

# SIERRA NEVADA ADAPTIVE MANAGEMENT PLAN

*Study Plan and Inventory Protocol  
For the California Spotted Owl Study*

Tahoe NF  
Study Site

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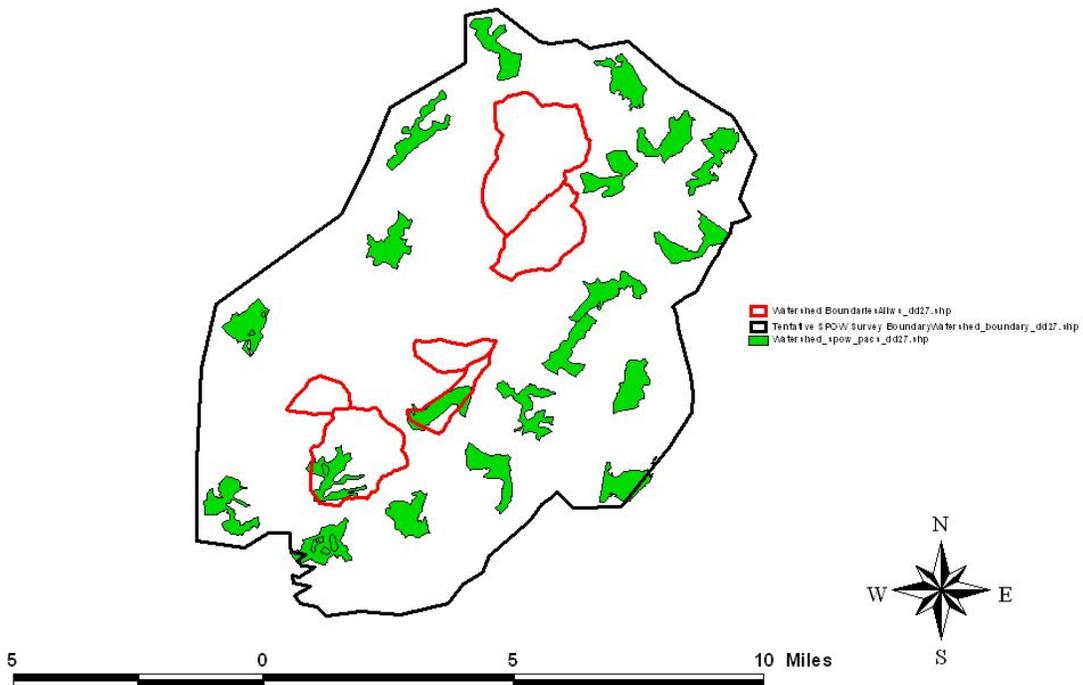
Last Revised  
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# CA Spotted Owl Monitoring Protocol

## DELINEATION OF SURVEY AREA BOUNDARY

Using ArcView, we examined the Sierra Nevada Adaptive Management (SNAMP) watershed boundaries in relation to current California spotted owl Protected Activity Centers (PACs; see Figure 1). The U.S. Forest Service delineates PACs in potentially critical spotted owl habitat, which includes most or all historic nest and roost locations. Two SNAMP watersheds on the Tahoe N.F. contain spotted owl PACs, while the third does not. Spotted owl home ranges are considerably larger than PACs (Zabel et al. 1992), however, so foraging birds from nearby PACs could be using the SNAMP watersheds. Therefore, our intended survey area is considerably larger than the SNAMP watershed boundaries. Surveying a larger area beyond the SNAMP watersheds will also facilitate our detection of owl movements to different territories during the course of the study.

