

California Spotted Owl Survey Results

Addendum to the Biological Survey Summary Report Battle Creek Salmon and Steelhead Restoration Project

Prepared for:

Navigant Consulting, Inc.
3100 Zinfandel Drive, Suite 600
Rancho Cordova, CA 95670
Contact: Don Wagenet
916/852-1300

and

U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825
Contact: Mary Marshall
916/978-5248

Prepared by:

Jones & Stokes
2600 V Street
Sacramento, CA 95818-1914
Contact: Colleen Smith
Surveyors: John Sterling
Bud Widdowson
Margaret Widdowson
916/737-3000

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Table of Contents

	Page
Summary	1
Year 1—2001 Survey Results.....	1
Year 2—2002 Survey Results.....	1
Project Description	2
Background	4
Field Methods	5
Results	6
Year 1 Surveys.....	6
Year 2 Surveys.....	6
Conclusion	10
 Appendix A. Protocol for Surveying Proposed Management Activities that May Affect Northern Spotted Owls	

List of Tables and Figures

Table		Page
1	California Spotted Owl 2001 Survey Results	7
2	California Spotted Owl 2002 Survey Results	8
3	Weather Conditions during Year 1 (2001) Surveys.....	9
4	Weather Conditions during Year 2 (2002) Surveys.....	9
5	Additional Raptors Observed during Field Surveys	9

Figure		Follows Page
1	Location of the Battle Creek Salmon and Steelhead Restoration Project.....	2
2	Index of Battle Creek Project Sites Surveyed for the California Spotted Owl.....	10
3	California Spotted Owl Surveys at North Battle Creek Feeder Diversion Dam.....	10
4	California Spotted Owl Surveys at Eagle Canyon Diversion Dam	10
5	California Spotted Owl Surveys at Wildcat Diversion Dam	10
6	California Spotted Owl Surveys at Coleman Diversion Dam/Inskip Powerhouse.....	10
7	California Spotted Owl Surveys at Inskip Diversion Dam/South Powerhouse	10
8	California Spotted Owl Surveys at South Diversion Dam.....	10

List of Acronyms

USFWS	U.S. Fish and Wildlife Service
Restoration Project	Battle Creek Salmon and Steelhead Restoration Project
CVPIA	Central Valley Project Improvement Act
CALFED	CALFED Bay-Delta Program
NMFS	National Marine Fisheries Service
FERC	Federal Energy Regulatory Commission
CNFH	Coleman National Fish Hatchery
USFWS	U.S. Fish and Wildlife Service
DFG	California Department of Fish and Game

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Addendum to the Biological Survey Summary Report

Battle Creek Salmon and Steelhead Restoration Project

SUMMARY

This report serves as an addendum to the Biological Survey Summary Report prepared by Jones & Stokes in April 2001 for the Battle Creek Salmon and Steelhead Restoration Project (Jones & Stokes 2001).

A 2-year survey for the California spotted owl was performed for the Battle Creek Salmon and Steelhead Restoration project, using the U.S. Fish and Wildlife Service (USFWS) Northern spotted owl survey protocol (Appendix A). Protocol for the 2-year survey requires three site visits per year between March 15 and August 31. Site visits were performed during the 2001 and 2002 survey seasons. The survey results for each year are summarized below.

Year 1—2001 Survey Results

In April through August 2001, Jones & Stokes wildlife biologists performed protocol-level surveys for the California spotted owl at six sites within the Battle Creek project area (Figure 1). Site visit 1 was performed on April 12–13 and May 29, 2001; site visit 2 was performed on May 28 and June 25, 2001; and site visit 3 was performed on August 25–26, 2001. No spotted owls were detected during the 2001 surveys. Table 1 identifies the survey date, time, and call response for each location.

Year 2—2002 Survey Results

In March, April, and June 2002, Jones & Stokes wildlife biologists performed protocol-level surveys for the California spotted owl at six sites within the Battle Creek project area (Figure 1). Although the 2-year survey protocol requires three site visits per year between March 15 and August 31, an additional survey was performed in Year 2 during June 2002 to ensure that California spotted owls are not present in the project area.

Site visit 1 was performed on March 18–19, 2002; site visit 2 was performed on March 29–30, 2002; site visit 3 was performed on April 5–6, 2002; and site visit 4 was performed on June 7–8, 2002. No spotted owls were detected during the 2002 surveys. Table 2 identifies the survey date, time, and call response for each location.

PROJECT DESCRIPTION

Declining salmonid populations in the Sacramento River system have prompted habitat restoration actions throughout the watershed to preserve and enhance current populations. Battle Creek, a tributary to the Sacramento River, presents one such restoration opportunity through the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project). This restoration effort is supported by directives from the following programs:

- the Central Valley Project Improvement Act's (CVPIA's) Anadromous Fish Restoration Program;
- the CALFED Bay-Delta Program's (CALFED's) California Bay-Delta Ecological Restoration Program;
- California's State Salmon, Steelhead Trout, and Anadromous Fisheries Program Act (California Senate Bill 2261, 1990);
- Central Valley Salmon and Steelhead Restoration and Enhancement Plan;
- the Upper Sacramento River Fisheries and Riparian Habitat Management Plan (California Senate Bill 1086, 1989);
- the National Marine Fisheries Service (NMFS) Proposed Recovery Plan for Sacramento River Winter-Run Chinook Salmon;
- Restoring Central Valley Streams—A Plan for Action; and
- the Steelhead Restoration Plan and Management Plan for California.

The Battle Creek watershed is on the volcanic slopes of Mt. Lassen in northern California in Shasta and Tehama Counties (Figure 1). Battle Creek stretches through remote, deep, shaded canyons and riparian corridors. The mountain stream is maintained by cold, spring-fed water with relatively high flows throughout the year. Before development in the watershed (described below), Battle Creek provided a contiguous stretch of prime habitat for anadromous chinook salmon and steelhead from its confluence with the Sacramento River upstream to natural barrier waterfalls. The decline of salmonid populations in the Sacramento River system in recent years has resulted in increased restoration efforts throughout the watershed to preserve and enhance current populations while addressing the needs of various stakeholders.

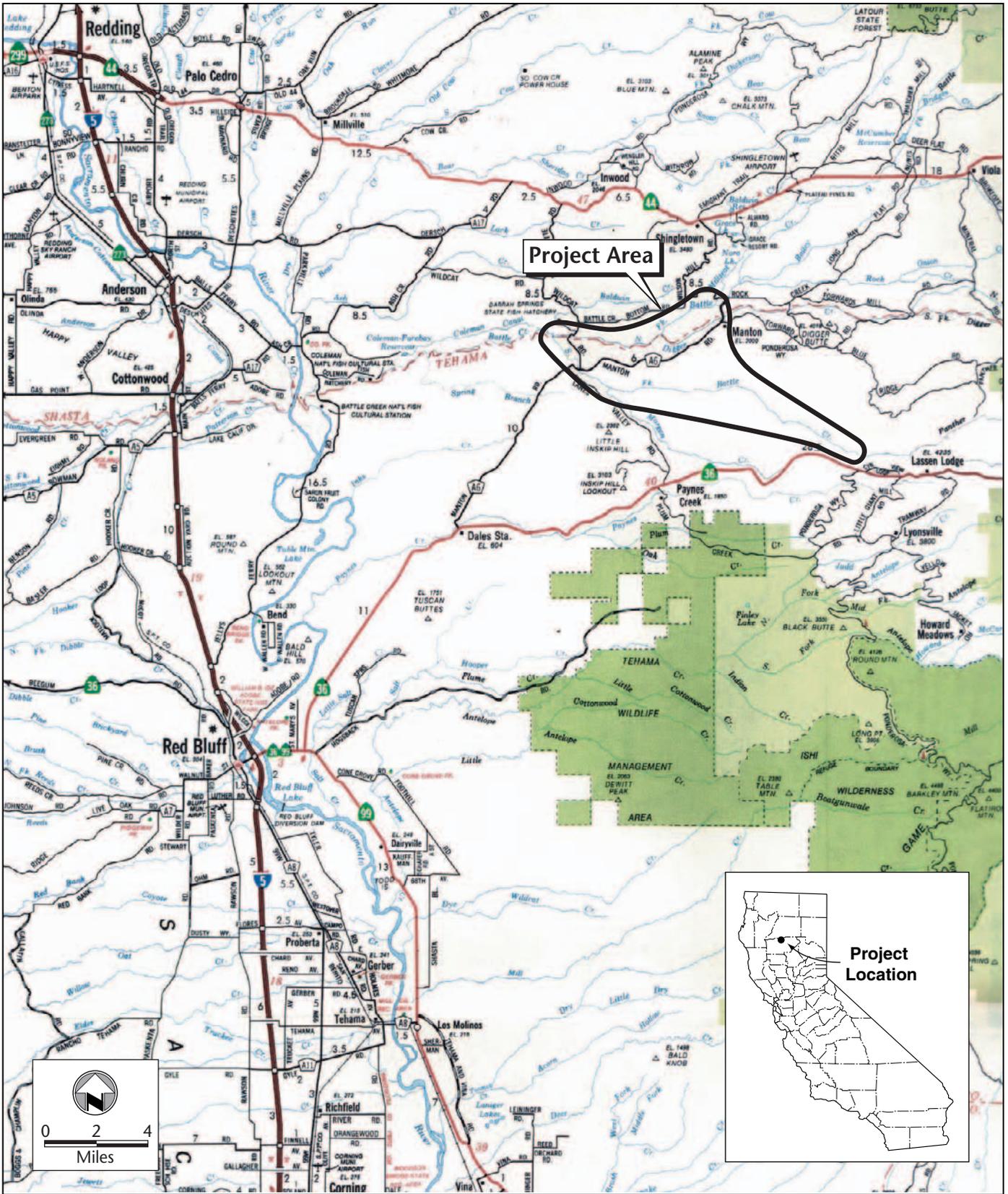


Figure 1
Location of the Battle Creek Salmon
and Steelhead Restoration Project

The purpose of the Restoration Project is to restore and enhance approximately 42 miles of habitat in Battle Creek plus an additional 6 miles of habitat in its tributaries while minimizing the loss of clean and renewable energy produced by the Pacific Gas and Electric Company's (the Licensee's) Battle Creek Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project 1121 (Hydroelectric Project). Habitat restoration and enhancement in the Sacramento River and its tributaries would enable safe passage for and facilitate the growth and recovery of naturally produced salmonids, including

- Central Valley spring-run chinook salmon, state- and federally listed as threatened;
- Sacramento River winter-run chinook salmon, state- and federally listed as endangered; and
- Central Valley steelhead, federally listed as threatened.

The majority of this project would be accomplished through amendment of the FERC license for the Hydroelectric Project.

Fish habitat in Battle Creek has been affected primarily by the development of a privately owned hydroelectric project and a federal fish hatchery. The Hydroelectric Project was constructed within and adjacent to Battle Creek and its tributaries in the early 1900s. It consists of eight small diversion dams and more than 40 miles of canals to support five powerplants. The Hydroelectric Project has been owned and operated by the Licensee since 1919 and was licensed by FERC in 1976. The Coleman National Fish Hatchery (CNFH), downstream of the Hydroelectric Project, was constructed in the 1940s to mitigate impacts on anadromous fish that were associated with construction of Shasta Dam on the upper Sacramento River.

The Licensee is committed to work cooperatively to develop a cost-effective and equitable plan to address improvements for fish ladders, unscreened diversions, and inadequate streamflows for anadromous fishery habitat needs, including the removal and modification of some of its facilities. In June 1999, the U.S. Bureau of Reclamation entered into a Memorandum of Understanding with NMFS, the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Game (DFG), and the Licensee to pursue a restoration plan for Battle Creek. Consequently, CALFED awarded \$28 million in directed funding to plan and implement the proposed Restoration Project. USFWS is also in the process of improving the CNFH intake structures and reevaluating its fish hatchery operations and has acquired CALFED funding to improve the CNFH seasonally operated fish barrier weir.

The proposed Restoration Project will involve restoration efforts at 11 sites along the North Fork and South Fork of Battle Creek. These sites include the following:

- North Battle Creek Feeder Diversion Dam,
- Eagle Canyon Diversion Dam,
- Wildcat Diversion Dam,
- Coleman Diversion Dam,
- Inskip Powerhouse,

- Penstock Junction Box,
- Lower Ripley Creek Feeder,
- Inskip Diversion Dam,
- South Powerhouse,
- Soap Creek Feeder, and
- South Diversion Dam.

Each site will be modified to restore and enhance fisheries habitat along Battle Creek. Based on the six alternatives in the Notice of Preparation for the proposed Restoration Project, the dam at each site would be either screened and laddered or removed. Hydropower facilities would be modified accordingly. A staging area and an access route to each project site (i.e., a new or existing road or trail) would be necessary to carry out construction activities.

Wildlife surveys performed in 2000 provided habitat information that helped wildlife biologists determine at which sites the California spotted owl would most likely be present. As a result, California spotted owl surveys were performed at the following project sites (Figure 2):

- North Battle Creek Feeder Diversion Dam
- Eagle Canyon Diversion Dam
- Wildcat Diversion Dam
- Coleman Diversion Dam/Inskip Powerhouse
- Inskip Diversion Dam/South Powerhouse
- South Diversion Dam

BACKGROUND

The California spotted owl is designated by the USFWS as a federal species of concern and by the California Department of Fish and Game as a state species of special concern. On October 12, 2000, the California spotted owl was petitioned to be federally listed as a threatened species (65FR 60605–60607). Until the petition is accepted by the USFWS, the California spotted owl retains its current status. However, the petition could be accepted during the lifetime of the Battle Creek project, resulting in a designation as federally proposed for listing as a threatened species. If the owl is proposed as a federally listed threatened species, consulting with the USFWS under Section 7 of the federal Endangered Species Act will be required to address potential effects to the species.

The California spotted owl is known to breed primarily in habitat that includes old growth fir forests. The owl has also been observed breeding in large hardwood trees, such as sycamore and live oak, along steep canyons that create cooler microclimates at elevations as low as 1,000 feet. Much of the Battle Creek project area includes habitat that would be considered potential California spotted owl habitat.

The USFWS has identified specific protocol for surveying listed owl species. Appendix A is a copy of the Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls, as endorsed by the USFWS. Survey protocol for the California spotted owl has yet to be developed by USFWS. However, according to USFWS representatives, survey protocol for the California spotted owl will be similar to the survey protocol for the northern spotted owl.

USFWS describes two different types of surveys in its protocol: a 1-year survey, which requires six site visits in 1 year between March 15 and August 31; and a 2-year survey, which requires three site visits per year between March 15 and August 31. USFWS encourages the use of the 2-year survey because it is more likely to determine the presence or absence of spotted owls. The 2-year survey for the California spotted owl was performed for the Battle Creek Salmon and Steelhead Restoration project, as recommended by USFWS.

FIELD METHODS

Two Jones & Stokes wildlife biologists conducted USFWS protocol-level surveys for the California spotted owl at six sites within the Battle Creek project area. Each biologist has extensive experience performing surveys using USFWS protocol for the northern spotted owl. As described above, USFWS survey protocol for the California spotted owl is anticipated to be similar to the survey protocol for the northern spotted owl. Surveys were performed at the following Battle Creek project sites:

- North Battle Creek Feeder Diversion Dam
- Eagle Canyon Diversion Dam
- Wildcat Diversion Dam
- Coleman Diversion Dam/Inskip Powerhouse
- Inskip Diversion Dam/South Powerhouse
- South Diversion Dam

One spotted owl call (survey) point was located at each of the six sites (Figures 3–8). Because the project sites are relatively small (less than 1/2 mile in diameter), additional call points were not necessary. Call points were established at the approximate center of each project site to allow maximum coverage with minimal background noise. Owl calls were made by voice; taped recordings of spotted owls were not used during the surveys. Each call point was hooted for a minimum of 20 minutes, beginning no earlier than 0.5 hour before posted sunset.

