
Chapter 5: California Spotted Owl Module

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Introduction

Knowledge regarding the effects of fuels and vegetation management on California spotted owls (*Strix occidentalis occidentalis*; CSOs) and their habitat is a primary information need for addressing conservation and management objectives in Sierra Nevada forests. The specific research objectives of the California spotted owl module as identified and described in the Plumas-Lassen Study (PLS) Plan are:

- 1) What are the associations among landscape fuels treatments and CSO density, distribution, population trends and habitat suitability at the landscape-scale?
- 2) What are the associations among landscape fuels treatments and CSO reproduction, survival, and habitat fitness potential at the core area/home range scales?
- 3) What are the associations among landscape fuels treatments and CSO habitat use and home range configuration at the core area/home range scale?
- 4) What is the population trend of CSO in the northern Sierra Nevada and which factors account for variation in population trend?

5) Are barred owls increasing in the northern Sierra Nevada, what factors are associated with their distribution and abundance, and are they associated with reduced CSO territory occupancy?

6) Does West Nile Virus affect the survival, distribution and abundance of California spotted owls in the study area?

Current information on the distribution and density of CSOs across the HFQLG study area is required to provide the data necessary to build predictive habitat models and provide baseline population information against which we will assess post-treatment changes in CSO populations and habitat. Our focus in 2005 was to complete collection of CSO surveys and continue banding to provide the required baseline information to meet the objectives of Research Questions 1-4 identified above. Complete landscape inventory surveys were conducted across 11 survey areas in 2005 (Figure 1). Details on survey methods are described in the study plan. Efforts were made to monitor the pair and reproductive status of each owl, and to capture, uniquely color-mark, and collect blood samples from each individual owl. Capture and color-marking is necessary to estimate survival and population trend, and to assess exposure to West Nile Virus (WNV)(Research Question #5). We also recorded all barred and hybrid barred-spotted owls encountered in the study area and synthesized all existing barred owl records for the northern Sierra Nevada to address Research Question #6.

Results

CSO Numbers, Reproductive Success, and Density:

A total of 103 territorial CSO sites were documented in 2005 across the study area (Figure 2). This total consisted of 76 confirmed pairs, 17 unconfirmed pairs (i.e., one member of pair confirmed as territorial single plus single detection of opposite sex bird), and 10 territorial single CSOs (single owl detected multiple times with no pair-mate detected). Seventeen pairs successfully reproduced in 2005 (22% of confirmed pairs). A total of 26 fledged young were documented (1.53 young per successful nest).

We estimated the crude density of CSOs based on the number of territorial owls detected in each of the 11 survey areas during 2005 surveys at the Treatment Unit and Cal-Planning Watershed spatial scales (Table 1, Figure 3). The estimated crude density across the study area was 0.068 territorial owls/km² (Table 1). Estimated mean crude density across 60 CAL-Planning Watersheds that were completely surveyed was 0.070 territorial owls/km² (Figure 3).

Table 1. Crude density of territorial California spotted owls across survey areas on the Plumas National Forest in 2005. Locations of survey areas are identified in Figure 1.

Survey Area	Size (km ²)	Crude Density of Territorial CSOs
SA-2	182.5	0.132 /km ²
SA-3	218.5	0.082 /km ²
SA-4	238.3	0.050 /km ²
SA-5	260.3	0.069 /km ²
SA-7	210.4	0.062 /km ²
SA-1A	190.5	0.058 /km ²
SA-1B	130.4	0.023 /km ²
SA-11	180.0	0.044 /km ²
SA-12	192.4	0.094 /km ²
SA-13	193.4	0.072 /km ²
SA-14	331.2	0.063 /km ²
SA-15	317.4	0.060 /km ²
Total Study Area	2,645.3	0.068 /km ²

Vegetation Sampling – Nest Plots

Vegetation plots were measured at eighty CSO nest territories in 2005. Vegetation plots were centered on nest CSO nest trees were measured using the national Forest and Inventory Assessment (FIA) protocol. The FIA protocol is used nationally by the USDA Forest Service for inventorying and monitoring vegetation. Use of the FIA sampling protocol will facilitate monitoring of vegetation and development of CSO habitat models that can be used as adaptive management planning tools. Habitat models are currently being evaluated that can be used to assess projected changes in CSO nesting habitat suitability under varying fuels and vegetation treatment scenarios.