### California Spotted Owl Study Area Sierra Nevada Adaptive Management Project Tahoe N.F., American River R.D.



## GENERAL BIOLOGY

The California spotted owl (*Strix occidentalis occidentalis*) is a nocturnal, medium-sized owl species that preys primarily on small mammals such as woodrats and flying squirrels. As with most raptor species, the females are larger than the males. California spotted owls generally begin nesting in early April and usually fledge young by mid-June. Nests are selected from existing structures such as natural cavities, broken tree tops, and the abandoned platform nests of other raptors. The female incubates the eggs, while the male provides food to the incubating female. After the eggs hatch, both parents supply food to the young. The typical brood size is 1 or 2 young, although 3 hatchlings are possible. After fledging, the juveniles continue to receive food from the parents until late August or early September. At that time, the juveniles disperse to new locations that are 5—75 km away from the natal territory.

Spotted owls communicate using a wide array of vocalizations. The primary call is a 4-note location call. Male 4-note calls are lower in pitch than female 4-note calls; we distinguish the sex of spotted owls primarily by listening to 4-note calls. Other calls include a series of hoots, a series of barks, a high-pitched “crow bark,” and soft contact whistles. It is possible to hear all of these calls and a combination of each during a single interaction in the field. Male and female hoots and contact calls can be heard at <http://www.owling.com/Spotted.htm#recordings>

## PRESENCE/ABSENCE SURVEYS

All of our survey methods will follow well-established field protocols that are consistently used by spotted owl researchers throughout the U.S. We briefly describe the basic protocols below, but refer the reader to the literature for more detailed descriptions (Forsman et al. 1984, Franklin et al. 1996).

### Call Point Establishment

We will establish survey stations (i.e., call points) throughout our defined study area in an effort to detect all territorial spotted owls. We will identify preliminary call-point locations on 7.5-minute USGS topographic maps based upon local topography and road access. Call-point locations will be fairly uniform in their distribution across the study area, with a typical distance of 400—800 m between neighboring call points. We will then locate each preliminary call-point location in the field using a Garmin GPS unit. Depending upon actual road and habitat conditions near each preliminary call-point location, we may adjust the final, on-the-ground location to maximize sampling efficiency.

### Call Point Methods

At each call-point location, we will conduct up to four night-time surveys during April 1—August 31. Each call-point survey will be conducted for **at least** 10 minutes. Call points are given unique codes that correspond to the map quad they are located on and the call-point

number (e.g., GS601 means Greek Store quad, call-point number 601). When conducting a survey, the observer stands at a call point and imitates spotted owl vocalizations while looking and listening for spotted owl responses or approaches. This method is useful for determining the presence of owls and their general location.

If a spotted owl is heard, the observer will note **a) his/her location, b) the time of the detection, c) the owl's sex, d) compass direction to the owl, and e) approximate distance from the observer's location to the owl.** After recording this information, the observer will then contact his/her partner and **walk in after the owl.** The observers will then attempt to identify the color bands on each owl present, determine the owl's reproductive status by mousing (see below, **Walk-in Surveys**), and capture and band the owl if the owl is unbanded. If, after a reasonable amount of time and effort, the observers are unable to locate, identify, or mouse the owls, they will follow up on the detection as a walk-in the next morning (see below, **Walk-in Surveys**). If the observers do locate **and identify** the owls, **and** attempt mousing (if necessary), nearby call points (generally within ½ mile of the detection) can be eliminated from night surveys in order to minimize disturbance to the birds.

## WALK-IN SURVEYS

We will perform walk-in surveys to visually locate, identify, and determine the reproductive status of territorial spotted owls. We will conduct walk-in surveys at the approximate location of an owl detected on a call-point survey, or at historic nest or roost locations (as identified by the location of PACs). The observer will walk into the general area and imitate spotted owl vocalizations, while visually searching for the owl(s).

### Owl Identification and Aging

Once an owl is detected (heard or seen), the observers will record the **detection time, the owl's location, and the owl's sex (if possible).** The observers will then attempt to visually find the owl(s). When an owl is visually located, its individual identity should be determined by each observer confirming the owl's unique band/tab combination which will consist of the following information: **a) sex; b) leg (right or left); c) band color & pattern; d) tab color.**

If the owl(s) is unbanded, then the observers will attempt to capture the owl and attach a unique band/tab combination to the bird later in the walk-in survey (see below, **Capturing**).