Access to each site was cleared prior to entry by notifying landowners the day before and contacting the Pacific Gas and Electric 24-hour switchboard (Pit 3 Powerhouse) immediately before entering and exiting the properties.

RESULTS

Year 1 Surveys

During Year 1, Jones & Stokes performed three sets of surveys between March 15 and August 31, 2001. Surveys were performed on the following dates:

- Site Visit 1—April 12–13 and May 29, 2001
- Site Visit 2—May 28 and June 25, 2001
- Site Visit 3—August 25–26, 2001

Table 1 shows the survey date, time, and call response for each location that was surveyed for the California spotted owl during Year 1. Table 3 describes the weather conditions during each site visit in 2001. Table 5 identifies additional raptors that were observed during the 2001 and 2002 surveys.

Year 2 Surveys

During Year 2, Jones & Stokes performed four sets of surveys between March 15 and August 31, 2002. As mentioned above, four rather than three sets of surveys were performed during Year 2. An additional survey was performed because USFWS protocol recommends that at least one survey be conducted in June to ensure the best coverage for determining presence of the California spotted owl. Surveys were performed on the following dates:

- Site Visit 1—March 18–19, 2002
- Site Visit 2—March 29–30, 2002
- Site Visit 3—April 5–6, 2002
- Site Visit 4—June 7–8, 2002

Table 2 provides the survey date, time, and call response for each location that was surveyed for the California spotted owl during Year 2. Table 4 describes the weather conditions during each site visit in 2002. Table 5 identifies additional raptors that were observed during the 2001 and 2002 surveys. Figures 3–8 identify the locations of each raptor siting.

Table 1. California Spotted Owl 2001 Survey Results

Project Site	Survey Date	Time Owl Calls Took Place	Response
Site Visit 1			
North Battle Creek Feeder Diversion Dam	April 13, 2001	8:49 p.m.–9:09 p.m.	None
Eagle Canyon Diversion Dam	May 29, 2001	9:58 p.m.–10:18 p.m.	None
Wildcat Diversion Dam	April 12, 2001	10:26 p.m.–10:46 p.m.	None
Coleman Diversion Dam/Inskip Powerhouse	April 12, 2001	9:38 p.m.–9:58 p.m.	None
Inskip Diversion Dam/South Powerhouse	May 29, 2001	9:11 p.m.–9:31 p.m.	None
South Diversion Dam	May 29, 2001	9:16 p.m.–9:36 p.m.	None
Site Visit 2			
North Battle Creek Feeder Diversion Dam	May 28, 2001	10:33 p.m.–10:53 p.m.	None
Eagle Canyon Diversion Dam	June 25, 2001	11:15 p.m.–11:35 p.m.	None
Wildcat Diversion Dam	May 28, 2001	11:56 p.m.–12:16 a.m.	None
Coleman Diversion Dam/Inskip Powerhouse	May 28, 2001	11:23 p.m.–11:43 p.m.	None
Inskip Diversion Dam/South Powerhouse	June 25, 2001	10:16 p.m.–10:36 p.m.	None
South Diversion Dam	May 28, 2001	9:16 p.m.–9:36 p.m.	None
Site Visit 3			
North Battle Creek Feeder Diversion Dam	26 August 2001	10:02 p.m.–10:22 p.m.	None
Eagle Canyon Diversion Dam	25 August 2001	9:06 p.m.–9:26 p.m.	None
Wildcat Diversion Dam	25 August 2001	9:41 p.m.–10:01 a.m.	None
Coleman Diversion Dam/Inskip Powerhouse	26 August 2001	10:34 p.m.–10:54 p.m.	None
Inskip Diversion Dam/South Powerhouse	25 August 2001	9:11 p.m.–9:31 p.m.	None
South Diversion Dam	26 August 2001	9:05 p.m.–9:25 p.m.	None

Table 2. California Spotted Owl 2002 Survey Results

Project Site	Survey Date	Time Owl Calls Took Place	Response
Site Visit 1			
North Battle Creek Feeder Diversion Dam	March 19, 2002	8:48 p.m.–9:09 p.m.	None
Eagle Canyon Diversion Dam	March 19, 2002	9:36 p.m.–9:56 p.m.	None
Wildcat Diversion Dam	March 19, 2002	10:52 p.m.–11:12: a.m.	None
Coleman Diversion Dam/Inskip Powerhouse	March 18, 2002	11:19 p.m.–11:39 p.m.	None
Inskip Diversion Dam/South Powerhouse	March 18, 2002	10:40 p.m.–11:00 p.m.	None
South Diversion Dam	March 19, 2002	8:44 p.m.–9:04 p.m.	None
Site Visit 2			
North Battle Creek Feeder Diversion Dam	March 29, 2002	11:15 p.m.–11:35 p.m.	None
Eagle Canyon Diversion Dam	March 30, 2002	10:07 p.m.–10:27 p.m.	None
Wildcat Diversion Dam	March 30, 2002	9:01 p.m.–9:21 p.m.	None
Coleman Diversion Dam/Inskip Powerhouse	March 30, 2002	9:30 p.m.–9:50 p.m.	None
Inskip Diversion Dam/South Powerhouse	March 29, 2002	12:00 a.m.–12:20 a.m.	None
South Diversion Dam – Point 1A	March 29, 2002	9:35 p.m.–9:55 p.m.	None
South Diversion Dam – Point 1B	March 29, 2002	9:58 p.m.–10:36 p.m.	None
Site Visit 3			
North Battle Creek Feeder Diversion Dam	April 5, 2002	8:53 p.m.–9:13 p.m.	None
Eagle Canyon Diversion Dam	April 6, 2002	7:43 p.m.–8:03 p.m.	None
Wildcat Diversion Dam	April 5, 2002	9:32 p.m.–9:52 p.m.	None
Coleman Diversion Dam/Inskip Powerhouse	April 6, 2002	7:02 p.m.–7:22 p.m.	None
Inskip Diversion Dam/South Powerhouse	April 5, 2002	8:17 p.m.–8:37 p.m.	None
South Diversion Dam	April 5, 2002	7:14 p.m.–7:34 p.m.	None
Site Visit 4			
North Battle Creek Feeder Diversion Dam	June 8, 2002	9:51 p.m.–10:11 p.m.	None
Eagle Canyon Diversion Dam	June 7, 2002	9:46 p.m.–10:06 p.m.	None
Wildcat Diversion Dam	June 8, 2002	10:24 p.m.–10:44 p.m.	None
Coleman Diversion Dam/Inskip Powerhouse	June 7, 2002	11:02 p.m.–11:22 p.m.	None
Inskip Diversion Dam/South Powerhouse	June 7, 2002	10:36 p.m.–10:56 p.m.	None
South Diversion Dam	June 8, 2002	8:43 p.m.–9:03 p.m.	None

Table 3. Weather Conditions During Year 1 (2001) Surveys

	12 April	13 April	28 May	29 May	25 June	25 August	26 August
Cloud cover	50%	20%	20%	0%	80%	0%	0%
Precipitation	None	None	None	None	None	None	None
Wind (Beaufort)	1	1	1	0	1	1	1
Temperature (°F)	55	54	68	68	80	76	75
Moon Phase	N/A	N/A	1/2	1/2	1/5	1/2	1/2

Table 4. Weather Conditions During Year 2 (2002) Surveys

	18 March	19 March	29 March	30 March	5 April	6 April	7 June	8 June
Cloud cover	0%	0%	0%	0%	90%	80%	0%	20%
Precipitation	None	None	None	None	None	None	None	None
Wind (Beaufort)	1	1	1	1 to 2	1	1	2-3	2-3
Temperature (°F)	43	45	55	59	49	66	81	61
Moon Phase	1/5	1/5	9/10	9/10	N/A	N/A	N/A	N/A

Table 5. Additional Raptors Observed during Field Surveys¹

Date ²	Location	Common Name	Scientific Name	Description
April 13, 2001	North Battle Creek Feeder Diversion Dam	Golden eagle	<i>Aquila chrysaetos</i>	1 adult
		Red-tailed hawk	<i>Buteo jamaicensis</i>	1 adult
April 13, 2001	Wildcat Diversion Dam	Red-tailed hawk	<i>Buteo jamaicensis</i>	2 adults
		Bald eagle	<i>Haliaeetus leucocephalus</i>	1 adult
		American kestrel	<i>Falco sparverius</i>	1 adult
April 13, 2001	Coleman Diversion Dam/Inskip Powerhouse	Red-tailed hawk	<i>Buteo jamaicensis</i>	1 adult flying, 1 adult on nest
		American kestrel	<i>Falco sparverius</i>	1 adult
April 13, 2001	South Diversion Dam	Peregrine falcon	<i>Falco peregrinus</i>	1 adult
		Cooper's hawk	<i>Accipiter cooperi</i>	1 adult
		Golden eagle	<i>Aquila chrysaetos</i>	2 adults
		Red-tailed hawk	<i>Buteo jamaicensis</i>	2 adults
		Turkey vulture	<i>Cathartes aura</i>	8 adults
March 18–19, 2002	Off-site	Western screech-owl	<i>Otus kennicottii</i>	1 adult

Notes:

¹ Barred owls, great-horned owls, and northern goshawks were not observed during the 2001 and 2002 California spotted owl surveys.

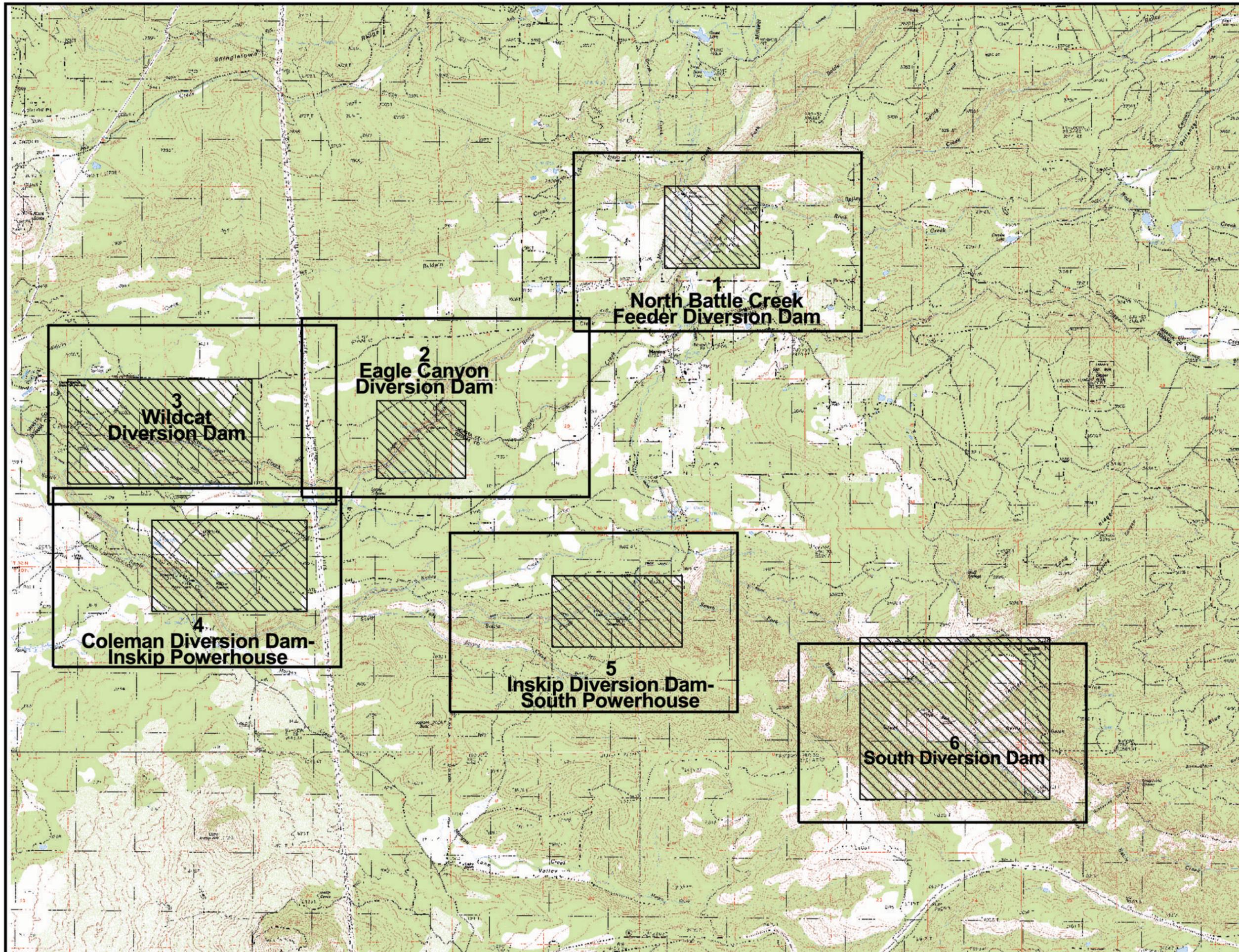
² Most raptors were observed in 2001 because surveys for nesting raptors were performed during the 2001 field season. No raptor surveys were performed in 2002; however, raptors would have been noted if observed in the field. Because the California spotted owl surveys were performed after dusk, no raptors were observed except for an occasional owl.

CONCLUSION

No California spotted owls were detected during the 2001 and 2002 surveys performed by Jones & Stokes wildlife biologists at the Battle Creek project sites. Results of the 2001 and 2002 surveys are presented in Tables 1 and 2, respectively.