Banding, Blood Sampling, West Nile Virus Monitoring

Eighty-three owls were captured and banded in 2005. This included fifty new CSOs (i.e., owls banded for the first time) and 33 recaptures. Blood samples were collected from 76 individuals and screened at the University of California, Davis for West Nile Virus antibodies. None of the 76 individuals tested positive for WNV antibodies in 2005.

Barred and Spurred (spotted/barred hybrid) Distributional Records:

We detected the presence of 1 barred owl and 3 spurred owls during 2005 surveys within the overall study area. Our synthesis and update of barred-spurred owl records through 2005 based on Forest Service and California Department of Fish and Game databases indicates that there are a minimum of 33 individual site records across the northern Sierra Nevada (Figure 4). The first barred owl in the region was reported in 1989. Twenty-one

of the 33 site-records were recorded and known occupied between 2002-2005. The pattern of records suggests that barred/spurred owls have been increasing in the northern Sierra Nevada between 1989-2005.

California Spotted Owl Diet:

A single survey plot was established at a CSO nest or roost location at each CSO territory on the Plumas National Forest in 2003-2005. Systematic searches for pellets and prey remains were conducted in each plot during each year. A total of 2256 pellets have been collected over the three years (2003 = 606; 2004 = 812; 2005 = 838). To date 1418 pellets have been sorted and all prey items identified to species or taxonomic group when species identification could not be ascertained. Mammals comprised the dominant taxonomic group identified in the diet. The three most frequently detected species were the dusky-footed woodrat (detected in 43% of pellets), northern flying squirrel (detected in 39% of pellets), and *Peromyscus* species (detected in 27% of pellets)(Table 2).

Current Research: 2005-2006

In addition to continuing field surveys in 2006 designed to address our six research questions, our emphasis will broaden to focus on the development of predictive habitat relationship models as described in the module study plan. Baseline information collected in 2002-2005 forms the foundation for this phase of the research. These models should be completed in Winter 2005-2006. We also are expanding the scope of our study to fully collaborate and integrate our work with the ongoing Lassen Demographic study. This collaboration and integration will broaden the base of CSO distributional and demographic information that can be used to develop predictive habitat models for our use in an adaptive management framework and to directly monitor implementation of the HFQLG project.

