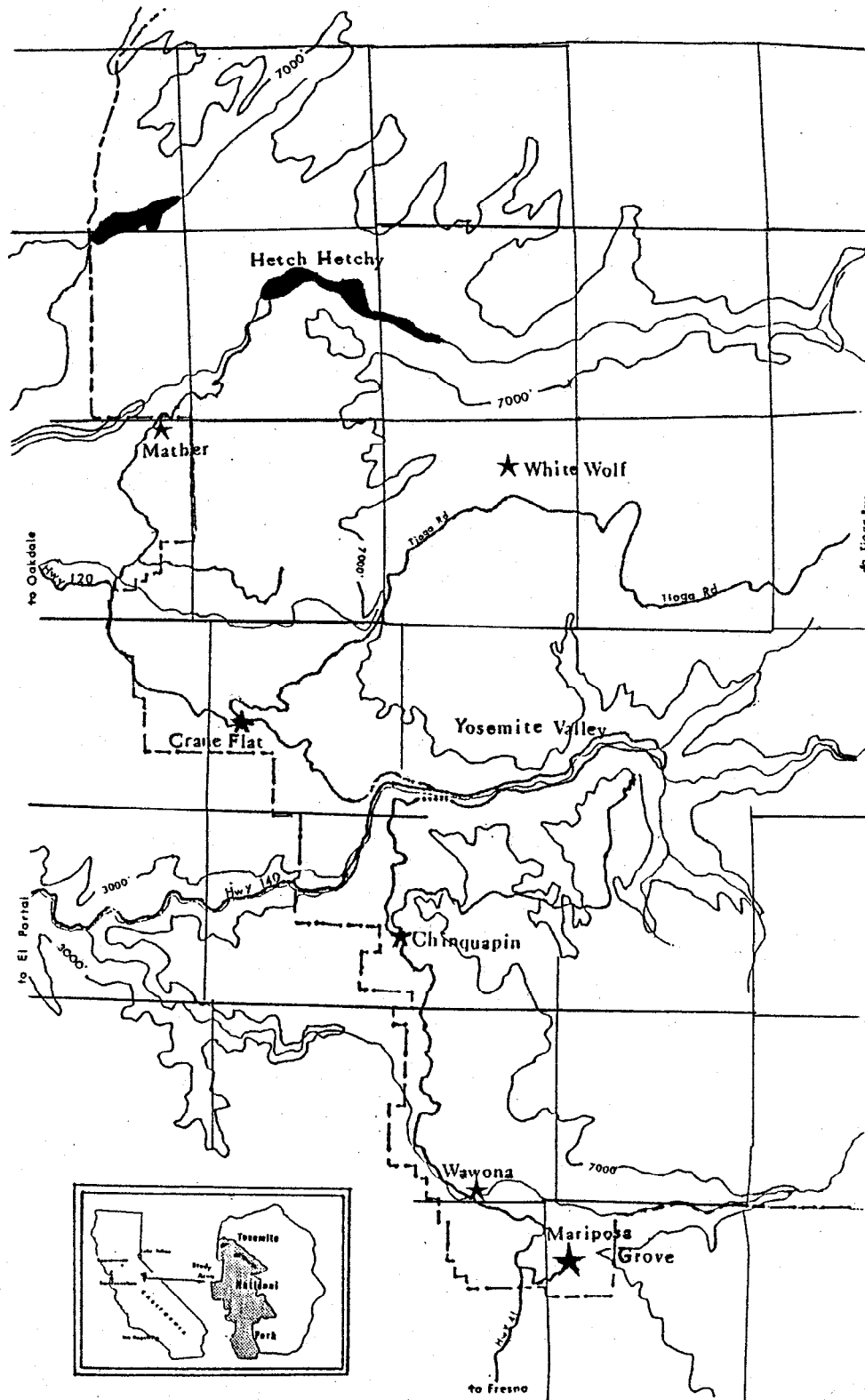


Figure 1. Yosemite National Park Study Area and Vicinity, 1988 and 1989.