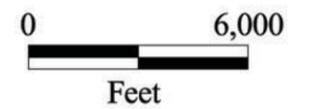
Index of Battle Creek
Project Sites Surveyed
for the
California Spotted Owl

Figure 2



LEGEND

-  Biological Survey Boundary
-  Detail Area for Construction Impacts



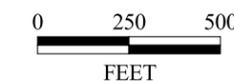
California Spotted Owl Surveys at North Battle Creek Feeder Diversion Dam

Figure 3

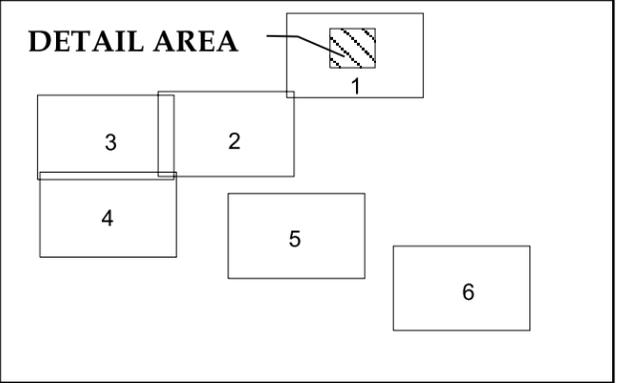
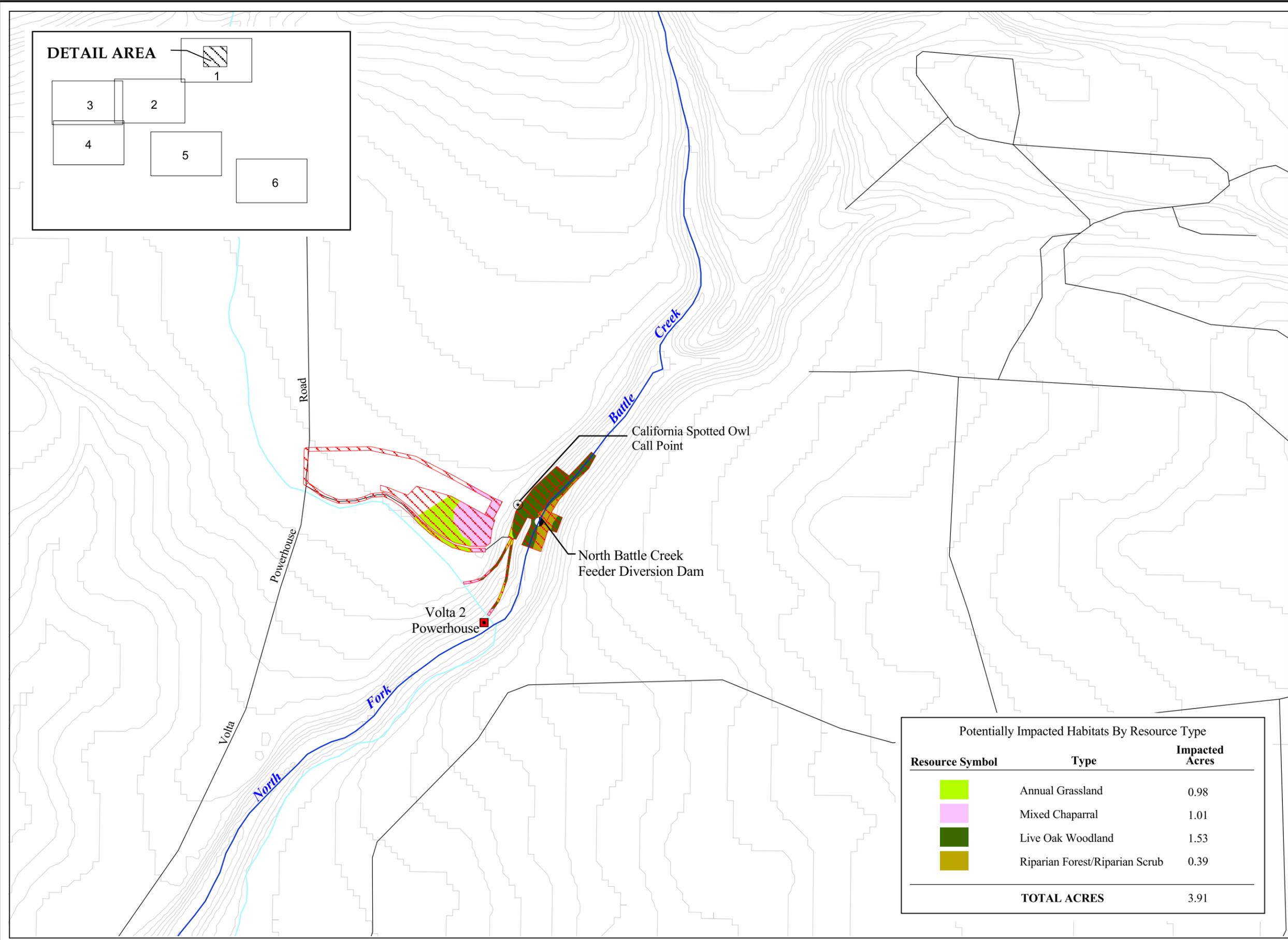
LEGEND

- Powerhouse
- Dam
- Road
- Proposed Construction Area/Physical Disturbance
- Canal or Tunnel
- Contour Interval 5 Feet
- ⊙ California Spotted Owl Call Point

N



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	0.98
	Mixed Chaparral	1.01
	Live Oak Woodland	1.53
	Riparian Forest/Riparian Scrub	0.39
TOTAL ACRES		3.91

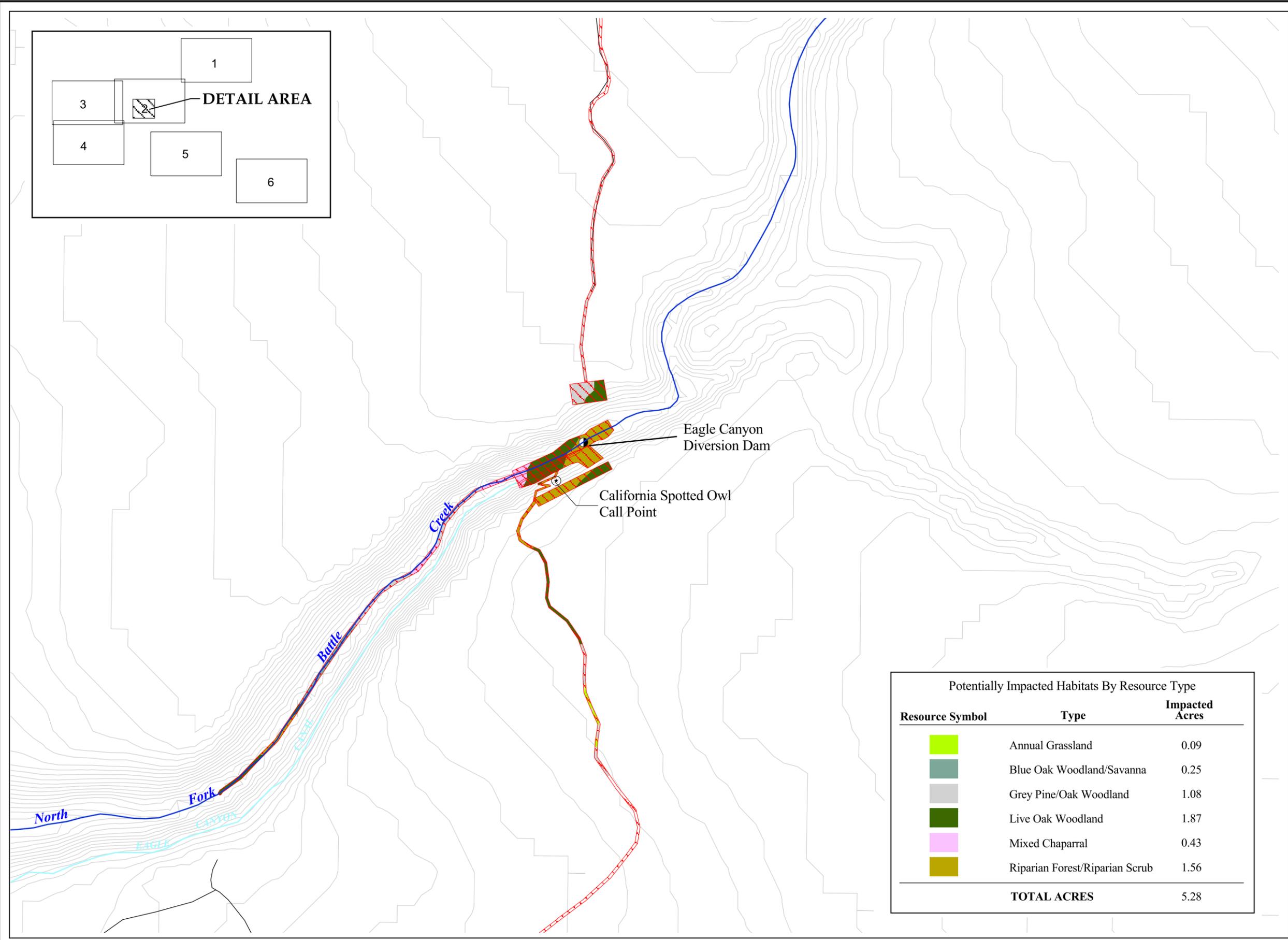


California Spotted Owl Surveys at Eagle Canyon Diversion Dam

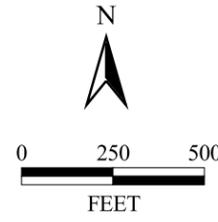
Figure 4

LEGEND

- Dam
- Road
-  Proposed Construction Area/Physical Disturbance
-  Canal or Tunnel
- Contour Interval 5 Feet
- ⊙ California Spotted Owl Call Point



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	0.09
	Blue Oak Woodland/Savanna	0.25
	Grey Pine/Oak Woodland	1.08
	Live Oak Woodland	1.87
	Mixed Chaparral	0.43
	Riparian Forest/Riparian Scrub	1.56
TOTAL ACRES		5.28

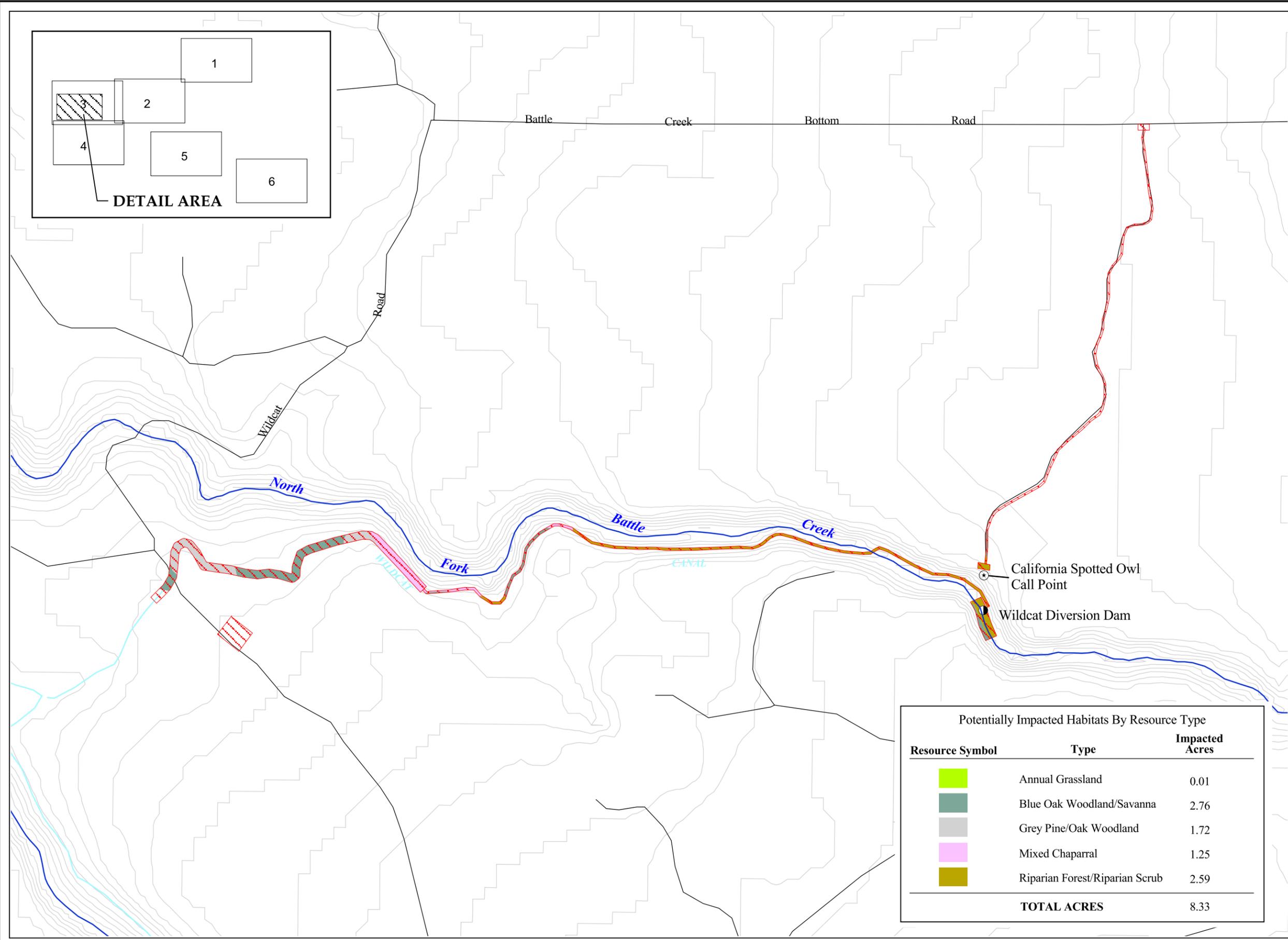


California Spotted Owl Surveys at Wildcat Diversion Dam

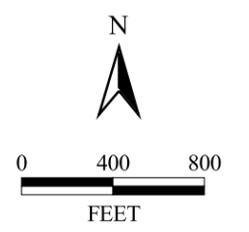
Figure 5

LEGEND

-  Dam
-  Road
-  Proposed Construction Area/Physical Disturbance
-  Canal or Tunnel
-  Contour Interval 5 Feet
-  California Spotted Owl Call Point



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	0.01
	Blue Oak Woodland/Savanna	2.76
	Grey Pine/Oak Woodland	1.72
	Mixed Chaparral	1.25
	Riparian Forest/Riparian Scrub	2.59
TOTAL ACRES		8.33

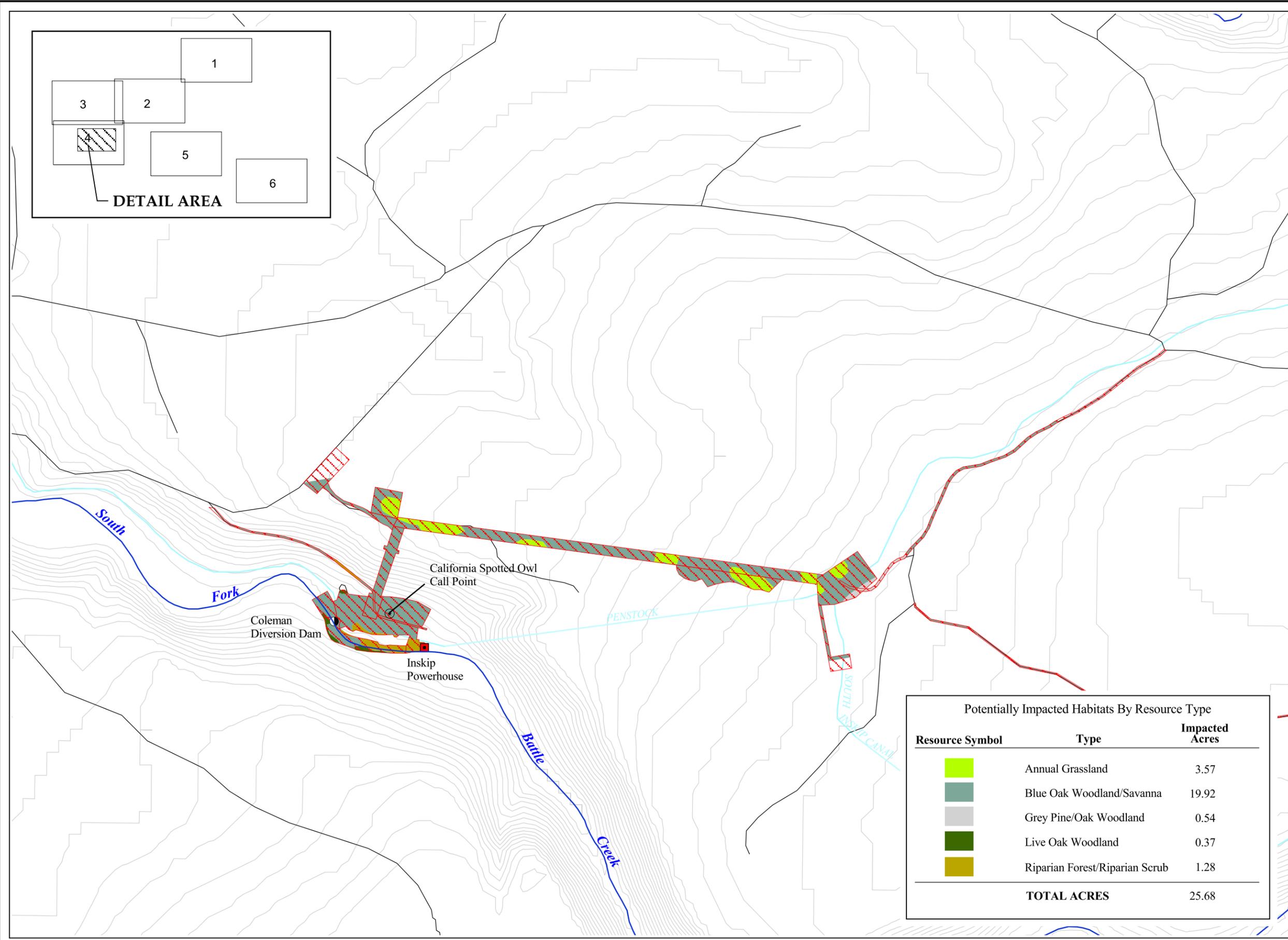


**California Spotted Owl
Surveys at
Coleman Diversion Dam/
Inskip Powerhouse**

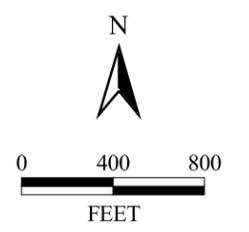
Figure 6

LEGEND

- Powerhouse
- Dam
- Road
- Proposed Construction Area/
Physical Disturbance
- Canal or Tunnel
- Contour Interval 5 Feet
- * California Spotted Owl
Call Point