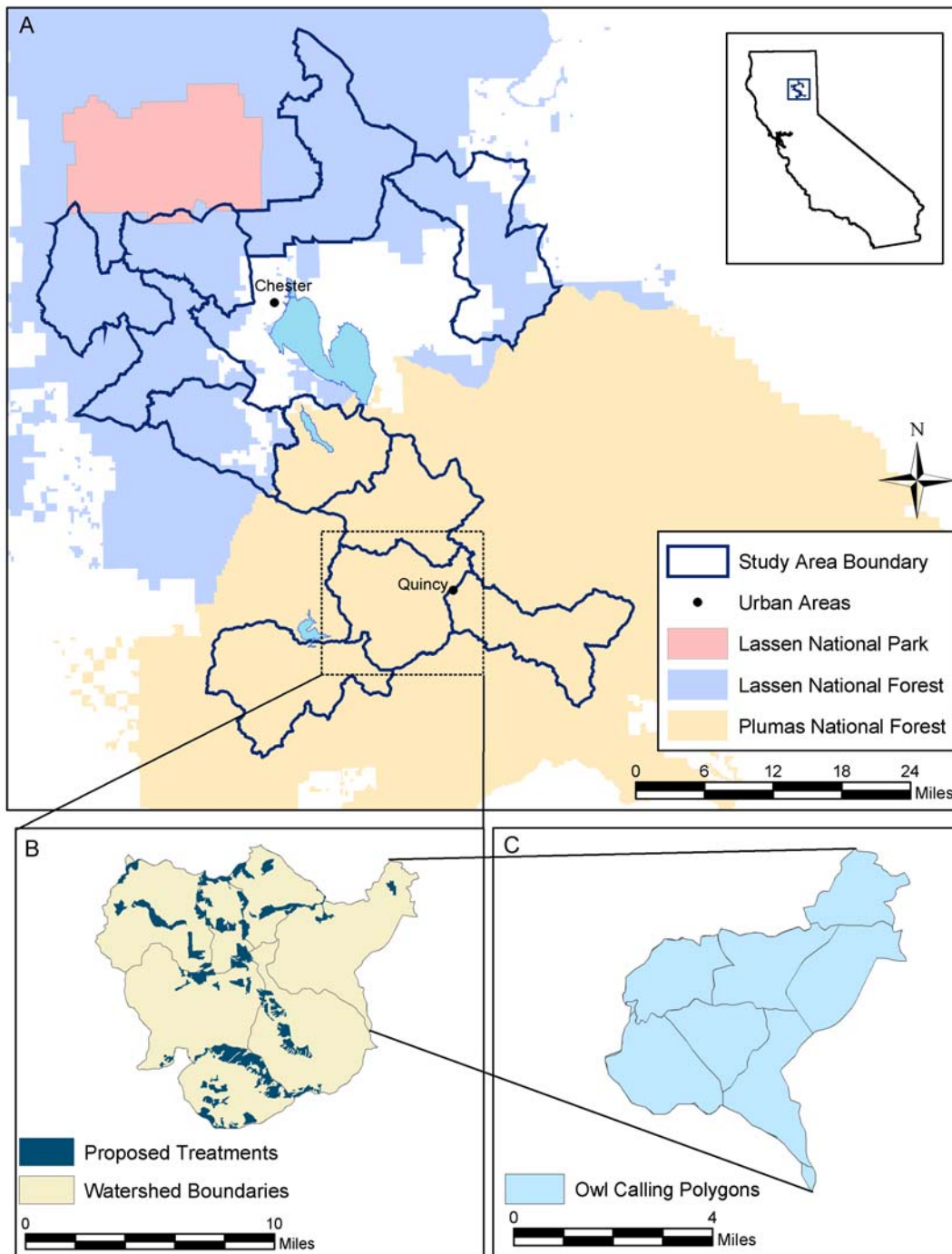


Figure 1. (A) Location of CSO Survey Plots surveyed in 2005. (B) Example of original survey plot consisting of multiple Cal-Planning watersheds. (C) Example of Primary Sampling Units for surveying for CSOs. See text and study plan for further details .