Inventories to determine pair occupancy were based on the inventory and monitoring protocol developed by the USDA Forest Service (1988). This methodology consists of a combination of night (survey) and day (usually early morning follow-up) work. Generally, before an attempt was made to verify a pair during the day, a night survey was conducted in the area to determine the presence and general location of the owl(s). If an owl was located, the following morning it was relocated and fed up to four mice (*Peromyscus* spp.) in an effort to get the owl to disclose if there was a mate or young present, and/or the location of the nest site or nest grove. Pair occupancy was verified by meeting one of the following criteria: 1) if both male and female owls were observed roosting within 200 yards of each other, 2) if within a 10 minute period, one owl was seen and the other of the pair is heard calling within 200 yards of the observed owl, or 3) if male and female are not seen, but are heard vocalizing within 200 yards of each other (USDA Forest Service 1988). Information on the location of nests and number of young produced was not a priority; such information gathered during this study was coincidental. These procedures did not involve the capture or marking of owls. As many as seven inventory visits were made to any one site to verify occupancy.

Field notes were kept containing the date, time, location of each survey and inventory, and the type of response or observation of an owl. For each Spotted Owl located, the location, using the Township, Range, and Section system, was recorded as well as sex (if possible) and number of owls detected. Survey routes and owl sightings also were plotted on copies of 7½' U.S. Geological Survey topographic maps.

RESULTS

Surveys

Surveys conducted in 1988 involved 128.8 person-hours, spanned 367 km (228.2 mi) of survey route, and covered an area of 404 km² (156 mi²; Roberts et al. 1988; Figure 2). In 1989, surveys required 59.2 person-hours, spanned 142.1 km (88.3 mi), and covered an area of 189.4 km² (73.1 mi²).

Seventy-six site visits were made to 61 different locations in 1988 (Appendix 1). Eight-two owls were found at 50 of the 61 sites surveyed (Figure 3). Of the 48 areas that were only surveyed, a single female was detected at 9 sites, a single male at 13 sites, a female and a male at 14 sites, and in one site a bird of unknown sex was detected (Table 1). Owls did not respond at 11 sites.

In 1989, 31 site visits were made, of which 20 were made to sites not previously checked for Spotted Owls (Appendix 1). Fifteen individual owls were identified at eight of the 22 sites only surveyed (Figure 4); both a male and a female were observed at seven sites and a single male was found at the eighth (Table 1). No owls were found at 14 of the 22 sites and a single male was found at a previously known site coincidentally checked while surveying for new sites.

One time surveys of an area proved to be fairly successful in determining if owls were present. In 1988, at least a single owl was found at 10 of 14 previously known sites on the first visit. Owls were detected on the first visit at 13 of 21 previously known sites in 1989.

Historical sites were surveyed or inventoried during both years. In 1988, owl presence was established in 12 of the 14 (86%) historical sites studied. In 1989, owls were present at eight of nine (89%) areas where owls were known previous to this study. Cumulatively, owl presence was reaffirmed at 12 of the 15 historical sites checked during this study. However, only one visit was made to each of the three sites where owls were not found. All of these sites were on National Forest lands and were surveyed incidental to surveys in the park.

Survey Routes in 1988.



Additional Survey Routes in 1989.