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	3.57
	Blue Oak Woodland/Savanna	19.92
	Grey Pine/Oak Woodland	0.54
	Live Oak Woodland	0.37
	Riparian Forest/Riparian Scrub	1.28
TOTAL ACRES		25.68



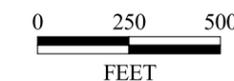
California Spotted Owl Surveys at Inskip Diversion Dam-South Powerhouse

Figure 7

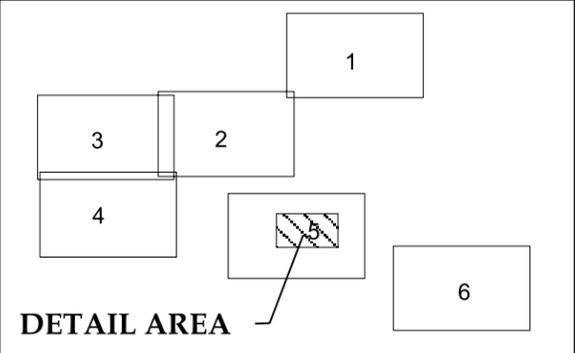
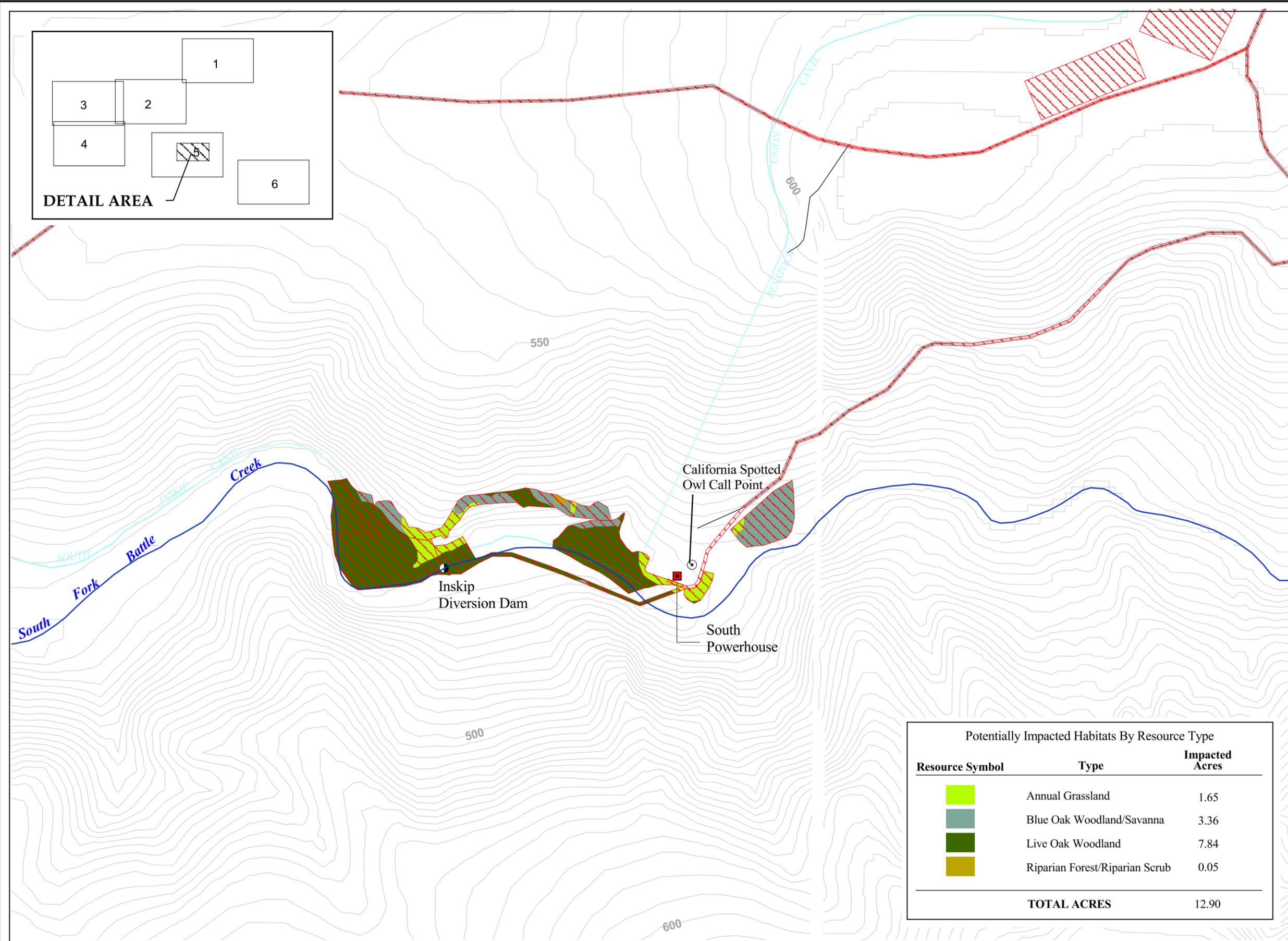
LEGEND

- Powerhouse
- Dam
- Road
- Proposed Construction Area/Physical Disturbance
- Canal or Tunnel
- Contour Interval 5 Feet
- ⊕ California Spotted Owl Call Point

N



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	1.65
	Blue Oak Woodland/Savanna	3.36
	Live Oak Woodland	7.84
	Riparian Forest/Riparian Scrub	0.05
TOTAL ACRES		12.90

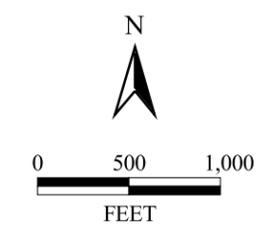


California Spotted Owl Surveys at South Diversion Dam

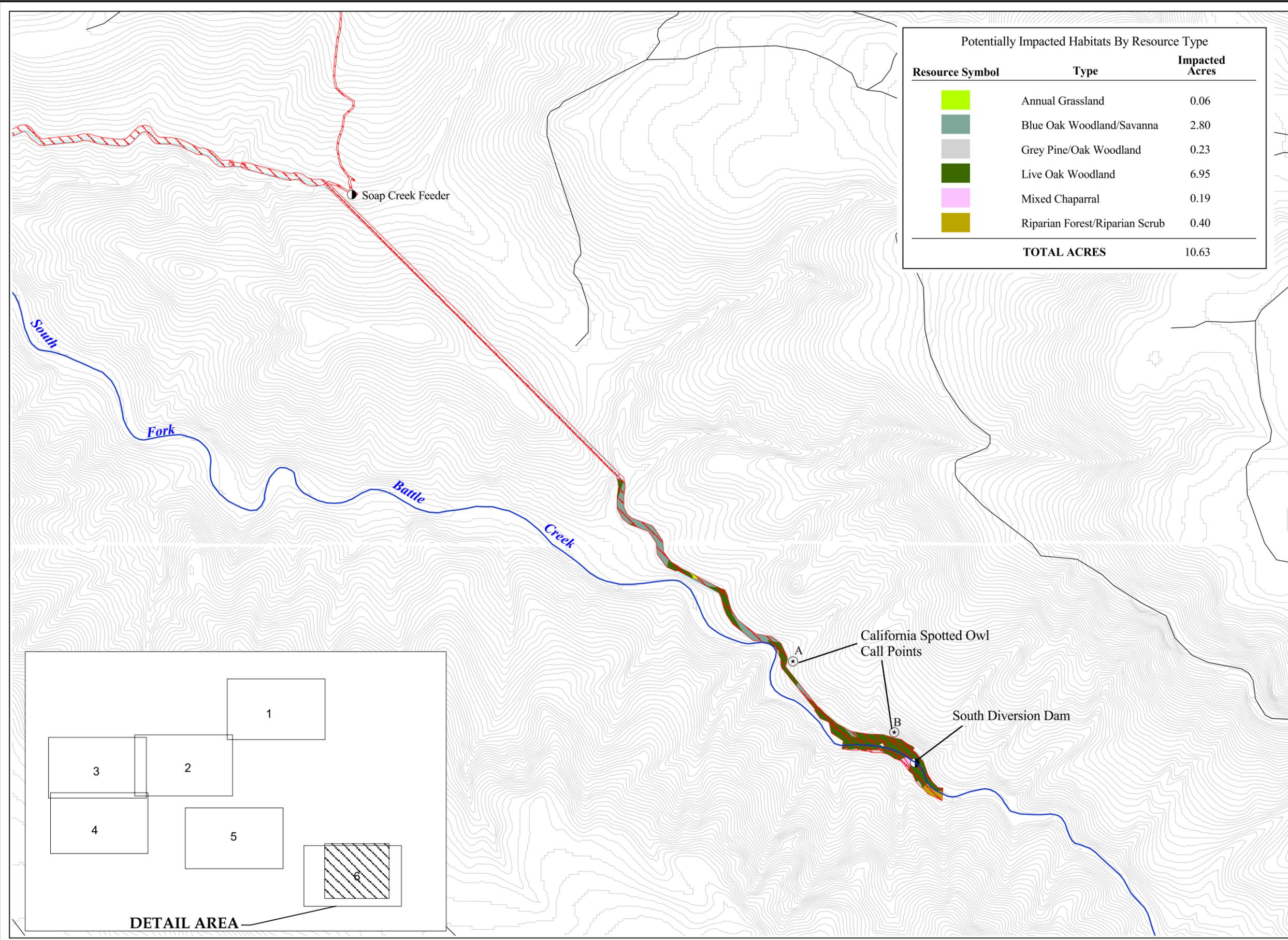
Figure 8

LEGEND

-  Dam
-  Road
-  Proposed Construction Area/Physical Disturbance
-  Canal or Tunnel
-  Contour Interval 5 Feet
-  California Spotted Owl Call Point



Potentially Impacted Habitats By Resource Type		
Resource Symbol	Type	Impacted Acres
	Annual Grassland	0.06
	Blue Oak Woodland/Savanna	2.80
	Grey Pine/Oak Woodland	0.23
	Live Oak Woodland	6.95
	Mixed Chaparral	0.19
	Riparian Forest/Riparian Scrub	0.40
TOTAL ACRES		10.63



**Appendix A. Protocol for Surveying Proposed Management
Activities That May Affect Northern Spotted
Owls**

PROTOCOL FOR SURVEYING
PROPOSED MANAGEMENT ACTIVITIES
THAT MAY IMPACT NORTHERN
SPOTTED OWLS

Endorsed by the
U.S. Fish and Wildlife Service

7 March 1991

REVISED - March 17, 1992

PROTOCOL FOR SURVEYING PROPOSED MANAGEMENT ACTIVITIES THAT MAY IMPACT NORTHERN SPOTTED OWLS

INTRODUCTION

The enclosed protocol was designed for surveying areas where Federal or non-Federal activities may remove or modify northern spotted owl habitat. The U.S. Fish and Wildlife Service (Service) endorses the use of this protocol for gathering information on spotted owl occupancy in proposed project areas for assessing affects of the proposed actions. Note that any information on owl presence within and/or adjacent to the proposed planning or activity areas is important, even if it does not meet the guidelines described below. However, if the only information available for a particular activity was acquired through less intensive surveys, the Service must conservatively assess (i.e. a worst-case analysis) the impacts of the action on northern spotted owls. It is always useful to document reasons for not adhering to the recommended protocol.

This protocol is based on several existing protocols and, when implemented, should serve two primary purposes: (1) provide adequate coverage and assessment of the area for the presence of spotted owls, and (2) ensure a high probability of locating resident spotted owls and identifying owl territories that may be affected by a proposed management activity, thereby minimizing the potential for unauthorized incidental take. It is not appropriate to use this protocol to monitor yearly trends of spotted owls or for many other research applications.

In this document, management activities are defined as those activities which may impact northern spotted owls. The most common activity is harvest or modification of spotted owl habitat. Also included under management activities are various types of disturbance not necessarily associated with timber harvest activities.

This protocol was peer-reviewed by scientists, biologists, and managers who work on various issues pertinent to the ecology and management of northern spotted owls. Reviewers included personnel from:

- U.S. Fish and Wildlife Service
- U.S. Forest Service
- Bureau of Land Management
- Humboldt State University
- Oregon State University
- California Department of Fish and Game
- Oregon Department of Fish and Wildlife
- Washington Department of Wildlife
- National Council of the Paper Industry for Air and Stream Improvement
- Timber Association of California
- Private Timber Companies
- Private Consultants

APPLICATION OF THE NORTHERN SPOTTED OWL SURVEY PROTOCOL

SURVEY AREA

- o To the maximum extent possible, all spotted owl habitat within the specified provincial radius from the perimeter of the proposed activity area should be surveyed. The provincial radii are as follows:

Washington Cascades	= 1.8 miles
Olympic Peninsula	= 2.2 miles
Oregon Cascades	= 1.2 miles
Oregon Coast Ranges	= 1.5 miles
Klamath Province	= 1.3 miles

DURATION OF SURVEYS

Previous survey data were analyzed to determine the number of visits needed to result in a high likelihood that territorial owls will be detected or that a lack of owl responses accurately reflects an absence of spotted owls. Preliminary analysis of the data provided the basis for determining the number of visits per year for both the 2-year and 1-year surveys. Two-year surveys provide more accurate results for an area because of the intermittent occupancy of spotted owls within particular areas. These 2-year surveys are more likely than 1-year surveys to accurately document the presence of owls or territories in these situations. Use the following instructions for surveys during 1992.

- o 1-year (6-visit) surveys are acceptable. However, 1-year surveys provide a somewhat lower likelihood of determining the presence or absence of spotted owls. In addition, 1-year surveys will be valid only until the beginning of the following breeding season.
- o 2-year (3 visits/year) surveys are preferable for surveying a management activity or planning area to determine the presence or absence of spotted owls. Surveys may be completed sooner if a response is obtained and status of the owl(s) is confirmed. However, we recommend that every effort be made to determine the highest status for a given site. 2-year surveys may be valid for 2 additional years.
- o 2-year surveys are encouraged to provide a higher likelihood of accurately determining presence or absence of spotted owls. They may also be more economical, especially in cases where harvest will occur in more than one year.

In this document, a complete survey is defined as coverage of the survey area to the required number of visits and an overall inventory that meets the protocol guidelines.

- o If a 2-year survey is completed (3 visits/year protocol), using the Service's survey protocol, and no responses are obtained, the negative results may be considered accurate for 2 additional years without conducting additional surveys.

