



United States Department of the Interior



In Response Reply To:
R8-ES

FISH AND WILDLIFE SERVICE
Pacific Southwest Region
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Sacramento, California 95825-1846

To all Interested Parties:

FEB 23 2010

Subject: 2010 Northern Spotted Owl Survey Protocol

This memo transmits the draft "2010 Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls" (hereafter referred to as the draft 2010 Protocol) and provides California-specific information on the transition from the previous protocol. This protocol is endorsed by the U.S. Fish and Wildlife Service (Service) for gathering information on northern spotted owl (spotted owl) occupancy in proposed project areas. A separate memo specific to implementation in Oregon and Washington has been issued for those states.

To roll out the draft 2010 Protocol, the Service is holding informational and survey coordination meetings in late February and early March at various locations in California, Oregon and Washington. The purpose of the meetings will be for users to better understand how to implement the new protocol and to coordinate surveys in areas where multiple landowners overlap. We encourage participation in these meetings by all consultants, land management agencies, private foresters, state biologists, and others conducting spotted owl surveys.

This is a transition year for implementation of the draft 2010 Protocol. Guidance for the transition is provided in this memo. As we commence this transition, the Service is soliciting comments on the transition guidance and Protocol itself, as well as any data analysis that the Service has not yet considered, to incorporate into revisions of the draft 2010 Protocol. We plan to revise the draft 2010 Protocol for the 2011 and 2012 field seasons, prior to finalizing after 2012.

The Service does not regulate or mandate the use of the draft 2010 Protocol. It has been developed in a continuing effort to provide information and technical assistance to landowners and managers. An Endangered Species Act section 10(a)(1)(A) scientific research permit is not required by the Service for calling spotted owls; however, any capture or handling of spotted owls does require a permit. For information on permits, please contact Mr. Daniel Marquez, the Service's Pacific Southwest Region permit coordinator, at (760) 431-9440.

Reasons for updating the survey protocol

The draft 2010 Protocol represents a culmination of new data analyses and the professional opinions of spotted owl and barred owl researchers and survey practitioners. Research on spotted owls over the last decade has raised concerns regarding the effectiveness of the 1992 survey protocol, particularly those which do not result in spotted owl detections, most likely due to barred owl presence. Implementation of the methods described in the draft 2010 Protocol is expected to provide a greater likelihood of detecting spotted owls that co-occur with barred owls.

Revision of the survey protocol is also consistent with the Northern Spotted Owl Recovery Plan (USDI Fish and Wildlife Service, 2008). Updating the protocol helps satisfy Recovery Action 23 (Analyze existing data sets from the demographic study areas relative to the effects of barred owls on spotted owl site occupancy, reproduction, and survival) and Recovery Action 24 (Ensure that protocols adequately detect spotted owls in areas with barred owls).

Transition Guidance

The Service recommends that agencies and organizations implement the draft 2010 Protocol as soon as feasible. Because we recognize that immediate transition may not be feasible in all instances, we have provided the following guidance for transitioning between the 1992 and 2010 survey protocols.

Transitioning from the 1992 1-Year Survey Approach to the Draft 2010 Survey Protocol

If a 1-year survey was conducted in 2009 with negative results and you had been planning to complete 3 additional surveys in 2010 to keep surveys “current” prior to project completion, the Service accepts conducting the second set of three surveys in 2010 for Year-2 of surveys (as described in the 1992 Protocol). The most recent version of the protocol should be implemented in 2012 if project implementation has not begun.

Transitioning from the 1992 2-Year Survey Approach to the Draft 2010 Survey Protocol

If the first year of a 2-year survey approach (3 visits) was completed in 2009 as described in the 1992 Protocol, and you are not able to implement the draft 2010 Protocol (6 visits in Year 2), the Service accepts conducting the second set of three surveys in 2010 for Year-2 of surveys (as described in the 1992 Protocol). The most recent version of the protocol should be implemented in 2012 if project implementation has not begun.

If projects have completed years 1 and 2 of a 2-year survey under the 1992 Protocol, the Service would accept these surveys as complete. Spot surveys will not be necessary. If the project has not been implemented by Year 5 of the 2-year survey, then the most recent version of the protocol should be implemented.