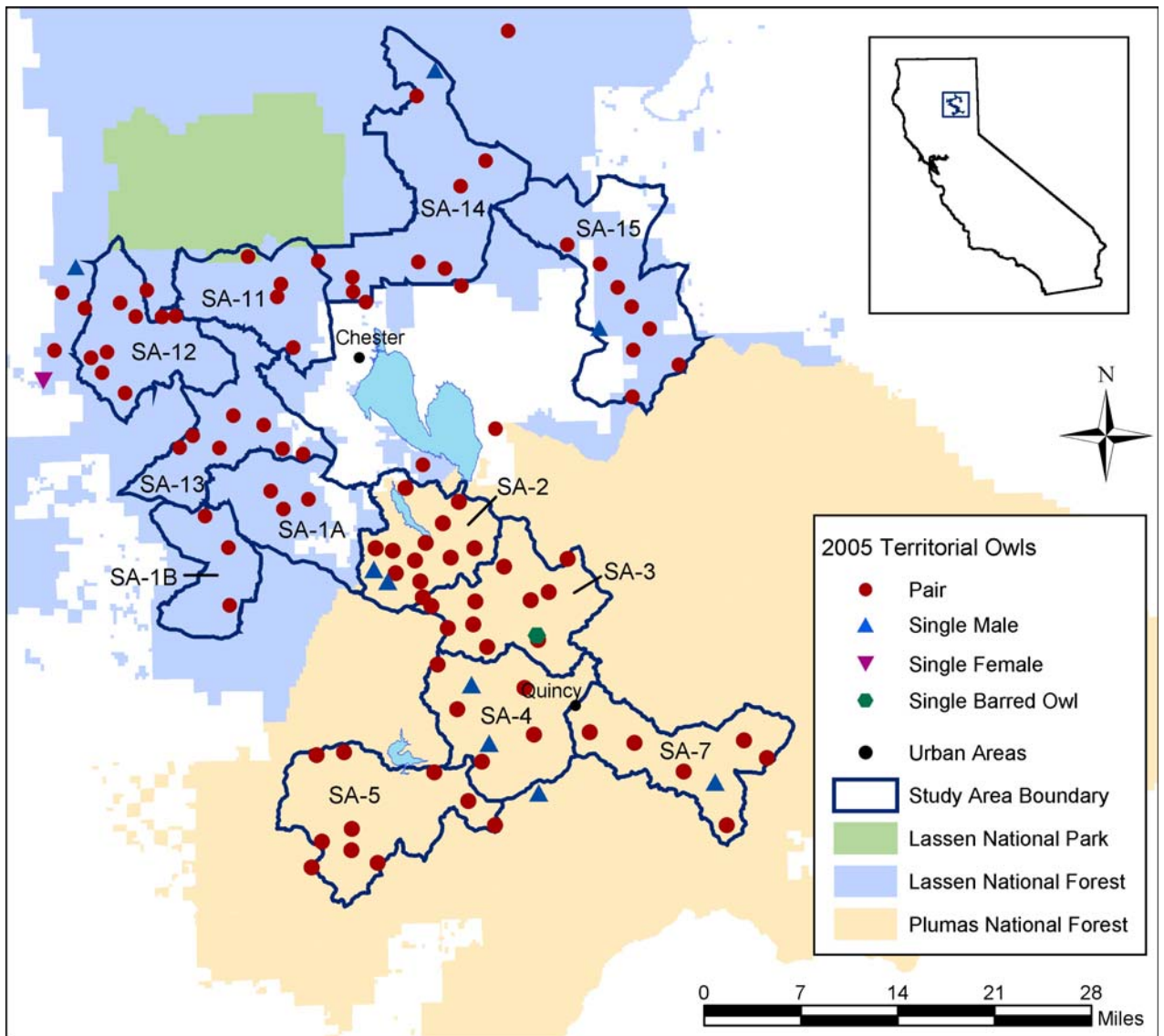


Figure 2. Distribution of California spotted owl territories within CSO survey plots across the Plumas National Forest, 2005.

Figure 3a.