Example: 2-year survey

Year 1 (March - Sept.)	3 visits with no response
Year 2 (March - Sept.)	3 visits with no response
Year 3	Harvest without additional surveys
Year 4	Harvest without additional surveys
Year 5	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- o If a 1-year survey is completed (6 visits), using the Service's survey protocol, and no responses are obtained, harvest could occur before the start of the next breeding season. If harvest is not completed within this time period, a 3-visit minimum survey would be needed prior to harvest in the second year. This is equivalent to 1 year of a 2-year survey. If harvest was not going to occur until after year 2, and the 3 visits in year 2 produced no responses, the negative results may apply for 2 more years without having to conduct additional surveys.

Example: 1-year survey

Year 1 (March - Sept.)	6 visits with no responses
Year 2	Conduct 3 more visits as described below if harvest is not completed before the beginning of the breeding season. The 3 visits should be conducted prior to harvest. If no responses obtained, additional surveys not needed for 2 more years.
Year 3	Harvest without additional surveys
Year 4	Harvest without additional surveys
Year 5	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- o If a nest site or activity center is located by a 1- or 2-year survey, and if harvest will take place in the area in years following the initial surveys, further surveys may be necessary, as follows:

If an owl site is located during a 1-year survey, and the project area is large enough to possibly support more than one site, remaining potential sites should be surveyed three times in the second year. Also, unless otherwise authorized under an incidental take statement or permit from the Service, the original nest site or activity center should be surveyed for occupancy in the year of the action. It is not unusual for owls to change their nesting location from year to year. If the owls are not at the original location, all areas inside harvest units and within 0.25 mile of harvest units should be surveyed each year of harvest according to a 3-visit protocol to eliminate the chances of disturbance to spotted owls during the breeding season.

OVERLAP OF NEW AREAS WITH AREAS SURVEYED IN THE PREVIOUS YEAR

- o In cases where a survey area overlaps all or part of a previous year's survey area, a minimum of 3 visits should be completed for those areas covered by the previous year's surveys, and the new areas should be surveyed with either the 1-year or 2-year protocol (see DURATION OF SURVEYS)

DETERMINING UNOCCUPIED STATUS OF AN HISTORICALLY OCCUPIED SITE

- o If no responses have been obtained from an historical site after 3 years of survey (using the guidelines established in this document), the site may be considered unoccupied, barring other evidence to the contrary.

NORTHERN SPOTTED OWL SURVEY PROTOCOL

HABITAT TO BE SURVEYED

For purposes of surveying, spotted owl habitat is any habitat where you may expect to elicit a response from a resident owl or pair of owls. Descriptions of spotted owl habitat for the various areas and physiographic provinces should be available from the various state wildlife and forestry agencies.

COORDINATION OF INFORMATION

The importance of coordination in conducting spotted owl surveys cannot be overemphasized. Appropriate coordination involves: 1) pre-season planning (including coordination of commitments by adjacent landowners on the areas to be surveyed by each party); 2) immediate communication of results, positive or negative, that may affect other landowners; and 3) exchange of post-calling season information summaries. Common mistakes, such as overlapping visits by more than one survey group, can be avoided through coordinated pre-planning. It is also advisable to inform adjacent landowners of all surveys near their ownership because new survey results may affect their management and logging operations.

The state agency or spotted owl database holder responsible for evaluating forest practice applications and analyzing survey data should be kept up to date with new survey results.

SURVEY PERIOD

- o All surveys of proposed management activity areas must take place between 15 March and 31 August. For areas where there is adequate biological information that birds are defending their established territories prior to 15 March, then earlier dates may be used as a starting time. Conversely, surveys should begin 1 April for the higher Cascades area where previous survey information has shown that birds return to their established territories later. Positive responses after 31 August are still valid, but negative results after this date do not count towards the number of visits required for completing the year's survey. Positive responses obtained only after 31 August also indicate that the area in question should be surveyed the following year.

ESTABLISHING THE SURVEY AREA

- o Develop transects and/or calling points to cover all spotted owl habitat within the delineated survey area.
- o Establish calling stations and survey routes to achieve complete coverage of the area, preferably with coverage from more than 1 calling point. Calling stations should be spaced approximately 1/4 to 1/2 mile apart, depending on topography and background noise levels. Take advantage of prominent points within the survey area when establishing calling stations. If necessary to ensure complete coverage of the area, supplement the prominent points with intermediate calling stations.

Where known spotted owl activity centers exist within the survey area, survey areas may be adjusted to exclude habitat that would be within earshot of the activity center. However, consider the need to survey the known activity center for current status.

The intent is to obtain complete coverage of the area where owls will be able to hear the surveyor and the surveyor will be able to hear the owl.

For each visit, whether results are positive or negative, record the following information on a survey form:

- 1) Brief description of survey route.
- 2) Survey start and stop time (total amount of time spent calling) and total time of survey.
- 3) Weather conditions (including estimated wind conditions and precipitation).
- 4) Survey results: note all spotted owl detections, including sex and age if possible, time of response and type of location (e.g. audio, visual, or both). For multiple or moving owls, list information and number each response or observation. This will allow more accurate determinations of management centers.

It is recommended that all sightings of, or responses by, barred owls, great horned owls, northern goshawks, or any other raptor species be recorded. The presence of barred owls, great horned owls, and goshawks may affect spotted owl responses.

For each visit, regardless of survey results, map (preferably on a USGS topographic, orthophoto, or some other high quality map), the following:

- 1) Route surveyed and stations called; and
- 2) All spotted owl response or observation locations. For multiple or moving owls, map all response or observation locations and number to correspond with survey results. Again, this will assist in determining activity centers.

It is recommended that barred owl, great horned owl, and northern goshawk responses or observation locations be mapped.

SURVEY METHODS

Two types of surveys are accepted: spot calling and leapfrog calling. Each is described below. Spot calling is the recommended method. Whatever method you use, be sure you cover all spotted owl habitat within the survey area.

- 1) **Spot calling:** Set up a series of calling points 1/4 to 1/2 mile apart along the road transects. When possible, pick prominent points which cover large areas. Spend at least 10 minutes at each point. Spend more time if the topography prevents you from hearing birds that might respond from the previous calling point (eg. you cross a major ridge). If the topography lends itself to fewer, prominent calling points, spend more time at each point. Be sure the entire survey area is adequately covered.

- 2) Continuous walking or leapfrog surveys: Walk the designated route playing the tape and pausing at prominent points and at regular intervals throughout the area to conduct informal stations of 10-minute duration. If two people are involved, you may use a leapfrog method (See Forsman 1983 - Methods and Materials for Locating and Studying Spotted Owls, USFS Gen. Tech. Rept. PNW-162).

The following instructions should be followed using either method:

- o It is recommended that a surveyor use a cassette tape with recorded spotted owl calls, a tape player, and a sound amplification device (e.g. a hand-held megaphone or loudspeaker). The use of a cassette tape, tape player, and sound amplification device enables surveyors to assure consistent and equitable calling methods. The amplified sound must be heard at least 1/4 mile. Surveyors must be stationed outside their vehicle. CAUTION: In areas of high owl density (e.g., California coastal area), over-amplification may confound survey results by eliciting responses from spotted owls representing multiple territories.
- o Start the tape and let it run for 3-7 calls, listen for a minute or two, then play another set of calls. It is recommended that the owl tape contain calls from both male and female owls. In particular, it should include male 4-note contact calls, and male and female agitated calls.
- o Continue this process for at least 10 minutes at each calling station.
- o Voice calling may be used by experienced surveyors at the discretion of the project leader (see SURVEYOR CREDENTIALS/QUALIFICATIONS). Negative results from inexperienced voice callers may not be adequate for evaluating spotted owl presence/absence.
- o Characterize behavioral observations as best you can. Make note of agitated calls, continuous responses, movement (toward you or away from you), or situations such as when one response is received and the owl is quiet thereafter. Recording this type of information may assist with the identification of activity centers.
- o Conduct night surveys between sunset and sunrise. Be sure not to call the same section of a survey route at the same time on each survey effort (i.e., vary time you start and the section of the route from which you start).
- o Do not survey under inclement weather conditions, such as high winds (> 10 mph), rain, heavy fog, or high noise levels (stream noise, machinery, etc.) which would prevent you from hearing responses. If weather conditions or noise levels are in doubt, be conservative. Survey visits conducted under marginal conditions will reduce quality of the overall survey effort. Negative results collected under inclement weather conditions may not be adequate for evaluating spotted owl presence/absence.
- o Systematically survey spotted owl habitat within each planning or activity area (as defined above in SURVEY AREA) until an owl responds, or if no response is heard, until a minimum of 3 complete night visits are conducted each year for a 2-year period or a minimum of 6 complete night visits are conducted for a 1-year period.

The objective of a complete visit is to conduct a thorough survey of the entire area in one field outing; however, in some cases this may not be possible. A complete visit may be a combination of a day and a night field outing and, in addition, may include a daytime follow-up visit. If reasonable effort was made to cover the area (timber sale or planning) in one outing, but this was not accomplished, then the remaining unsurveyed area should be surveyed in the following field effort. To reduce the chance of owls moving between portions of the survey area and, as a result, being missed, complete the visit on consecutive days as much as possible. The entire area should be covered within 7 days in order to be considered as one complete visit.

- If the project area is too large to be surveyed in 7 days, it should be divided into smaller areas based on available habitat, topography, drainages, and other important factors. Survey areas need to be small enough to be completely surveyed within the specified time period.
- If a surveyor gets an owl response at night and conducts a daytime follow-up, the combination of the night outing and the daytime follow-up would be counted as 1 complete visit for that owl or pair of owls. If a surveyor goes out at night and does not get a response, a daytime follow-up would not be necessary. In this case, the night outing alone would be considered as 1 complete visit. Whether or not owls are heard, the entire area needs to be surveyed to count as a complete visit.
- Visits must be spaced at least 5 days apart. For example, assume a visit ends on the 3rd of May. Using a proper five-day spacing (4-8 May), the next possible visit date would be 9 May.
- At least 2 of the night visits per year must be conducted before 30 June for a 2-year survey and at least 4 of the night visits must be conducted before 30 June for a 1-year survey. To ensure the best coverage, at least 1 visit should be conducted in June. Survey effort should be spread out over 2-3 months, to avoid survey efforts concentrated in a short period of time, particularly at the beginning of the survey season. Concentrating visits early in the season may result in inaccurate assessments of nesting status; therefore such surveys may not be adequate for evaluating spotted owl presence/absence.
- Where survey seasons are restricted (due to snow, landslides, mud, bridge failures, etc.), the survey period may be adjusted to fit the conditions. Documentation should be provided to explain the modified survey period.
- Surveys may be conducted during the day where there are no roads or foot trails to traverse at night, or where there are other safety concerns. Documentation should be provided for specific safety concerns, etc.
- o If birds are heard during a survey:
 - Estimate the bird's original and final location. One method is to triangulate on the owl's call, taking compass bearings from 2-3 locations. Make sure compass bearings are taken in as short a time-frame as

possible. Record on the survey form the method used to estimate the location.

- Record the location(s) of the owl, preferably on a map or photo attached to the survey form.

The intent of the triangulation and mapping is to provide a means for verification of the location. Attempt to confirm the owl(s) with a daytime follow-up. Daytime locations are very important in determining more precise management (activity) centers.

- o When a bird responds, record the required data. If no response is heard, proceed to the next calling point. Continue until the survey area is completely covered.
- o If a bird(s) responds at night, return to the area during the day as soon as possible (daytime follow-up) to verify status as described below, unless status has already been determined.
 - The objective of the daytime follow-up is to locate spotted owls (pairs or singles) by conducting an intensive search within the general vicinity (approximately a 0.5-mile radius) of the original response location at night. Surveys may begin from roads closest to the night response area. However, if owls do not respond to road surveys, surveyors should conduct walking routes through the area. Surveyors should spend sufficient time within the stand to cover the area well. This may take several hours, depending on the terrain. Observers should watch for owls flying in without responding and other evidence of occupancy, such as pellets, whitewash, and molted feathers. Pellets, whitewash, or feathers alone are not sufficient to document spotted owl presence or residency. Mobbing jays are also a potential indicator of owl presence. The follow-up should be completed as soon as possible after presence was detected, as owls are more apt to be located near the previous night's location. A daytime follow-up is only the second part of a complete visit.
- o If a response occurs during daylight hours and there is sufficient time to determine the status, do so.

DO NOT HOOT ANY MORE THAN IS NECESSARY. BY STIMULATING THE OWLS TO MOVE AROUND, YOU MAY INCREASE THEIR RISK OF PREDATION.

EXCESSIVE CALLING NEAR A NEST SITE MAY CAUSE HARASSMENT BY BRINGING THE FEMALE OFF THE NEST. EXCESSIVE USE OF THE AGITATED CALL IN HIGH OWL DENSITY AREAS (E.G., CALIFORNIA COASTAL AREAS) MAY ALSO CONFOUND SURVEY RESULTS BY ELICITING RESPONSES FROM OWLS REPRESENTING MULTIPLE TERRITORIES.

USE CONSERVATIVE JUDGEMENT AND HOOT ONLY AS MUCH AS IS NEEDED TO DETERMINE STATUS.

- o Once a bird responds at night, complete the station to determine pair status and the remainder of the survey route. To avoid 'leading' a spotted owl through calling, we recommend that once an owl responds, the surveyor go to the other end of the survey route and complete the rest of the survey. If that is not practical, survey only the remaining points that are beyond the earshot of the

responding bird. Beyond earshot is generally over a ridge or at least 1/2 to 3/4 mile straight-line distance from the owl. Completing the route will provide an opportunity to detect any other owls.

- o Continue to call for the duration of the station visit even after other species respond unless the surveyor believes that this will increase the potential for predation by great horned owls or goshawks, for example.
- o If a single bird responds, and after 3 complete visits (2-year survey) or 6 complete visits (1-year survey) resident status has not been determined, then up to 3 additional visits may be necessary in that year. Additional visits are visits conducted beyond the number of complete visits required by the 2- or 1-year survey protocol and are conducted only in the general area of the response (a 0.5-mile radius around the site). If resident status is determined at any point during the additional visits, no more visits to that particular site are required that year. Other portions of the project activity area may require further surveys.
- o For additional visits, maintain the standards (timing, intervals, weather condition limitations, etc.) outlined elsewhere in this document.

- 2-year survey

In a 2-year survey, the additional visits are to be conducted the same year as the response.

If the last response occurs on:

visit #1, conduct 1 additional visit
visit #2, conduct 2 additional visits
visit #3, conduct 3 additional visits

OR

until resident status is determined.

- 1-year survey

If the last response occurs on:

visit #4, conduct 1 additional visit
visit #5, conduct 2 additional visits
visit #6, conduct 3 additional visits

OR

until resident status is determined

If 3 responses are not obtained, even after the additional visits, then the bird is not classified as a resident single.

STATUS

- o Verify the status according to the following definitions (status visits can be day or night). These definitions may be somewhat different from the status definitions outlined in the density/demography survey guidelines due to the different objectives of the guidelines for surveying proposed management activities.

PAIR STATUS is established by any of the following:

- 1) a male and female are heard and/or observed (either initially or through their movement) in proximity (< 1/4 mile apart) to each other on the same visit; or
 - 2) a male takes a mouse to a female (see "mousing" clarification under GUIDELINES FOR DETERMINING REPRODUCTIVE STATUS); or
 - 3) a female is detected (seen) on a nest; or
 - 4) one or both adults are observed with young. Young alone do not define a pair because young barred owls look like young spotted owls until late in the summer.
- o When unidentified calls are heard in the vicinity of a known spotted owl do not assume species identification of the unknown owl. Daytime follow-ups should be used to clarify these situations.