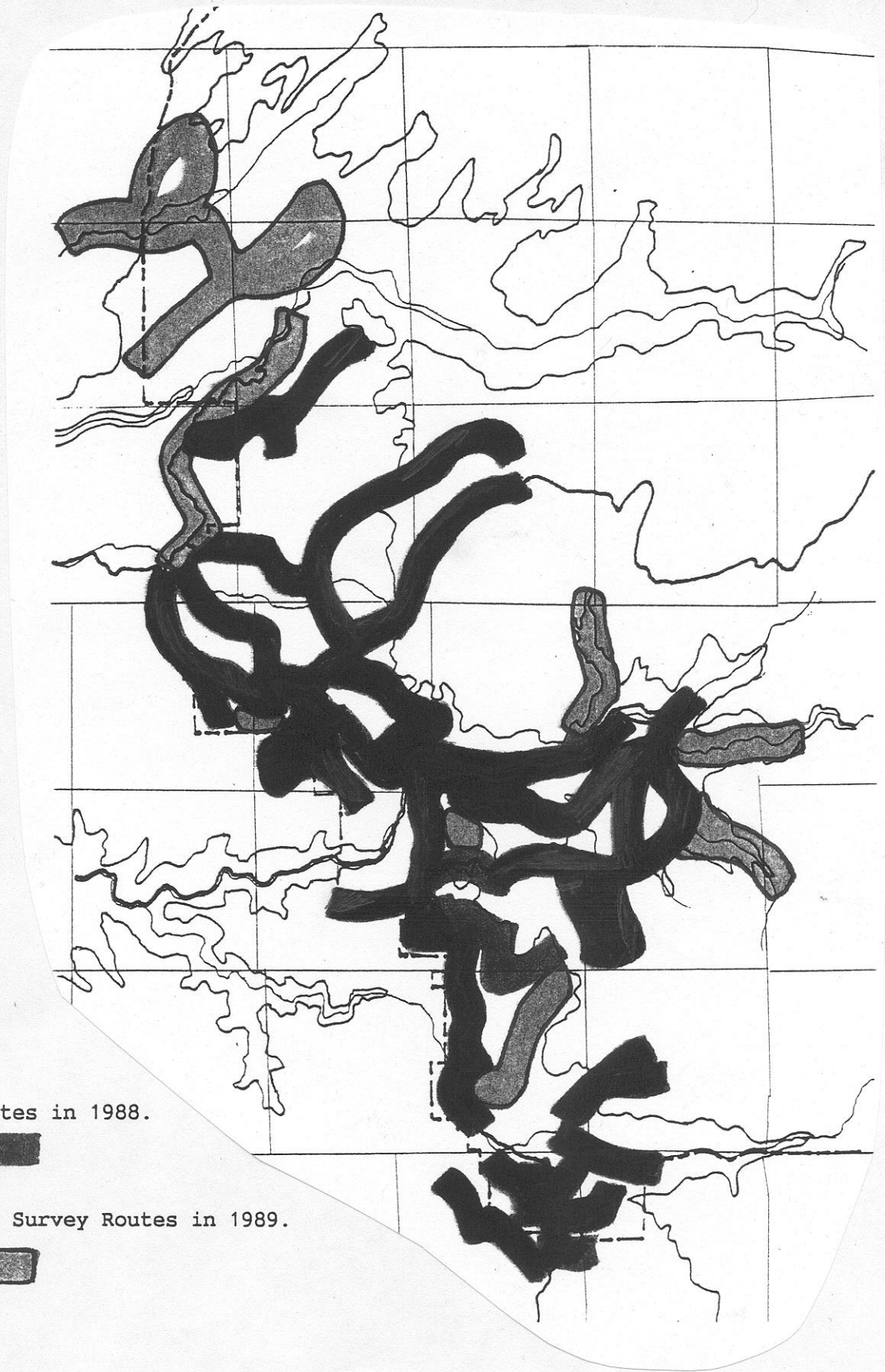


Figure 2. Survey Routes within Yosemite National Park Study Area during 1988 and 1989.