Consideration of Unoccupied Status of a Historically Occupied Site

The draft 2010 Protocol modifies the Service’s guidance relative to historically occupied sites. The 1992 Protocol contained the following guidance: “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.” Recent analysis conducted on spotted owl site occupancy indicates that 3 years of surveys are not sufficient to conclude that a site will not become occupied. In addition, peer review comments received on the Northern Spotted Owl Recovery Plan suggest that habitat associated with these sites has some recovery value for spotted owls. The Service now believes it is necessary to make this unoccupied site determination on a case-by-case basis, so we recommend that you contact your local Service field office for technical assistance following 3 consecutive years of negative survey results.

Disturbance Activities other than Habitat Modification

The Service recommends using the transition guidance and the draft 2010 Protocol as soon as possible for conducting disturbance related surveys. Local efforts (e.g., Level 1 Teams) that have previously-obtained Service concurrence are excepted from this recommendation.

Review and Testing of the Draft 2010 Protocol

The development of the draft 2010 Protocol has benefitted from a substantial analysis of data and from the guidance and reviews by the interagency Barred Owl Working Group and its Survey Protocol Subcommittee, established pursuant to 16 U.S.C. 1533(f)(2), to assist in implementing recovery plan actions. Additional reviews were provided by federal, state and private individuals (see list of names and organizations below). Most of the data used to develop the draft 2010 Protocol was from either previously published peer reviewed professional journal articles or manuscripts in peer review during the update process.

The effectiveness of the draft 2010 Protocol, and future revisions, can be enhanced through feedback from survey practitioners after implementing the methodologies and techniques and incorporation of data not yet received by the Service. Therefore, the Service welcomes comments on the draft 2010 Protocol by October 31, 2010 by those individuals and organizations who utilize the draft 2010 Protocol during the 2010 field season. For the 2011 field season, the Service would again like to receive comments, by October 31, 2011, from individuals and organizations who utilize the protocol. Comments can be submitted to the above letterhead address, attn: NSO Survey Protocol. The Service will analyze the available data and make revisions to the protocol as appropriate.

We hope to further expand our understanding of barred owl densities throughout the range and the changing influence of this species on spotted owls over the next two years. Additionally, spotted owl detection probability data will be collected from spotted owls involved in telemetry studies in various portions of the species range, in partnership with project researchers and cooperators. Concurrently, the Service will request input and seek peer review by the Interagency Scientific Review Committee established under the auspices of the Northern Spotted Owl Recovery Plan.

The Service strongly recommends that Federal and non-Federal landowners submit spotted owl data to the California Department of Fish and Game to ensure current site information is evaluated when determining effects.

The following is a list of individuals and organizations that assisted in the development and/or review of the draft 2010 Protocol. The Service offers its sincere gratitude to these folks for the time and effort they provided during this process.

Joe Buchanan	Washington Department of Fish and Wildlife
Scott Gremel	National Park Service, Olympic National Park
Don Youkey	U.S. Forest Service, Wenatchee
Dave Clayton	U.S. Forest Service, Rogue-Siskiyou
Elaine Rybak	U.S. Forest Service, Region 6
Mike Blow	Bureau of Land Management, Eugene District

Kerrie Palermo	Bureau of Land Management, Coos Bay District and State Office
Eric Greenquist	Bureau of Land Management, Eugene District and State Office
Tony Melchiors	Weyerhaeuser Company
Mike Rochelle	Weyerhaeuser Company
Matt Hane	Weyerhaeuser Company
A.J. Kroll	Weyerhaeuser Company
Doug Woodworth	Biota Pacific
Dennis Rock	National Council of Air and Stream Improvement
Dale Herter	Raedeke Associates
Ray Bosch	U.S. Fish and Wildlife Service, Arcata, CA
Ken Hoffman	U.S. Fish and Wildlife Service, Arcata, CA
Robin Bown	U.S. Fish and Wildlife Service, Portland, OR
Kevin Maurice	U.S. Fish and Wildlife Service, Portland, OR
Jan Johnson	U.S. Fish and Wildlife Service, Yreka, CA
Kent Livezey	U.S. Fish and Wildlife Service, Lacey, WA
Trisha Roninger	U.S. Fish and Wildlife Service, Klamath Falls, OR
Elizabeth Willey	U.S. Fish and Wildlife Service, Klamath Falls, OR
Robert Pearson	National Audubon Society, Seattle Chapter The Campbell Group Hancock Forest Management
Rich Klug	Roseburg Forest Products
Jennifer Weikel	Oregon Department of Forestry
Rod Krahmer	Oregon Department of Fish and Wildlife
Dale Steele	California Department of Fish and Game
Carie Battistone	California Department of Fish and Game
Lowell Diller	Green Diamond Resources
Robert Anthony	Oregon Cooperative Fish and Wildlife Research Unit
Katie Dugger	Oregon State University
Eric Forsman	U.S. Forest Service, Pacific Northwest Research Station, Corvallis
Janice Reid	U.S. Forest Service, Pacific Northwest Research Station, Roseburg