RESIDENT SINGLE STATUS is established by:

- 1) the presence or response of a single owl within the same general area on 3 or more occasions within a breeding season, with no response by an owl of the opposite sex after a complete survey; or
 - 2) Multiple responses over several years (i.e., 2 responses in year 1 and 1 response in year 2, from the same general area).
- o A resident single may represent a succession of single owls within the same general area in a single or multiple years.

Determining if the responses occur within the same general area should be based on topography and the location of any other owls known for the surrounding area. This should be determined by the wildlife biologist for the particular area. Radio-telemetry and banding data can also be used to aid in determining status of singles.

TWO BIRDS, PAIR STATUS UNKNOWN is established by:

- The presence or response of 2 birds of the opposite sex where pair status cannot be determined and where at least 1 member must meet the resident single requirements.

STATUS UNKNOWN is established by:

- The response of a male and/or female which does not meet any of the above category definitions.

PROTOCOL FOR DETERMINING REPRODUCTIVE STATUS

REPRODUCTION SURVEYS

Determining reproductive success is not required to avoid "take" , if breeding season restrictions are applied to all harvest activity in order to protect owl reproduction during any given year. Restrictions may be dropped if, according to the protocol, surveys reveal that owls are non-nesting or that no young were produced.

The following is the recommended protocol for determining reproductive status of spotted owls. The protocol is designed for management purposes and may not meet all research goals. Reproduction surveys may provide information on nest tree locations which provide the most accurate management (activity) center locations.

- o There are 2 stages of reproduction surveys: nesting status and reproductive success.

NESTING STATUS

- o Conduct nesting status surveys between 1 April and 1 June. The start date is based on nest initiation dates. If local data suggests a different date for nest initiation, adjust the start date accordingly. Young identified after 1 June would still confirm nesting.
- o Spread the surveys throughout the survey period. Do not conduct all nesting status surveys early in the breeding season.
- o Use a standard "mousing" procedure as described below to determine nesting status. However, DO NOT "MOUSE" BIRDS ANY MORE THAN IS NECESSARY TO DETERMINE NESTING STATUS. BY STIMULATING THEM TO MOVE AROUND DURING THE DAY, YOU MAY INCREASE THEIR RISK OF PREDATION. THE SAME GOES FOR HOOTING. EXCESSIVE CALLING NEAR A NEST SITE MAY CAUSE HARASSMENT AND ENDANGER EGGS OR YOUNG BY BRINGING THE FEMALE OFF THE NEST.

MOUSING

- o Locate 1 or both members of a pair during the day and offer them mice or other small prey items.
- o Once the owl(s) take prey, or are found with natural prey, record the 'fate' of each prey item (e.g., eaten, cached, given to female or young). The fate of the prey is used to classify nesting status.
- o If the owl eats the prey item, continue to offer additional prey items until the owl caches the prey, sits on it for an extended period of time (30-60 minutes), refuses to take additional prey, or carries the prey away. If the bird flies with the prey, follow and try to determine the final disposition of the prey. For more details on mousing procedures, see Forsman (1983) Methods and Materials for Locating and Studying Spotted Owls. USDA Forest Service, Gen. Tech Rept. PNW-162.

- o Field personnel should make a concerted effort to get the owl(s) to take mice. Be creative in placing a mouse where the owl can easily see and capture it and offer mice to the mate of an owl that has refused mice on that visit.

The site will be classified as nesting, non-nesting, or unknown nesting status based on your observations.

NESTING

The owls will be classified as nesting if any of the following conditions are observed.

Two observations, at least 1 week apart, are required to determine nesting status if the first observation occurs before 1 May. This is necessary because the owls may show signs of initiating nesting early in the season without actually laying eggs and their behavior could easily be mistaken for nesting behavior. After 1 May, a single observation is sufficient.

Nesting is confirmed if, on 2 visits before 1 May, or 1 visit after 1 May:

- 1) the female is detected (seen) on the nest; or
- 2) either member of a pair carries natural or observer-provided prey to the nest; or
- 3) a female possesses a brood patch when examined in hand during mid-April to mid-June. Only 1 observation is required. Dates may vary with the particular areas. Be careful not to confuse the normal small area of bare skin (apteria) on the abdomen with the much larger brood patch. A fully developed brood patch covers most of the lower abdomen, extending to the base of the wings. Describe the brood patch on the field form, including length, width, color, and texture of the skin, and any evidence of regenerating feathers around the edge (NOTE - while a scientific research permit is not required by the Service for calling spotted owls, any capture or handling of spotted owls does require such a permit); or
- 4) young are detected in the presence of 1 or both adults. Because young barred owls look like young spotted owls until late in the summer, young alone are not sufficient.

NON-NESTING

The site is classified as non-nesting if any of the following are observed. Again, except for brood patch information, 2 observations are required during the nest survey period, with at least 3 weeks separating these observations to ensure that late nesting attempts are not missed. The second observation should occur after 15 April. Because nesting attempts may fail before surveys are conducted, the non-nesting status includes owls that did not attempt to nest as well as those that have failed.

Non-nesting is inferred if:

- 1) the female is observed roosting for 60 minutes, particularly early in the season (1 April to 1 May). (Be aware that nesting females with large nestlings often roost outside the nest during warm weather. If in doubt, be sure to schedule 1 or more visits in mid-June to check for fledglings.);
- 2) the female does not possess a brood patch when examined in hand between mid-April and mid-June; or
- 3) you offer prey to 1 or both members of the pair and they cache the prey, sit with prey for an extended period of time (30-60 minutes), or refuse to take additional prey beyond the minimum of 2 prey items. To be considered a valid nesting survey, an owl must take at least 2 prey items.

Surveys where the bird(s) leaves the area with prey and you are unable to determine the fate of the prey cannot be classified as to nesting status and do not count toward the required 2 visits. Banded or radio-marked birds may be reluctant to take prey at all; therefore, nesting status should be inferred from other means (e.g., checking for fledglings later in the season).

UNKNOWN NESTING STATUS

If nesting is not determined before 1 June, you CANNOT classify the owls as non-nesting using the criteria listed above.

- o If owls are found after 1 June, without young, nesting status is unknown.
- o If no owls are found after 1 June (at those sites where owls were present prior to 1 June), nesting status is unknown.

REPRODUCTIVE SUCCESS (NUMBER OF YOUNG FLEDGED)

Once a pair is classified as nesting, conduct reproductive success surveys after the time the young leave the nest (fledge), usually in late May to late June. If local fledging times are available you may adjust the dates accordingly.

Schedule at least 2 visits to the site to locate and count fledged young, timing the visits so that the fledged young are observed as soon after leaving the nest as possible to reduce losses to predation.

- o Attempt to locate fledged young. Use visual searches and/or mousing. If young are present, the adults should take at least some of the prey to the young. The sight of an adult with prey will usually stimulate the young to beg, revealing their number and location.
- o If the birds take at least 2 prey items and eventually cache, sit with, or refuse further prey without ever taking prey to fledged young; on at least 2 occasions, separated by at least 1 week, 0 young are recorded.

If you wish to determine the true number of fledged young, do the following:

- o On the first reproductive success visit, count the number of fledged young seen or heard.
- o Conduct a minimum of 1 follow-up visit, 3 to 10 days after the first fledged young is seen. This is necessary because it is possible to miss some owlets on a single visit.
- o If you do not elicit a response on a minimum of 2 visits, separated by at least 1 week during the fledging period, then classify the production of young as unknown.
- o If you count young on 1 visit but do not get back for a second visit, or find no owls on the second visit, classify the number of young as 1+ or 2+ etc.

Opportunistic mousing late in the season (after July 30) may be useful for providing supplemental information about site productivity. However, mousing efforts late in the season must be considered inconclusive if they fail to provide positive information, because dispersal and/or mortality may have occurred.

PROTOCOL FOR SURVEYING FOR SPOTTED OWLS IN PROPOSED
MANAGEMENT ACTIVITY AREAS AND HABITAT CONSERVATION AREAS
March 12, 1991 (Revised February 1993)

The following survey protocol is for locating spotted owl pairs and resident singles in proposed management activity areas and Habitat Conservation Areas (HCA). These are the minimum standards required for surveying areas. Further effort to determine status beyond what is required may be initiated.

Read the entire document before initiating any phase of the survey. The protocol guidelines are a step-by-step process. The steps are:

1. Establish calling stations and survey routes (see section II).
2. Conduct surveys to determine activity centers of pairs and resident singles (see section III).
3. Conduct reproductive status surveys if needed (see section IV).

OUTLINE OF CONTENTS

	<u>PAGE</u>
DEFINITIONS	3
SURVEY PERIOD	6
ESTABLISHING CALLING STATIONS/SURVEY ROUTES	7
A. Delineate the boundaries	7
B. Survey Methods	7
1. Spot calling	7
2. Continuous walking or leapfrog surveys	7
C. Determine what survey procedure(s) will be implemented	7
1. Nighttime Survey Using Roads	7
2. Nighttime Survey Using Trails	8
3. Daytime Survey	8
D. Establish calling stations and survey routes	8
E. Prepare a survey plan	8

	<u>PAGE</u>
III. SURVEY PROCEDURES FOR DETERMINING ACTIVITY CENTERS	10
A. General Instructions And Considerations	10
B. Survey Procedures	12
1. Preliminary Survey Using Historic Information	12
2. Survey Procedures For A Complete Visit Using Stations	13
a. Nighttime Survey Using Roads	13
b. Nighttime Survey Using Trails	14
c. Daytime Survey	14
d. Follow-up Visit	15
3. Additional Visits	16
C. Determining Status From Survey Results	16
1. Pair Status	16
2. Resident Single Status	17
3. Status Unknown	17
4. Verified Unoccupied	17
IV. SURVEY METHODS FOR DETERMINING REPRODUCTIVE STATUS	18
A. General Instructions and Considerations	18
B. Determining Nesting Status	19
C. Determining Reproductive Success	20
RECOMMENDATIONS FOR SPOTTED OWL SURVEYOR: CREDENTIALS/QUALIFICATIONS ..	22
APPENDIX A. SURVEY PERIOD AND DURATION OF SURVEYS	23

DEFINITIONS

Area

The spotted owl habitat that has been delineated to be surveyed. Management activity areas and HCAs may need to be divided into two or more smaller survey areas to meet protocol guidelines.

Complete Survey

The survey area has been surveyed to protocol guidelines, including the required number of visits. (This could be completed in one or two years; see sections II and III.)

Complete Visit

The objective is to locate spotted owls by conducting a thorough survey of the spotted owl habitat in the entire survey area. A complete visit may be a combination of a day and night field outing and, in addition, may include a follow-up visit(s). A complete visit should be completed in 1 field outing, but this may not be possible in some cases. If every reasonable effort has been made to cover the survey area in 1 outing but this was not accomplished, then the remaining survey area must be surveyed in the following field effort(s). Complete the visit on consecutive days as much as possible, realizing weather may be a problem. The entire survey area must be covered within 7 days (e.g., 20 May-26 May) in order to be considered as 1 complete visit. If the management activity area or HCA is too large to be covered in 7 days, it should be divided into smaller survey areas based on available habitat, topography, drainages, and other physical characteristics.

If a surveyor gets an owl response at night and conducts a follow-up visit, the combination of the night outing and the follow-up visit would be counted as 1 complete visit. If a surveyor goes out at night and does not get a response, a follow-up visit would not be necessary so the night outing alone would be considered as 1 complete visit.

Current Pair

An owl pair that was verified within the last 5 years. The data on pairs from approximately the past 5 years is generally considered more reliable and most reflective of the pairs that actually exist. Thus, this definition is to be used to indicate if the owl site is considered by the Forest to be a reliable, existing pair. There may be exceptions to using the "last 5 year rule" in determining which are the existing pairs on the Forest. For example, an owl pair verified in 1986 in an area where there has been no logging or disturbance, such as wilderness, would likely still be considered an existing pair even though the pair was verified more than 5 years ago.

NOTE: Current pair, existing pair, and reliable pair are terms that have been used interchangeably.

Follow-up Visit

The objective of the follow-up visit is to locate spotted owl pairs during the day by conducting an intensive search (1 to 6 hours) around the original response location at night, usually within a 0.5 mile radius. The follow-up visit should be completed as soon as possible after an owl is detected, preferably the next day. A follow-up visit is part of a complete visit.

Field season

Field season dates vary between physiographic provinces. Refer to Table 1 presented later in this document for the appropriate dates for your area.

Historical information

Includes the location of a nest tree(s), roost site(s), or vocal response(s). Spotted owl response locations from 1 or more complete visits in which status is determined become historical information for the subsequent complete visits.

Housing

Feeding mice to owls; it is the most efficient way to locate females and young. The assumption is that adult owls with live young will take a mouse to its young and the young will be observed.

Survey plan

Includes: (1) a brief narrative describing the survey area(s); (2) a map showing boundaries of the survey area(s), spotted owl habitat, delineated survey areas, un-callable areas, survey routes, and calling stations; (3) estimates of time, number of personnel needed, and costs to complete; (4) acreages of spotted owl habitat in callable and un-callable areas.

Pair status

Pair(s) of owls are confirmed if any of the following is detected: (1) a male and female are heard and/or observed in proximity (< 1/4 mile apart) to each other on the same outing during daylight hours; (2) a male and female are heard and/or observed in proximity (< 1/4 mile apart) to each other on two separate outings at night within a 2-year time frame; (3) a male takes a mouse to a female; (4) a female is seen on a nest; or (5) one or both adults are observed with young (young alone do not define a pair because young barred owls look like young spotted owls).

Resident single status

A resident single is confirmed if an owl is detected on 3 different visits within the same general area over a one to three year period.

Status unknown (single owl)

Status is unknown if the response of an owl does not meet the pair or resident single status definitions.

Verified unoccupied

A complete survey of the area has been conducted and there were no detections of any owls.

productive visit

A visit to determine the nesting status or reproductive success status of known pair.

ing

Alive or dead owlets that are out of the nest and seen with one or more adults.

activity center

The point that best describes the focal area of use by a resident single or pair. This can be based on locations of adults, nests, roosts, or young. Refer to 'Guidelines For Selecting A Spotted Owl Location To Represent The Management Center' for more instruction.

SURVEY PERIOD

Table 1 lists recommended dates for conducting surveys to determine activity centers, nesting status, and reproductive success status. If different dates are used, contact the Regional Office and document the reasons why different dates are used. The duration and longevity of surveys are addressed in Appendix A.

Table 1. Recommended dates for conducting surveys to determine activity centers, nesting status, and reproductive success status by physiographic province.

Physiographic Province	Period		
	Station Visits	Nesting Status Visits	Reproductive 1/ Success Visits
Olympic Peninsula	3/15 to 8/31	4/15 to 6/1	5/15
Wash. Casc.-West	3/15 to 8/31	4/15 to 6/15	6/1
Wash. Casc.-East	3/15 to 8/31	5/15 to 7/15	7/1
Coast Range	3/1 to 8/31	4/1 to 6/1	5/15
Oreg. Casc.-West	3/15 to 8/31	4/15 to 6/1	5/15
Oreg. Casc.-East	3/15 to 8/31	5/1 to 7/1	6/15
Klamath	3/1 to 8/31	4/1 to 6/1	5/15
Sierra Nevada	3/1 to 8/31	4/1 to 6/1	6/1
Southern California	3/1 to 8/31	4/1 to 6/1	6/1

1/ = Reproductive success status visits may be initiated until the end of the seasonal restrictions.

ESTABLISHING CALLING STATIONS/SURVEY ROUTES

This section provides guidelines for identifying and planning for surveying a management activity area or HCA.

- A. Delineate the boundaries of the management activity area or HCA and delineate the spotted owl habitat on a photograph, topographic map, or other suitable map.