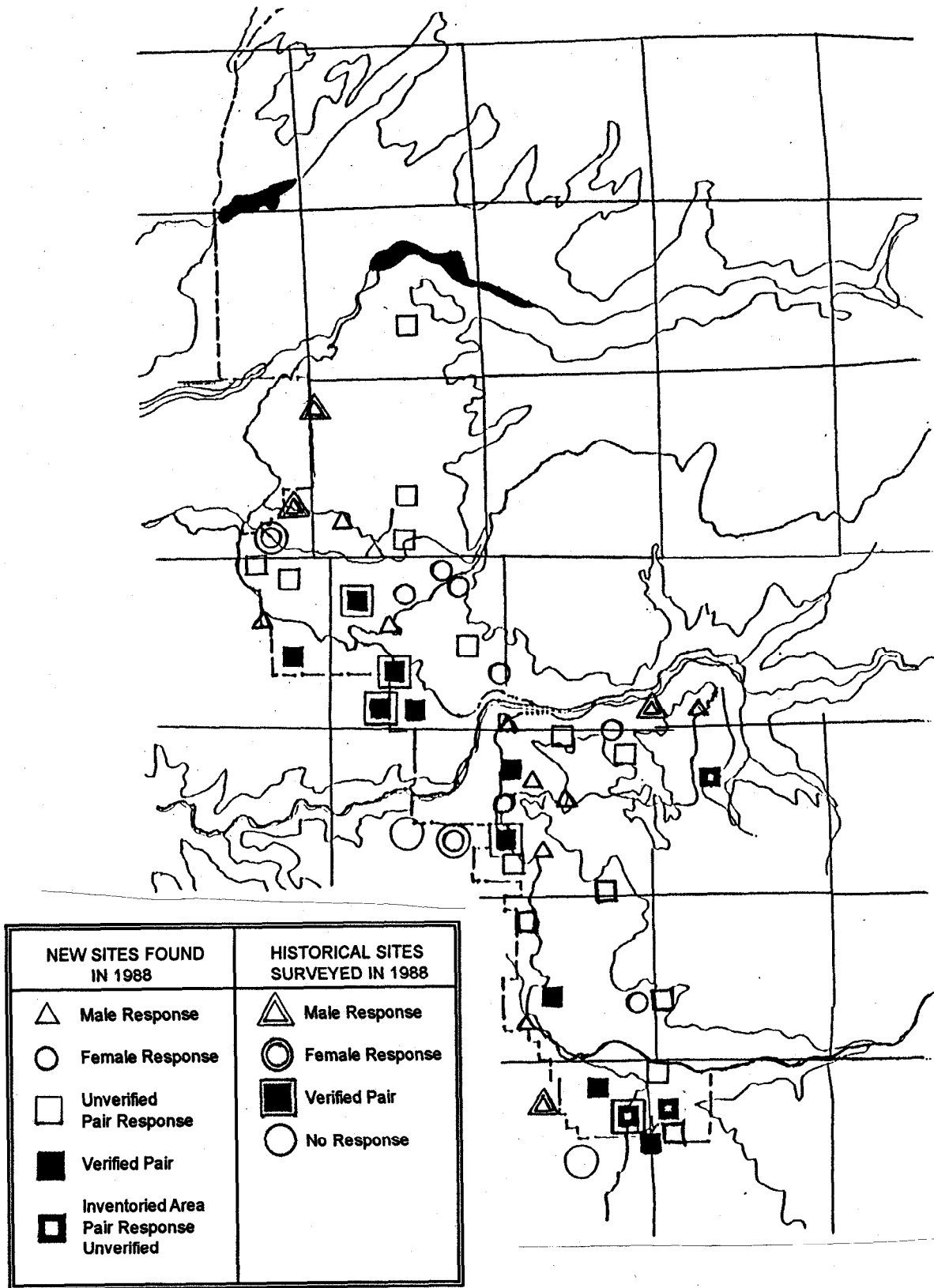


Figure 3. Locations of 48 Spotted Owl Territories within Yosemite National Park Study Area during 1988.