Observers will estimate the age class of each owl if the owl by noting the appearance of the tail feathers (Moen et al. 1991). Tail feathers that have all-white, triangular-shaped, and spiked tips indicate a 1<sup>st</sup>-year sub-adult. Tail feathers that have all-white, triangular-shaped, and rounded tips indicate a 2<sup>nd</sup>-year sub-adult. Tail feathers that have rounded tips and a pattern of brown blotches on a white background indicate an adult bird ( $\geq 3$  years old).

### Reproductive Assessment ("Mousing")

After identification and aging, the owl will then be fed mice to determine its reproductive status. Feeding mice to an adult spotted owl is called “**mousing**”. A minimum of four mice are sequentially offered to an individual owl, and the fate of *all mice* are used to determine reproductive status. If the owl has young or a nest, it should, theoretically, take one of the four mice to either the nest or a fledgling. If the owl eats or caches all four mice in any combination, it is assumed to be non-reproductive at that time.

The four-mouse protocol applies to only one owl at a time. In other words, if a male eats 2 mice and a female eats 2 mice, the protocol has not been met. The four mice must apply to *only one* owl. Reproductive status on territorial owls needs to be determined on at least 2 occasions, spaced at least one week apart, during the breeding season (April 1—August 31).

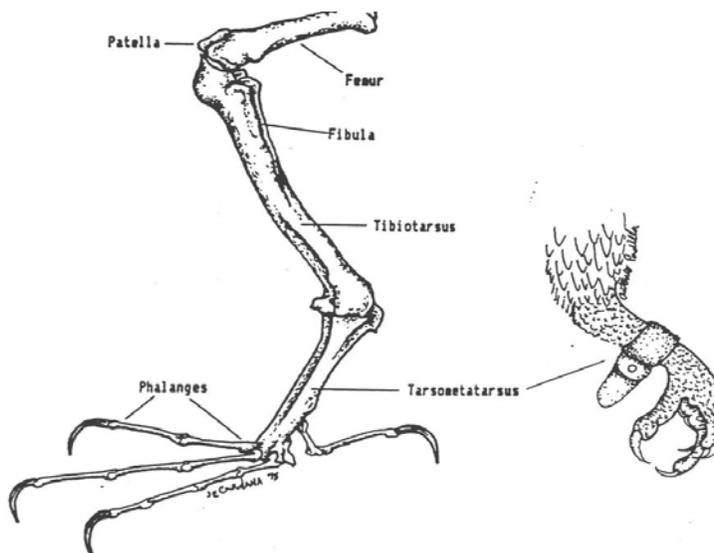
### Capturing and Banding

Unbanded owls are captured using a snare pole or mist net. Once an owl is captured, two bands are attached to the owl:

- 1) a numbered aluminum band (supplied by the U.S. Fish & Wildlife Service) on one leg, and
- 2) a colored plastic band with a soft plastic tab on the other leg.

The bands are put onto the tarsometatarsi of the owl (see figure below). The capturers will carefully record the band/tab combination and the USFWS band number, and the leg to which each was attached.

For each sex of owl, only one individual may have a specific band/tab combination on a specific leg. For example, one (and only one) female owl may have a solid blue band with a yellow tab on the *left leg*, and one (and only one) female owl may have a solid blue band with a yellow tab on the *right leg*. Thus, we can identify each individual bird by noting its sex, band/tab colors, and which leg the band is on.



# DATA FORMS

## Capture Form

A capture form will be filled out whenever: 1) an unbanded bird is captured for the first time and fitted with a color band, or 2) a previously banded bird is properly resighted for the first time in each field season. A blank capture form is shown below. Further information on the proper completion of a capture form is available in “The University of Minnesota California Spotted Owl Demography Study Training Manual” by Mark Seamans and Vince Berigan (unpublished, but available upon request).