Large areas should be divided into smaller survey areas to ensure that a visit can be completed in 7 days. Consider the known owl locations, habitat, and topography in making this decision. Delineate division boundaries to reduce the possibility of resident singles and pairs being counted more than once in the management activity area or HCA (i.e., ensure that each subdivision is not too small or too narrow relative to the other subdivisions of the management activity area or HCA).

B. Survey Methods

Two types of surveys are accepted: spot calling and leapfrog calling. Each is described below. Spot calling is the recommended method. Whatever method you use, be sure you cover all spotted owl habitat within the survey area.

1. Spot calling: Set up a series of calling points 1/4 to 1/2 mile apart along the transects. When possible, pick prominent points which cover large areas. Spend at least 10 minutes at each point, more if the topography prevents you from hearing birds that might respond from the previous calling point (e.g., you cross a major ridge). If the topography lends itself to fewer, prominent calling points, spend more time at each point.
2. Continuous walking or leapfrog surveys: Walk the designated route. Spend at least 10 minutes at each call point. As you walk between call points, listen for responses. If there is no response at a station or between stations, continue to the remaining stations. If two people are involved, you may use a leapfrog method (See Forsman 1983 - Methods and Materials for Locating and Studying Spotted Owls, USFS Gen. Tech. Rept. PNW-162).

- C. Determine what survey procedure(s) will be implemented in the survey areas. Many survey areas encompass combinations of well-roaded areas, roadless areas, and remote areas. One or more procedures of surveys may be used in the same survey area:

1. Nighttime Survey Using Roads. Survey areas that have accessible roads for establishing stations to cover the survey area should be called at night. Calling stations should be spaced no more than a straight-line distance of 0.5 mile from each other. Use the spot calling or continuous walking/leap-frog survey method. Procedures for conducting nighttime surveys using roads are explained in section III.B.2.a.

2. Nighttime Survey Using Trails. In habitat without roads, nighttime calling stations will only be established in survey areas that can be traversed safely. Calling stations may be established on well maintained trails where there is virtually no danger to a caller equipped with only a flashlight or headlamp. Fixed calling stations along trails should be spaced no more than a straight-line distance of 0.25 mile apart from each other. Fixed calling stations must be well marked and visible with a headlamp or flashlight (sense of distance while walking at night can be significantly distorted; there will be no distinctive bends in the road, cull decks, or road junctions for reference). Use the spot calling or continuous walking survey method. Procedures for conducting nighttime surveys using trails are explained in section III.B.2.b.
 3. Daytime Surveys. Survey areas that cannot be effectively and safely surveyed from the roads or trails at night will be surveyed during the daytime. The beginning of the transect should be marked on the ground or be visible on the copy of the aerial photograph, topographic map, or other suitable map. Fixed calling stations along trails should be no more than a straight-line distance of 0.25 mile apart from each other. Use the spot calling or continuous walking survey method. Procedures for conducting daytime surveys are explained in section III.B.2.c.
- D. Establish calling stations and survey routes within the survey area to achieve complete coverage of the spotted owl habitat. The intent is that owls will be able to hear the surveyor and the surveyor will be able to hear the owls. Identify each established station on a photograph, topographic map, or other suitable map. Stations along trails should be identified by prominent topographic features and elevations, and/or some type of permanent identifier that cannot be easily destroyed or removed. It is expected that the surveyor will be within 100-200 feet of the fixed calling stations on repeat visits within each year, as well as between years.
- E. Prepare a survey plan for the management activity area or HCA (see definitions).

The following items should be considered when establishing calling routes:

- It may be necessary to conduct some 'pre-survey' work to assist in establishing calling routes and stations.
- The entire survey area must be covered in 7 days. If it cannot be covered in 7 days, divide it into smaller survey areas.
- Consider the physical characteristics of the survey area:
 - o Sound travels in a straight line (sound does not travel around bends or go over ridges).

- o Establish calling stations that directly face each drainage.
 - o Avoid establishing a calling station near loud noise sources, such as loud creeks and well-used roads.
 - o Whenever possible, establish stations at "outstanding" physiographic features such as prominent ridge points, saddles, and openings in the vegetation to ensure complete coverage of the survey area.
- If marking a trail in a wilderness area, discuss appropriate methods for marking permanent calling stations with the local wilderness manager or recreation personnel.

III. SURVEY PROCEDURES FOR DETERMINING ACTIVITY CENTERS

This section provides guidelines on how to locate owls to determine activity centers of pairs and resident singles.

A. General Instructions And Considerations:

1. Number of complete visits required:

HCAs-three complete visits per year; number of years of surveys to be determined through Regional direction.

Management activity areas-three complete visits per year for two consecutive years, or six complete visits for one year if a two year survey is not possible (see also section I for details on duration of surveys).

2. If a complete visit takes more than one outing, complete the remaining outings on the following consecutive days.
3. Complete a field visit form for all outings, regardless if an owl was detected or not.
4. Conduct night surveys between sunset and sunrise (use local sunrise/sunset tables to determine these times).
5. When a complete visit has been finished, 5 days must elapse between the end of the previous visit and the beginning of the next visit. For example, assume a visit ends on 3 May. Using a proper five-day spacing (4-8 May), the next possible visit date would be 9 May. Continue until the required number of complete visits is completed for that year.
6. If a two-year survey is being conducted, at least 2 of the visits must be conducted before 30 June in each year. If a one-year survey is being conducted, at least 4 of the visits must be conducted before 30 June. Document the reasons why if the 2 or 4 visits cannot be conducted before 30 June. The survey effort must be spread out over 2-3 months, to avoid survey efforts concentrated in a short period of time (for example, in a 3-week period at the first of the survey season).
7. Try to start each visit at a different station from the last visit. This could mean reversing the route from the last visit (starting the second visit at the last station of the first visit), but any combination is acceptable as long as the stations are done as efficiently as possible.
8. DO NOT "MOUSE" OR CALL ANY MORE THAN IS NECESSARY. DO NOT STIMULATE ANY MORE THAN NECESSARY TO DETERMINE STATUS. BY STIMULATING OWLS TO MOVE AROUND DURING THE DAY, YOU MAY INCREASE THEIR RISK OF PREDATION.

9. Do not call spotted owls in parts of the survey area where predators are active. Several stations may need to be skipped. Document reasons why stations are skipped.
10. It is recommended that the surveyor use a spotted owl calling tape, a tape player, and a sound amplification device (e.g., a hand-held megaphone or loudspeaker). Surveyors must be outside their vehicle, and use a projection device or have a tape player that can project the call so it can be heard at least 1/4 mile. Turn the tape off after 3-7 calls, listen for a minute or two, then play another set of calls. It is recommended that the owl tape contain calls from both male and female owls, in particular it should include male 4-note contact calls, and male and female agitated calls. Continue this process for at least 10 minutes at each calling station. Voice calling may be used by experienced surveyors at the discretion of the project leader. It is important to recognize that females may be under-represented if only male calls are used.

NOTE: The use of a calling tape, tape player, and sound amplification device enables surveyors to more effectively locate owls.

11. Characterize behavioral observations as best you can. Make note of agitated calls, continuous responses, movement (toward you or away from you), or other situations such as when one response is received and the owl is quiet thereafter. This will give the person(s) analyzing the data and determining activity centers additional information to consider.
12. Do not survey under inclement weather conditions, such as high winds (> 10 mph), moderate to heavy rain, or high noise levels (e.g., stream noise, machinery) which would prevent you from hearing a response that would be heard under better conditions.
13. If owls are heard during the daytime, it may be possible to visually locate them by walking in the direction of their calls. Additional broadcasts or vocal imitations of spotted owl calls may be needed to elicit additional responses from an owl to pinpoint its location.
14. Because owls will not always continue to call and because they may move, it is important to visually locate them as soon as possible after they respond. Keep the original approximate location of the owl response in mind, as the owl may be drawn toward the observer. If the owl is thought to have moved, search the original, approximate location for its mate or young.
15. The responsiveness of owls depends on many factors, which may include:

- a. Time of day. Spotted owls are more likely to be detected early in the morning and late in the day, as these times are closest to their foraging hours. During the middle of the day they are relatively inactive and less likely to respond.
 - b. Temperature. Air temperature will affect an owl's responsiveness. In extremely hot weather, owls may be less likely to respond.
 - c. Individual variation. Individual owls appear to have individual "comfort" radii. Sometimes they will respond from a hundred yards away, but not respond as the caller draws nearer.
16. When appropriate, record similar information for predators and competitors of spotted owls (e.g., goshawk, great horned owl, barred owl) that are detected while surveying for spotted owls.

B. Survey Procedures

The following three survey procedures should be initiated in order. First (optional), consider historical sites to determine if parts of the survey area do not need to be surveyed using stations. Second, survey the survey area using stations until the required number of complete visits are completed. Third (optional), conduct additional visits on sites in which a pair or resident single status could not be determined, but it is judged that the sites may be occupied by a pair or resident single.

1. Preliminary Survey Using Historic Information

Some current known pairs and resident singles (historical information) may be located more efficiently by going directly to their activity center during the day than by standard survey procedures using stations that emphasize nighttime procedures. If it is possible to locate pairs or resident singles without doing station visits, time and effort may be saved. Use your knowledge of the area, the owls in the area, and your professional judgement in deciding if this will be beneficial.

NOTE: For HCAs, start with section III.B.1.a. Check historic sites for pairs or resident singles. If a pair is not located, that portion will need to be surveyed using stations.

For management activity areas, if the known pair and resident single locations in a management activity area are accepted as current, go to section III.B.1.c to delineate the areas that do not need to be surveyed. If the known locations are not accepted as current, start with section III.B.1.a or conduct station visits in the area.

- a. Identify the centers of activity of the known pairs and resident singles in the survey area on a map or photograph.
- b. Go to the activity center areas during the day. Use whatever techniques that are appropriate to locate the pair or resident single (e.g., locating known nests, calling, mousing). If the pair or resident single is located, record the location and go to III.B.1.c. If the pair or resident single is not located, initiate complete visits at this location and to the remainder of the survey area using station calling procedures (see section III.B.2.).
- c. Delineate on a photograph or map the portion of the survey area that does not need to be revisited that year. This is generally beyond earshot of the bird (over a ridge and at least 1/2 to 3/4 mile away), but also consider other physical characteristics of the area and the average home range of pairs in your area. Initiate complete visits to the remainder of the survey area using station calling procedures (see section III.B.2.).

2. Survey Procedures For A Complete Visit Using Stations

The objective is to locate owls to determine the status of a site. Once presence of one or more owls is determined, conduct a follow-up visit as soon as possible after getting a response. The goal of this follow-up visit is to visually confirm or infer the existence of a pair of spotted owls. Each survey procedure explained in section II.C is presented.

a. Nighttime Survey Using Roads

(1) Conduct a complete visit by calling for 10 minutes at each station.

(a) If there is no response along the survey route, continue to the remaining stations until the visit is complete or there is a response.

(b) If there is a response along the survey route:

- i. Estimate the bird's location (the best method is to triangulate on the owl's call, taking compass bearings from 2 to 3 locations. Make sure compass bearings are taken in as short a time-frame as possible). Record the location on the map or photograph and the field visit form, mentioning the location method used.
- ii. Survey the remaining area beyond the earshot of the bird (generally over a ridge and at least 1/2 to 3/4 mile away).

- iii. Do a follow-up visit as soon as possible (see section III.B.2.d).

b. Nighttime Survey Using Trails

- (1) Conduct a complete visit by calling for 10 minutes at each station.
 - (a) If there is no response along the survey route, continue to the remaining stations until the visit is complete or there is a response.
 - (b) If there is a response along the survey route:
 - i. Estimate the bird's location (the best method is to triangulate on the owl's call, taking compass bearings from 2 to 3 locations. Make sure compass bearings are taken in as short a time-frame as possible). Record the location on the map or photograph and the field visit form, mentioning the location method used.
 - ii. Survey the remaining area beyond the earshot of the bird (generally over a ridge and at least 1/2 to 3/4 mile away).
 - iii. Do a follow-up visit as soon as possible (see section III.B.2.d).

c. Daytime Surveys

- (1) Conduct a complete visit by calling for 10 minutes at each station.
 - (a) If there is no response along the survey route, continue to the remaining stations until the visit is complete or there is a response.
 - (b) If there is a response along the survey route:
 - i. If there is sufficient daylight hours, do a follow-up visit (see III.B.2.d). After the follow-up visit is completed, survey the remaining area (as daylight allows) beyond the earshot of the bird.

- ii. If there is not sufficient daylight, estimate the bird's location (the best method is to triangulate on the owl's call, taking compass bearings from 2 to 3 locations. Make sure compass bearings are taken in as short a time-frame as possible). Record the location on the map or photograph and the field visit form, mentioning the location method used. Continue to the remaining stations (as daylight allows) beyond earshot of the detected bird. Do a follow-up visit as soon as possible (see section III.B.2.d).

d. Follow-up Visit

If an owl is detected during a visit, complete a follow-up visit as soon as possible, preferably within 48 hours of detecting an owl.

- (1) Starting as close as possible to the location where the owl position was determined, begin a search in the general area of the owl location (usually within 0.5 mile).
 - (a) If no owl is found within 4 hours, the follow-up visit is complete.
 - (b) If an owl is found, allow up to two hours to establish pair status. Use mousing and visual observation to help in determining status.
 - i. If the owl is located, but is observed roosting/sleeping and ignoring any mice that are presented for one hour, the follow-up visit is over.
 - ii. If the owl is active and shows interest in mice that are offered, but pair status cannot be determined in the 2 hours, the follow-up visit is complete. Additional time is recommended if the surveyor believes pair status can be determined with further effort.
 - iii. If pair status is determined, the follow-up visit is complete.

NOTE: The follow-up visit may take at least 6 hours--at least 4 hours searching for an owl and at least 2 hours trying to determine pair status. Additional time may be used (the time constraints are minimums). When more than one observer is involved, the observers may split up into two groups, so long as distinctly separate areas are being searched by each group and the total number of hours spent searching for owls by each group amounts to four hours (i.e., 2 hours per group, or other combinations amounting to four hours). Splitting up into more than two groups is not acceptable.

3. Additional Visits

Additional visits may be conducted in areas in which pair or resident single status could not be determined even though an owl was detected, and it is judged that the site may be occupied by a pair or resident single. The additional visits are beyond the number of complete visits required and only the general area where the owl was detected should be searched. There is no time limit or minimum number of visits in conducting additional visits.

C. Determining Status From Survey Results

1. Pair Status is determined by any of the following:

- a. a male and female are heard and/or observed in proximity (< 1/4 mile apart) to each other on the same outing during the day; or
- b. a male and female are heard and/or observed in proximity (< 1/4 mile apart) to each other on two separate outings at night within a 2-year time frame; or
- c. a male takes a mouse to a female; or
- d. a female is seen on a nest; or
- e. one or both adults are observed with young (young alone do not define a pair because young barred owls look like young spotted owls).

NOTE: Once pair status is determined, it is considered an activity center (historical information). Adjust the area to be surveyed for the remaining complete visits (see section III.B.1).

NOTE: The sexes must be positively identified by call and/or sight before pair status is determined as defined in a and b. If the sex of an individual is uncertain, pair status is not determined.

2. Resident Single Status is determined by:

- a. the presence or response of a single owl within the same general area on 3 or more visits within a breeding season, with no response by an owl of the opposite sex after a complete survey; or
- b. the presence or response of a single owl within the same general area on 3 or more visits during the breeding season over a one to three year period (i.e., 2 responses in one year and 1 response in the following year).
- c. Two Birds, Pair Status Unknown is a resident single location in which there was the presence of 2 birds of the opposite sex, pair status could not be determined, and at least 1 of the birds meets the resident single status requirements.