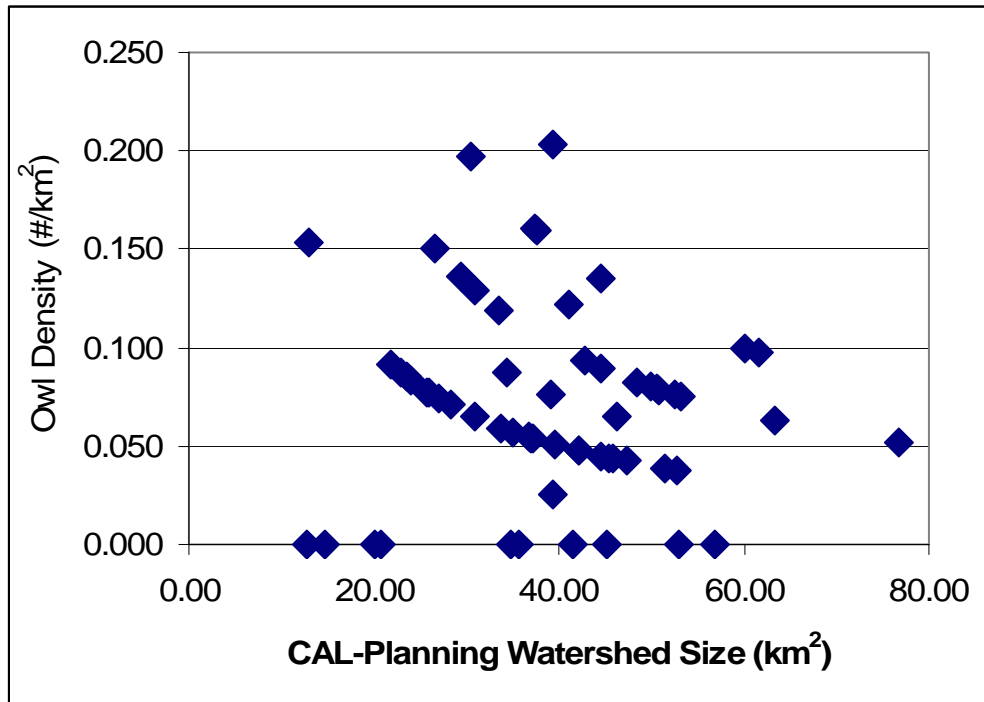


Figure 3b.

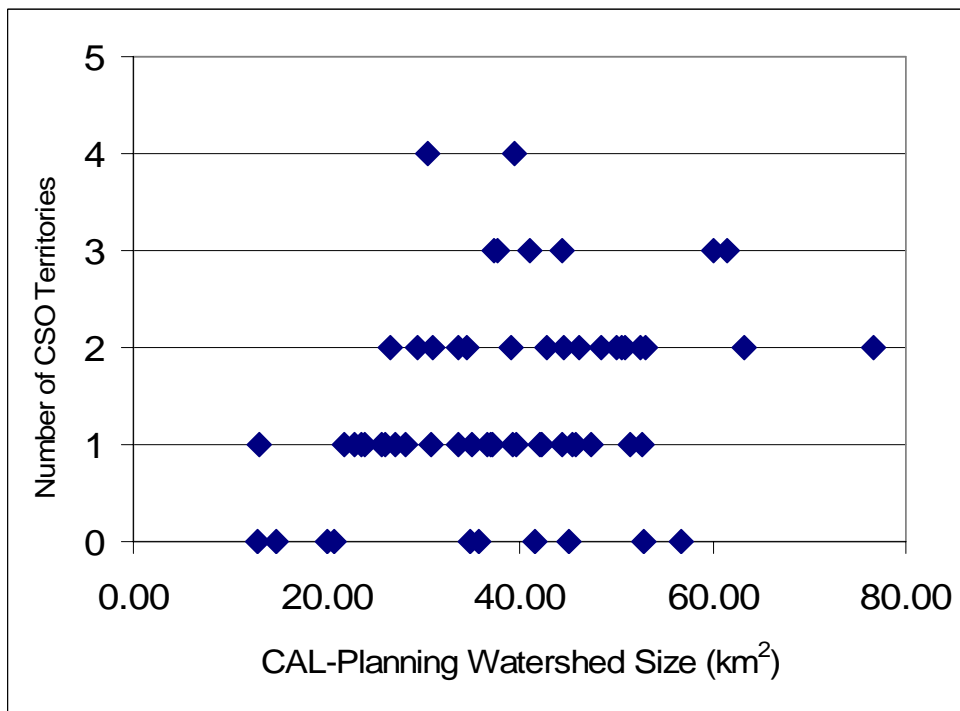


Figure 3. (a) Estimated crude density of territorial California spotted owls across CAL-Planning Watersheds, and (b) number of California spotted territories across CAL-Planning Watersheds on the Plumas National Forest during 2005.