**ELDORAD STUDY AREA, CALIFORNIA SPOTTED OWL  
CAPTURE / RESIGHT FORM**

Study Area <input type="text"/>	Territory Acronym <input type="text"/>	Trap Code <input type="text"/>	Date <input type="text"/>	Julian Date <input type="text"/>	Capture Time <input type="text"/>
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<b>IDENTIFICATIONS</b>				
USFWS Number <input type="text"/>	Leg <input type="text"/>	Color <input type="text"/>	Pattern <input type="text"/>	Tab <input type="text"/>
<b>LOCATIONS</b>				
UTM E <input type="text"/>	UTM N <input type="text"/>	Coord. Source <input type="text"/>	Elevation <input type="text"/>	Elev. Source <input type="text"/>
Township <input type="text"/>	Range <input type="text"/>	Section <input type="text"/>	1/4 <input type="text"/>	1/16 <input type="text"/>
County <input type="text"/>	Map Quad <input type="text"/>			
<b>CAPTURE METHOD</b> <input type="text"/>		<b>INDIVIDUAL CHARACTERISTICS</b>		
Sex of Bird <input type="text"/>	Age Class <input type="text"/>	Est. Age <input type="text"/>	Social Status <input type="text"/>	Repro Status <input type="text"/>
<b>MEASUREMENTS</b>				
Gross Weight <input type="text"/>	Equipment Weight <input type="text"/>	Net Weight <input type="text"/>	# of Mice Eaten <input type="text"/>	Adjusted Weight <input type="text"/>
$\text{Gross Weight} - \text{Equipment Weight} = \text{Net Weight} - (\text{\# of Mice Eaten} \times 20\text{g}) = \text{Adjusted Weight}$				
Wing Chord <input type="text"/>	Tail Length <input type="text"/>	Bill Length <input type="text"/>	Bill Depth <input type="text"/>	Tarsus Length <input type="text"/>
Plumage Type <input type="text"/>	Retrices Tips <input type="text"/>	Brood Patch Condition <input type="text"/>	Brood Patch Length <input type="text"/>	Brood Patch Width <input type="text"/>
		# of Hippos Seen <input type="text"/>	# of Hippos Collected <input type="text"/>	
Blood Sample Taken? <input type="text"/>	West Nile Sample? <input type="text"/>	Zoogen Sample? <input type="text"/>	Oral Swab? <input type="text"/>	Minutes Spent Trying to Capture or Resight <input type="text"/>
<b>COMMENTS</b> <input style="height: 40px;" type="text"/>				
<p><b>PRINT</b></p> <p style="font-size: small;">Spotted Owl Demography Project University of Minnesota Department of Fisheries, Wildlife, and Conservation Biology St. Paul, MN (Revised 2006)</p>				
<b>OBSERVERS</b>				
Capturer <input type="text"/>	Bander <input type="text"/>	Measurer <input type="text"/>	Resighter 1 <input type="text"/>	Resighter 2 <input type="text"/>

*Detection Form*

A detection form will be filled out whenever an owl(s) is detected on a call-point or walk-in survey. A blank detection form is shown below. Further information on the proper completion of a detection form is available in "The University of Minnesota California Spotted Owl Demography Study Training Manual" by Mark Seamans and Vince Berigan (unpublished, but available upon request).

**ELDORAD STUDY AREA, CALIFORNIA SPOTTED OWL  
DETECTION FORM**

Study Area	Territory Acronym	Survey Type	Date	Julian Date	Start	Stop	Elapsed	Observer 1	Observer 2
<input type="text"/>									

IDENTIFICATIONS												
		Social Status	# Adults Identified	# Juvies Identified								
Detection Time	How Initially Detected	Trap Code	Leg	Color	Pattern	Tab	Time of ID	Minutes to Identify	Resight Observer 1	Resight Observer 2	Retrices Tips	Age Class
M	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
U	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

LOCATIONS								OFFICE USE ONLY		
Pair or Single	UTM E	UTM N	Coord. Source	Elevation	Elev. Source	Roost?	Map Quad	Call Point	Est. Age	USFWS Number
<input type="text"/>										
	Township	Range	Section	1/4	1/16	County	Owner	Forest	District	Time Repro Assessed
	<input type="text"/>									