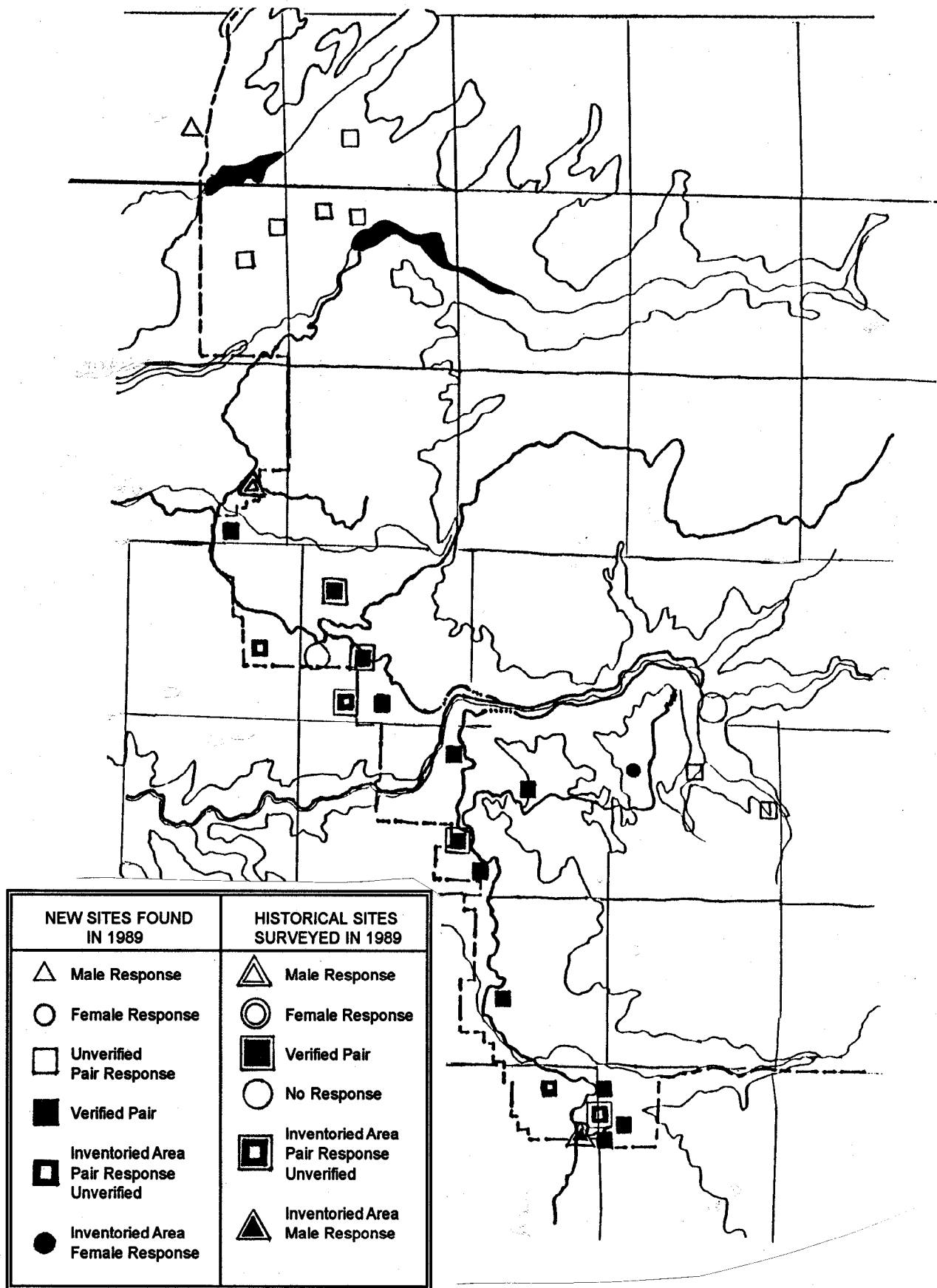


Figure 4. Locations of 27 Spotted Owl Territories within Yosemite National Park Study Area during 1989.

Table 1. Occupancy status of areas surveyed and inventoried for Spotted Owls, Yosemite National Park, 1988 and 1989.							
	Verified Pairs	Presence of:					Sample Size
		Male/Female	Male	Female	unknown	None	
Survey Areas: 1988 Historical	--	0	4	2	0	2	8
New	--	14	9	7	1	9	40
Inventory Areas	10	3	0	0	0	0	13
1988 Totals	10	17	13	9	1	11	61
Survey Areas: 1989 Historical	--	0	1	0	0	2	3
New	--	7	1	0	0	12	20
Inventory Areas	12	3	2	1	0	0	18
1989 Totals	12	9	4	1	0	17	43

Inventories

Thirteen sites were chosen to carry out protocol procedures to verify pair occupancy in 1988. Five additional sites were added to the original 13 in 1989. In 1988, 42 inventory visits were made to 13 sites, requiring a total of 94.7 hours. Total time spent at each site varied from 1.6 to 25.9 hours. In 1989, 65 inventory visits were made to 18 sites, requiring a total of 286.7 hours. Total time spent at each site ranged from 1.4 to 35.5 hours. Site visits for inventory work included both night and day work.

Pairs were verified at ten of 13 sites inventoried in 1988, and 12 of 18 in 1989 (Table 1, Figure 3, Appendices 1 & 2). In 1988, the three remaining sites had both a male and female present, but pairs were not verified according to USFS protocol (1988). At the remaining sites in 1989, three had both a male and female present, two had a male, and one had a female. The number of visits per site varied from one to seven, one more than the protocol requirements (Figure 5). Of the 18 sites inventoried both years or surveyed in 1988 and inventoried in 1989, at least one owl was present at all 18 sites both years.

Distribution

Surveys and inventories conducted in YONP were at elevations from 1220 m to 2465 m (4000 - 8080 ft). Most sites with Spotted Owls (91%) were located at elevations from 1295 m to 2110 m (4250 - 7250 ft), where 89% of the surveys were done (Figure 6, Appendix 3). Relatively more sites had owls below 1295 m (4250 ft) than above 2210 m (7250 ft), 67% versus 50%. However, 71% of the sites checked in the 1295 m to 2210 m (4250- 7250 ft) elevation range contained Spotted Owls.