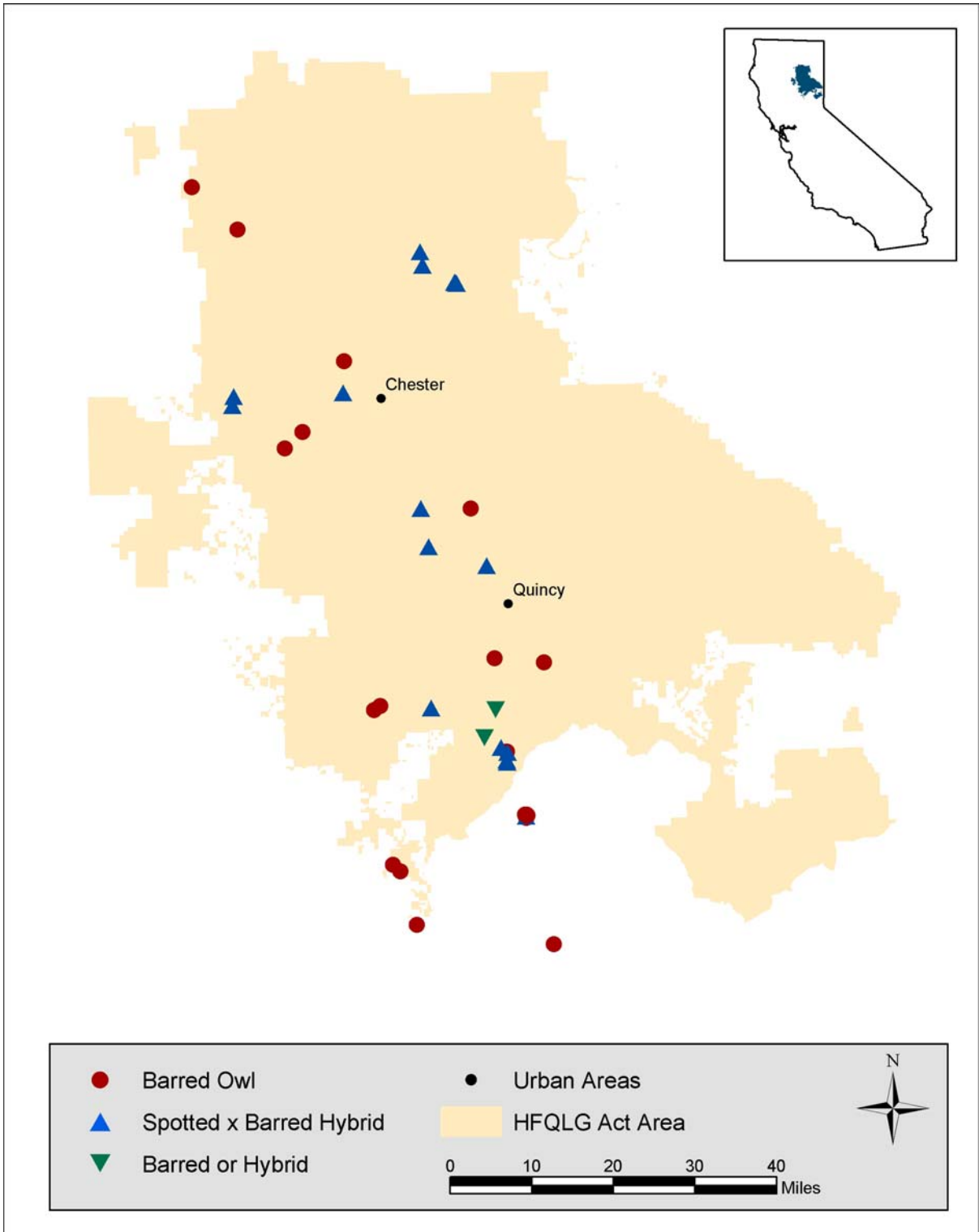


Figure 4. Distribution of Barred and Sparrred (Spotted-Barred hybrids) Owls between 1989-2005 within the HFQLG Project area.

Table 2. Prey species occurrences in California spotted owl pellets collected on the Plumas National Forest 2003-2004.