REPRODUCTION						NEST TREE DATA				
# Mice Fed	Fates of Mice	Time of 1st Cache	Time 1st Mouse Out	Time of 4 Mouse Protocol	Repro Status	UTM E	UTM N	Coord. Source	Elevation	Elev. Source
M	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>					
U	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>					

NEST TREE DATA					
Nest Tree Species	Tag Number	Nest Type	Tree Aspect	Nest Azimuth	Nest Height
<input type="text"/>					

OTHER OWL AND RAPTOR SPECIES				
Species	Sex	Time	UTM E	UTM N
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

WEATHER CONDITIONS				
Temp	Clouds	Wind	Moon	Precip.
<input type="text"/>				

HABITAT TYPE
<input type="text"/>

Spotted Owl Demography Project  
 University of Minnesota Department of  
 Fisheries, Wildlife, and  
 Conservation Biology  
 St. Paul, MN  
 (Revised 2006)

Non-detection Form

A non-detection form will be filled out whenever a call-point or walk-in survey is conducted and no owls are detected. A blank non-detection form is shown below. Further information on the proper completion of a non-detection form is available in “The University of Minnesota California Spotted Owl Demography Study Training Manual” by Mark Seamans and Vince Berigan (unpublished, but available upon request).

**ELDORADO STUDY AREA, CALIFORNIA SPOTTED OWL  
NON-DETECTION SURVEY FORM**

*Office Use Only*  
Survey #

Study Area

Date

Julian Date

Territory

Observer 1

Observer 2

Assignment Type

Were all Assigned Points Done?

Form #

OF

Total #

CALL POINTS														
Survey Type	Start	Stop	Elapsed	Quad / Call Point	UTM E	UTM N	UTM Source	Elevation	Elev. Source	Clouds	Temp	Precip	Wind	Moon
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼
▼							▼		▼	▼		▼	▼	▼

**OMITTED POINTS** *(For use with Night Surveys only)*

Quad / Call Point    Explanation    *(Limit to 30 characters or less)*


**OTHER OWL OR RAPTOR SPECIES**

	SPECIES	SEX	TIME	UTM E	UTM N
1.	▼	▼			
2.	▼	▼			
3.	▼	▼			

Print

Spotted Owl Demography Project  
University of Minnesota  
Department of Fisheries, Wildlife,  
and Conservation Biology  
St. Paul, MN  
(Revised 2007)

**COMMENTS** *(Limit to 100 characters or less)*

## References

- Forsman, E.D., E.C. Meslow, H.M. Wight. 1984. Distribution and biology of the Spotted Owl in Oregon. *Wildlife Monographs* 87.
- Franklin, A.B., D. R. Anderson, E.D. Forsman, K.P. Burnham, F.F. Wagner. 1996. Methods for collecting and analyzing demographic data on the northern Spotted Owl. Pages 12-20 *in* E. D. Forsman, S. DeStefano, M. G. Raphael, R. J. Gutiérrez, [eds]. *Demography of the northern Spotted Owl. Studies in Avian Biology* 17.
- Moen, C.A, A.B. Franklin, R.J. Gutiérrez. 1991. Age determination of subadult northern spotted owls in northwest California. *Wildlife Society Bulletin* 19(4): 489-493.
- Zabel, C.J., G.S. Steger, K.S. McKelvey, G.P. Eberlein, B.R. Noon, J.Verner. 1992. Home-range size and habitat-use patterns of California spotted owls in the Sierra Nevada. Pages 149-163 *in* J. Verner, K.S. McKelvey, B.R. Noon, R.J. Gutiérrez, G.I. Gould, T.W. Beck, [eds]. *The California spotted owl: a technical assessment of its current status. General Technical Report PSW-GTR-133. U.S. Forest Service, Pacific Southwest Research Station, San Francisco, CA.*