The Service is committed to providing assistance to you during this time of transition, and we look forward to receiving feedback on the effectiveness and utility of the draft 2010 Protocol, the transition guidance, and future protocols. If you have any questions, please contact Ken Hoffman in the Arcata Fish and Wildlife Office at (707) 822-7201, Jan Johnson in the Yreka Fish and Wildlife Office at (530) 842-5763, Trisha Roninger in the Klamath Falls Fish and Wildlife Office at (541) 885-8481, Lyle Lewis in the Red Bluff Fish and Wildlife Office at (530) 527-3043, or Arnold Roessler in the Sacramento Fish and Wildlife Office at (916) 414-6600.

Sincerely,



Michael Fris
Assistant Regional Director, Ecological Services

Attachment

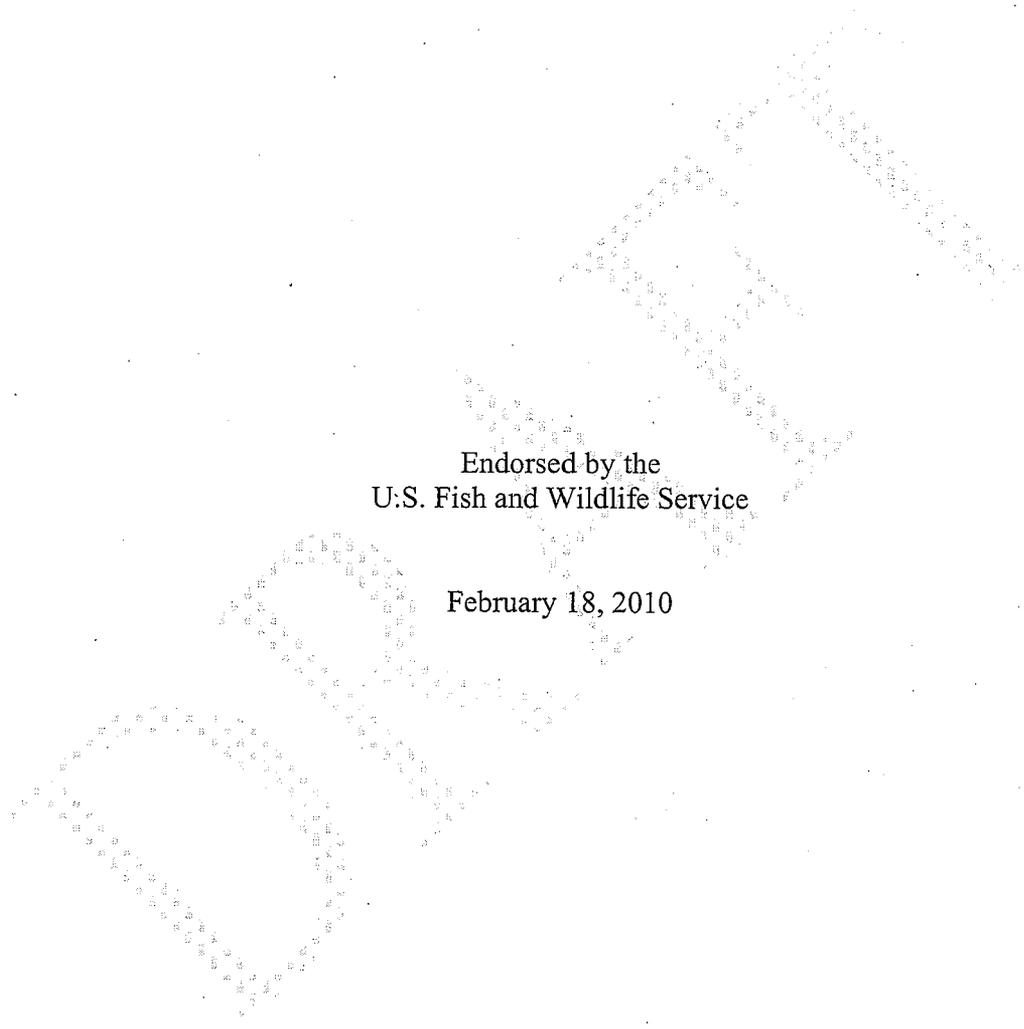
cc:

USFS Regional Forester, Region 5, Vallejo, CA
BLM California State Director, Sacramento, CA
NPS Pacific West Regional Director, Oakland, CA
BIA Pacific Regional Director, Sacramento, CA
CalFire Director, Sacramento, CA
California Department of Fish and Game Director, Sacramento, CA
California Department of Transportation Director, Sacramento, CA

February 18, 2010

2010 PROTOCOL FOR SURVEYING
PROPOSED MANAGEMENT ACTIVITIES
THAT MAY IMPACT NORTHERN
SPOTTED OWLS

Version 1.0



Endorsed by the
U.S. Fish and Wildlife Service

February 18, 2010

7 March 1991
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FURTHER REVISED – February 18, 2010

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The following provides a brief synopsis of some of the similarities and differences (in bold text) between the 1992 and 2010 Northern Spotted Owl Survey Protocol.

Protocol provision	1992	2010
Calling	Voice calling	Recommend digital calling and electronic devices; voice calling discouraged
Habitat to be surveyed	All suitable habitat in Survey Area	All suitable habitat in Survey Area
1-Year survey approach	6 visits	Discontinued
2-Year survey approach	3 visits for 2 consecutive years	6 visits for 2 consecutive years
Daytime surveys	Not part of standard calling	At least 1 daytime stand searches in project areas with habitat removal and any affected site centers
Time per call station	10 minutes	10 minutes plus 5 minutes if a barred owl is detected
Pre-season coordination meetings	Not suggested	Encouraged but voluntary
Survey area	Provincial home range	Provincial home range
Survey Period	March 15 – August 31	March 1- August 31 or September 15 depending on province
Visit spacing	5 days between visits	10 days between visits
Timing of visits	4 visits by June 30	3 visits by June 30
Social, Nesting and Reproductive Status	Guidance provided for timing of surveys and classifications	No substantial changes; some minor modifications
Qualifications of Crew Leaders and Surveyors	Qualifications provided	Qualifications are similar. Training for Crew Leads highly encouraged

2010 PROTOCOL FOR SURVEYING PROPOSED MANAGEMENT ACTIVITIES THAT MAY IMPACT NORTHERN SPOTTED OWLS

INTRODUCTION

The northern spotted owl (*Strix occidentalis caurina*) survey protocol, originally implemented in 1991, was developed to provide federal and nonfederal landowners with guidance for conducting spotted owl surveys related to forest management activities, mainly timber harvest, in landscapes that might be occupied by spotted owls. Surveys were a means to determine whether proposed harvest activities might impact spotted owls that had not been discovered prior to harvest planning.

In recent years, research on spotted owls has provided insights that raise concerns regarding the effectiveness of surveys, particularly those which do not result in spotted owl detections. Specifically, the invasion of the Pacific Northwest by the barred owl (*Strix varia*), a potential competitor of the spotted owl, has resulted in a suppression effect on spotted owl response rates (Olson et al. 2005, Crozier et al. 2006). Therefore, survey results that do not account for barred owl effects on spotted owl detection rates may provide false or limited information about spotted owl presence and lead to forest management activities that may impact spotted owls and be in conflict with the Endangered Species Act (ESA). To address this concern, the USFWS and cooperators (see list below), have conducted analyses leading to estimates of detection rates for spotted owls with barred owl influence. Information utilized to generate the detection rates came from long-term spotted owl demography study areas (Anthony et al. 2006, Olson et al. 2005, Dugger et al. 2009, Bailey et al. 2009, Kroll et al. 2010) and spotted owl site and timber-harvest related surveys on private industrial forest lands in both Oregon and California (Kroll et al. 2009). These detection rates, along with data on spotted owl site colonization and extinction probabilities and empirical analysis of site occupancy (Olson et al. 2005, Dugger et al. 2009), were utilized in developing the 2010 Protocol. Lastly, professional opinion by researchers, survey practitioners, and regulators were integrated into this product.