Prey Species	Number of 2003 Pellets Containing Taxon (n=606)	Percentage of 2003 Pellets Containing Taxon	Number of 2004 Pellets Containing Taxon (n=812)	Percentage of 2004 Pellets Containing Taxon	Total Number of Pellets Containing Taxon (n=1418)	Total Percentage of Pellets Containing Taxon
Mammals	581	95.87	797	98.15	1378	97.18
Dusky-footed woodrat (<i>Neotoma fuscipes</i>)	287	47.36	318	39.16	605	42.67
Northern flying squirrel (<i>Glaucomys sabrinus</i>)	254	41.91	298	36.70	552	38.93
Deer mouse (<i>Peromyscus</i> spp.)	145	23.93	237	29.19	382	26.94
Unidentified mouse (<i>Peromyscus</i> spp. or <i>Mus musculus</i>)	16	2.64	32	3.94	48	3.39
California red-backed vole (<i>Clethrionomys californicus</i>)	11	1.82	11	1.35	22	1.55
Meadow voles (<i>Microtus</i> spp.)	12	1.98	32	3.94	44	3.10
Unidentified vole	6	0.99	6	0.74	12	0.85
Pocket gopher (<i>Thomomys bottae</i>)	26	4.29	73	8.99	99	6.98
Chipmunk (<i>Tamias</i> spp.)	6	0.99	32	3.94	38	2.68
Western harvest mouse (<i>Reithrodontomys magalotis</i>)	0	0.00	1	0.12	1	0.07
Shrew (<i>Sorex</i> spp.)	22	3.63	40	4.93	62	4.37
Broad-footed mole (<i>Scapanus latimanus</i>)	23	3.80	89	10.96	112	7.90
Large bat (e.g., <i>Eptesicus</i> spp.)	8	1.32	13	1.60	21	1.48
Small bat (e.g., <i>Myotis</i> spp.)	10	1.65	8	0.99	18	1.27

Table 2. (Continued)

Prey Species	Number of 2003 Pellets Containing Taxon (n=606)	Percentage of 2003 Pellets Containing Taxon	Number of 2004 Pellets Containing Taxon (n=812)	Percentage of 2004 Pellets Containing Taxon	Total Number of Pellets Containing Taxon (n=1418)	Total Percentage of Pellets Containing Taxon
Unidentified rabbit or hare (family <i>Leporidae</i>)	1	0.17	11	1.35	12	0.85
Unidentified large rodent (comparable to a woodrat)	15	2.48	28	3.45	43	3.03
Unidentified small rodent (comparable to a mouse)	30	4.95	56	6.90	86	6.06
Unidentified mammal	3	0.50	2	0.25	5	0.35
Unidentified vertebrate (may include non-mammals)	8	1.32	15	1.85	23	1.62
Birds	59	9.74	104	12.81	163	11.50
Unidentified bird (unknown size)	4	0.66	4	0.49	8	0.56
Unidentified large bird (e.g., American robin)	23	3.80	38	4.68	61	4.30
Unidentified medium bird (e.g., western tanager)	15	2.48	31	3.82	46	3.24
Unidentified small bird (e.g., pine siskin)	12	1.98	20	2.46	32	2.26
Steller's jay (<i>Cyanocitta stelleri</i>)	2	0.33	5	0.62	7	0.49
Northern flicker (<i>Colaptes auratus</i>)	3	0.50	6	0.74	9	0.63
Insects	82	13.53	145	17.86	231	16.29
Long-horned beetle (<i>Ergates</i> spp.)	46	7.59	61	7.51	107	7.55
Giant lacewing (<i>Polystoechotes lineata</i>)	11	1.82	25	3.08	36	2.54

Jerusalem cricket (<i>Stenopelmatus</i> spp.)	25	4.13	45	5.54	70	4.94
Carpenter ant (<i>Camponotus</i> spp.)	1	0.17	11	1.35	12	0.85
Cicada	2	0.33	25	3.08	27	1.90
Unidentified insect	3	0.50	14	1.72	17	1.20