NOTE: Once resident single status is determined in a management activity area, it is considered an activity center (historical information). Adjust the area to be surveyed for the remaining complete visits (see section III.B.1). It may be desirable to conduct additional visits to determine pair status for a more reliable activity center.

NOTE: Resident single status in HCAs are recorded, but the area to be surveyed is not adjusted. Pair status must be determined in HCAs in order to adjust the area to be surveyed.

3. Status Unknown (Single Owl) is determined by the response of a male and/or female which does not meet the pair or resident single requirements.
4. Verified Unoccupied is determined when a complete survey has been conducted in a survey area, but no owls were detected.

V. SURVEY METHODS FOR DETERMINING REPRODUCTIVE STATUS

Reproductive status visits are used to determine the nesting and/or reproductive success status of a site in a particular year. The status refers to the particular site (area around the activity center) only, and does not infer that the pair that was associated with the site did not nest or successfully produce young at another site.

Reproductive status visits are not required for HCAs and should not be conducted if the general inventory work will be impacted.

Reproductive status visits will result in the following classifications:

- Nonnesting inferred-nonreproduction inferred
- Nesting confirmed-reproduction unknown
- Nesting confirmed-reproduction confirmed
- Nesting confirmed-nonreproduction inferred
- Nesting unknown-nonreproduction inferred
- Nesting unknown-reproduction unknown

There are 2 types of reproductive surveys -- nesting status and reproductive success.

A. General Instructions and Considerations

1. Conduct reproductive status surveys between the dates listed in Table 1. The start date is based on nest initiation dates. If local data suggest a different date for nest initiation, adjust the start date accordingly. Young identified after 1 June would still confirm nesting.
2. Spread the surveys throughout the survey period. Do not conduct all nesting status surveys early in the breeding season.
3. Use a standard "mousing" procedure as described below to determine nesting status. For more details on mousing procedures, see Forsman (1983) Methods and Materials for Locating and Studying Spotted Owls. USDA Forest Service, Gen. Tech Rept. PNW-162. Make a concerted effort to get the owl(s) to take prey; be creative in placing prey where the owl can easily see and capture it, and offer prey to the mate of the owl that has refused prey on that visit.
4. DO NOT "MOUSE" OR CALL ANY MORE THAN IS NECESSARY. DO NOT STIMULATE ANY MORE THAN NECESSARY TO DETERMINE STATUS. BY STIMULATING OWLS TO MOVE AROUND DURING THE DAY, YOU MAY INCREASE THEIR RISK OF PREDATION. DO NOT CALL SPOTTED OWLS IN PARTS OF THE SURVEY AREA WHERE PREDATORS ARE ACTIVE.
5. Attempt to locate the pair between the dates listed in Table 1. Search the area for four hours on each visit.

B. Determining Nesting Status

1. Nesting is confirmed if any of the following conditions are observed. Two observations, at least 1 week apart, are required to determine nesting status if the first observation occurs before 1 May. This is necessary because the owls may show signs of initiating nesting early in the season without actually laying eggs and their behavior could easily be mistaken for nesting behavior. After 1 May, a single observation is sufficient. Nesting is confirmed if, on 2 visits before 1 May, or 1 visit after 1 May:
 - a. the female is detected (seen) on the nest; or
 - b. either member of a pair carries natural or observer-provided prey to the nest; or
 - c. a female possesses a brood patch when examined in hand during mid-April to mid-June. Only 1 observation is required. Dates may vary with the particular areas. Be careful not to confuse the normal small areas of bare skin (apteria) on the abdomen with the much larger brood patch. A fully developed brood patch covers most of the lower abdomen, extending to the base of the wings. Describe the brood patch on the field form, including length, width, color, and texture of the skin, and any evidence of regenerating feathers around the edge (NOTE: while a scientific research permit from the U.S. Fish and Wildlife Service is not required for calling spotted owls, any capture or handling of spotted owls does require such a permit); or
 - d. young are detected in the presence of 1 or both adults. Because young barred owls look like young spotted owls until late in the summer, the presence of young alone is not sufficient to confirm nesting.
2. Non-nesting (and non-reproduction) is inferred if any of the following are observed. Two observations are required during the nest survey period, with at least three weeks separating these observations to ensure that late nesting attempts are not missed. The second observation should occur after 15 April. Because nesting attempts may fail before surveys are conducted, the non-nesting status includes owls that did not attempt to nest as well as those that have failed. Non-nesting is inferred if:
 - a. the female is observed roosting for 60 minutes, particularly early in the season (1 April to 1 May). (Be aware that nesting females with large nestlings often roost outside the nest during warm weather. If in doubt, be sure to schedule 1 or more visits in mid-June to check for fledglings); or

- b. the female does not possess a brood patch when examined in-hand between mid-April and mid-June. Only one observation is required; or
- c. the pair is not located after a four hour search on 2 separate visits; or
- d. you offer prey to one or both members of the pair and they cache the prey, sit with prey for an extended period of time (30-60 minutes), or refuse to take additional prey beyond the minimum of 2 prey items. To be considered a valid nesting survey, an owl must take at least 2 prey items.

Surveys where the bird(s) leaves the area with prey and you are unable to determine the fate of the prey cannot be classified as to nesting status and do not count toward the required 2 visits. Banded or radio-marked birds may be reluctant to take prey at all; therefore, nesting status should be inferred from other means (e.g., checking for fledglings later in the season).

- 3. If nesting is not determined before the latest date (by Province) listed for nesting status visits in Table 1, You cannot classify the owls as non-nesting using the criteria listed above. Nesting is unknown if:
 - a. owls are found after these dates (see Table 1), without young; or
 - b. no owls are found after these dates at those sites where owls were present prior to these dates (see Table 1).

C. Determining Reproductive Success

Reproductive success visits may be done for sites where nesting has been confirmed, nesting is unknown, or where nesting visits were not conducted in the same breeding season. Sites determined to be nonnesting do not need reproductive success visits.

Locate the pair or one member of the pair between the dates listed in Table 1 (conduct reproductive success surveys after the time young leave the nest, usually in late May to late June; if local fledging times are available, you may adjust the dates accordingly). Mouse if necessary.

Conduct at least two visits to the site to locate and count fledged young, timing the visits so that the fledged young are observed as soon after leaving the nest as possible to reduce losses to predation.

- 1. If fledged young are located: Nesting confirmed-reproduction confirmed.

2. If the bird(s) take at least 2 prey items and eventually cache, sit with, or refuse further prey without ever taking prey to fledged young on at least 2 occasions separated by at least one week; and
 - a. the status of the site is nesting confirmed: Nesting confirmed-nonreproduction inferred; or
 - b. the nesting status of the site is unknown: Nesting unknown-nonreproduction inferred.

3. If the owl(s) refuse to take at least 2 prey items, and:
 - a. the status of the site is nesting confirmed: Nesting confirmed-reproduction unknown; or
 - b. the nesting status of the site is unknown: Nesting unknown-reproduction unknown

Appendix A. SURVEY PERIODS AND DURATION OF SURVEYS

NOTE: The following information on the duration of surveys is applicable wherever the U.S. Fish and Wildlife Service requires the U.S. Fish and Wildlife Service-endorsed protocol be used for northern spotted owl surveys. Regional direction may amend this section of the protocol for areas not meeting this criterion.

Previous survey data were analyzed to determine the number of visits needed to result in a high likelihood that territorial owls will be detected or that a lack of owl responses accurately reflects an absence of spotted owls. Preliminary analysis of the data provided the basis for determining the number of visits per year for both the 2-year and 1-year surveys. Two-year surveys provide more accurate results for an area because of the intermittent occupancy of spotted owls within particular areas. These 2-year surveys are more likely than 1-year surveys to accurately document the presence of owls or territories in these situations.

- A. 1-year (6-visit) surveys are acceptable. However, 1-year surveys provide a somewhat lower likelihood of determining the presence or absence of spotted owls. In addition, 1-year surveys will be valid only until the beginning of the following breeding season.
- B. 2-year (3 visits/year) surveys are preferable for surveying a management activity or planning area to determine the presence or absence of spotted owls. Two-year surveys may be valid for 2 additional years.
- C. 2-year surveys are encouraged to provide a higher likelihood of accurately determining presence or absence of spotted owls. They may also be more economical, especially in cases where harvest will occur in more than one year.
- D. If a 2-year survey is completed (3 visits per year protocol), and no responses are obtained, the negative results may be considered accurate for 2 additional years without conducting additional surveys.

Example: 2-year survey

Year 1 (March-Aug.)	93	3 visits with no response
Year 2 (March-Aug.)	94	3 visits with no response
Year 3	-95	Harvest without additional surveys
Year 4	-96	Harvest without additional surveys
Year 5	-97	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- E. If a 1-year survey is completed (6 visits), and no responses are obtained, harvest could occur before the start of the next breeding season. If harvest is not completed within this time period, a 3-visit minimum survey would be needed prior to harvest in the second year. This is equivalent to 1 year of a 2-year survey. If harvest was not going to occur until after year 2, and the 3 visits in year 2 produced no responses, the negative results may apply for 2 more years without having to conduct additional surveys.

Example: 1-year survey

Year 1 (March-Aug.)	6 visits with no responses
Year 2	Conduct 3 more visits as described below if harvest is not completed before the beginning of the breeding season. The 3 visits should be conducted prior to harvest. If no responses are obtained, additional surveys are not needed for 2 more years.
Year 3	Harvest without additional surveys
Year 4	Harvest without additional surveys
Year 5	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- F. If a nest site or activity center is located by a 1- or 2-year survey, and if harvest will take place in the area in years following the initial surveys, further surveys may be necessary, as follows:

If an owl site is located during a 1-year survey, and the project area is large enough to possibly support more than one site, remaining potential sites should be surveyed three times in the second year. Following the completion of both 1- or 2-year surveys, unless otherwise authorized under an incidental take statement or permit from the Service, the original nest site or activity center should be surveyed for occupancy in the year of the action. It is not unusual for owls to change their nesting location from year to year. If the owls are not at the original location, all areas inside harvest units and within 0.25 miles of harvest units should be surveyed each year of harvest according to a 3-visit protocol to eliminate the chances of disturbance to spotted owls during the breeding season.

- G. In cases where a survey area overlaps all or part of a previous year's survey area, a minimum of 3 visits should be completed for those areas covered by the previous year's surveys, and the new areas should be surveyed with either the 1-year or 2-year protocol.

consecutive or not?

H. If no responses have been obtained from an historically occupied site after three years of survey (using the guidelines in this document), the site may be considered unoccupied, barring any evidence to the contrary.

CLARIFICATION FOR
SPOTTED OWL INVENTORY AND MONITORING HANDBOOK dated FEBRUARY 16, 1988

Many questions have arisen since the Spotted Owl Inventory and Monitoring Handbook dated February 16, 1988, was issued. The following documentation should help provide consistency in application of the protocols.

(1) Flexibility

Many persons have asked about the extent to which the protocols presented in the handbook have any flexibility. Irregularities in following the protocols that result from unavoidable, accidental occurrences are referred to by statisticians as "noise in the system". As long as these are random events, the final monitoring results will be valid. If some observers are systematically not following the protocols, such as always spacing complete visits only 2 days apart, than this would introduce a significant bias into the monitoring effort, and it would affect the final monitoring results.

(a) Time at calling stations

Keep the 10 minute limit as consistent as possible. If no responses are obtained within 10 minutes, go on to the next calling station. However, once a response has been obtained, continue calling the owl until the observer is convinced that no "mate" might also be called up, and that the observer has established the correct location for the owl. The observer is encouraged to continue and move to an adjacent calling station in order to get a triangulation on the owl location. In summary, an observer is not limited to 10 minutes at a calling station once a response has been obtained.

(b) Time Between Visits

There are specifications given in the handbook for time that should elapse between certain types of visits. For example, wait at least 5 days between complete visits (occupancy), and 3 days between reproductive visits for May 15 - July 1, and 1 day between reproductive visits after July 1. For example, complete all routes of one complete visit within 7 consecutive days. *← 3 call visits / timer*

The intent of the protocol is to meet the spacing requirements to every extent possible. However, weather may play an important role in meeting time objectives, as may accidents, emergencies and weekends. Therefore, where the prescribed time frames cannot be met, this should be documented, but will not discredit the entire monitoring effort.

Example: Presence of an owl is heard on Monday night. There are torrential storms the next two days, meaning that a follow-up visit cannot be conducted within 48 hours. Conduct that follow-up visit as soon as possible, but document in the notes that the follow-up visit was conducted 36 hours after presence was established due to weather. Similarly, perhaps 3 of 4 routes that comprise one complete visit have been completed and a person has a family emergency for the next two days, so can't finish the final 4th route within 7 days. Finish the final 4th route as soon as possible and document that the complete visit was conducted within a 9 consecutive day period due to a family emergency.

Other miscellaneous examples of time flexibility in the protocols:

Example: If after the 4 hour follow-up search within a 0.5 mile radius, the observer is outside the 0.5 mile radius, but is still within the defined monitoring area, on the way to their vehicle, and sees a pair of spotted owls roosting, it is appropriate to include this observation in the monitoring results. If the observer is doing his/her work according to the protocol in a

as walking back to the truck, than results would have been obtained within the protocol. If, however, the observer is PURPOSELY not following protocol and is surveying a fifth hour, instead of stopping at 4 hours, any results obtained in that fifth hour would bias the monitoring effort and the observer should be cautioned against such deviation from the protocol. If, however, in the same situation the observer only saw a single owl while walking back to the truck, it would not be appropriate to continue surveying for the pair. Instead, the observer would have to begin complete visits again, as Occupancy was not established during the 4-hour follow-up or the walk back to the truck.

(2) Maximum Number of Mice That Can be Fed to an Owl

The following comments refer to mousing to determine reproductive status AFTER OCCUPANCY HAS BEEN CONFIRMED:

It only takes 4 mice eaten by the same owl on one reproductive visit to determine Nonreproduction, however, if during a 2 hour mousing effort one owl caches two mice, and feeds another owl two mice; or caches four mice, etc. the observer can continue to offer more mice up to the 2 hour time limit. (Remember if after 1 hour the owl doesn't take a mouse, the observer can leave.)

In summary, during a reproductive visit, mousing can be attempted for up to two hours, during which one owl can eat four mice thereby establishing a Nonreproduction outcome, or young can be located, or the observer can attempt to offer 4 or more mice with the mice getting cached, passed off, etc.

(3) Mouse Disappearing During Reproductive Visit

The reproductive visit mousing protocol in the handbook states that if an owl takes "one mouse, flies off, cannot be followed, and does not return...result...is inconclusive - young suspected."

Unfortunately, the handbook does not describe the situation where an owl takes a mouse, flies off, cannot be followed, and then after a while an owl appears, or is located by the observer, and that owl does not have the mouse. The observer does not know if this is the same owl that took the first mouse, and the observer does not know what happened to that first mouse.

If this situation occurs, the observer should proceed to offer mice to the "second" owl. If the second owl eats 4 mice, outcome is Nonreproduction. If young are located outcome is Reproduction. If neither of these outcomes is achieved by feeding the second owl (e.g. it caches 4 mice, or won't eat more than 2 mice, etc), then the OUTCOME FOR THAT REPRODUCTIVE VISIT IS INCONCLUSIVE-YOUNG SUSPECTED.

(4) Owl Located Outside Defined Area Flies Inside

If a spotted owl is first heard outside the defined area but then flies inside, even if the observer feels that the bird flew inside in response to the observer's calls, as long as the bird is located within the defined area it counts. Document where the bird was located inside the defined area, and also document that a bird was first heard outside the area and appeared to have flown in to the observer. Remember, the observer will still need to get a daytime visual of a pair to confirm occupancy, so if the bird actually never uses habitat inside the defined area, occupancy will never get established for that bird in that defined area for the year.