Similar to the 1992 Protocol, the 2010 Protocol was designed for surveying areas where Federal or non-Federal activities may remove or modify northern spotted owl habitat or create disturbances such that breeding activities may be affected. 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; however, the ESA does not require that landowners/managers conduct surveys for listed species. Therefore, 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 herein. If the only information available for a particular activity was acquired through less intensive surveys, the Service must conservatively assess (e.g., 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.

Use of the 2010 Protocol should serve two primary purposes: (1) provide a methodology that results in 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. The 2010 Protocol is not designed to monitor yearly trends of spotted owls or for many other research applications.

The development of the 2010 Protocol has benefitted from a substantial analysis of data and the guidance and reviews by the interagency Barred Owl Work Group and its Survey Protocol Subcommittee (see organizations below), established pursuant to 16 U.S.C. 1533(f)(2) to assist in implementing recovery plan actions. Much of the data used in the development of the 2010 Protocol was from either peer reviewed professional journal articles or manuscripts in per review during the update process.

U.S. Fish and Wildlife Service
U.S. Forest Service
Bureau of Land Management
Oregon State University
California Department of Fish and Game
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Washington Department of Fish and Wildlife
National Council for Air and Stream Improvement
Green Diamond Resources
Weyerhaeuser Company
Plum Creek Timber Company
Hancock Forest Management
The Campbell Group
Raedeke Associates, Inc.
National Audubon Society – Seattle Chapter

APPLICATION OF THE 2010 PROTOCOL

An outline of the 2010 Protocol is provided in Appendix 1.

COORDINATION OF INFORMATION

It is very important to coordinate how spotted owl surveys are conducted. Appropriate coordination involves: 1) pre-season planning (including coordination of commitments by adjacent land managers on the areas to be surveyed by each party); 2) immediate communication of results, positive or negative, that may affect other land managers or regulatory actions; 3) exchange of post-calling season information summaries; and 4) limit unnecessary calling. Common inefficiencies, such as overlapping visits by more than one survey group, can be avoided through coordinated pre-planning. It is also advisable to inform adjacent land managers of all surveys near their ownership because new survey results may affect their management activities.

To help enhance coordination efforts, the Service, through its local field offices, will initiate voluntary, pre-survey coordination meetings beginning in 2011. The purpose of the meetings will be to: 1) have representatives from the various land management agencies and organizations conducting surveys to share approximate extent of planned survey area, 2) look for ways to reduce potential survey overlap, 3) discuss opportunities for sharing information throughout the field season, 4) provide discussion opportunities related to implementation of the survey protocol, and 5) share information on techniques used in surveying spotted owls that will enhance the likelihood of responses.

REPORTING OF INFORMATION

The Service **strongly recommends** that entities conducting spotted owl surveys provide frequent updates of new data to the state agency or spotted owl database holder responsible for evaluating forest practice applications. When possible, spotted owl response data should be shared with these agencies without delay, as the information may inform evaluation of pending forest practices.

ESTABLISHING THE SURVEY AREA

To the maximum extent possible, all suitable spotted owl habitat (see HABITAT TO SURVEY below) within the specified spotted owl provincial home range radius from the perimeter of the proposed project area (see PROJECT AREA below) should be surveyed (A Glossary of Terms is provided in Appendix 2). Efforts should be made to obtain access to all ownerships within this survey area. If access is unavailable, document reasons why. These same radii apply when surveying known spotted owl sites. The provincial radii are as follows:

Olympic Peninsula	=	2.7 miles
Washington Cascades	=	1.8 miles
Oregon Coast Ranges	=	1.5 miles
Klamath Province	=	1.3 miles
Oregon Cascades	=	1.2 miles
California Cascades	=	1.3 miles

California Coast Range: to be determined with appropriate state and federal wildlife agencies.

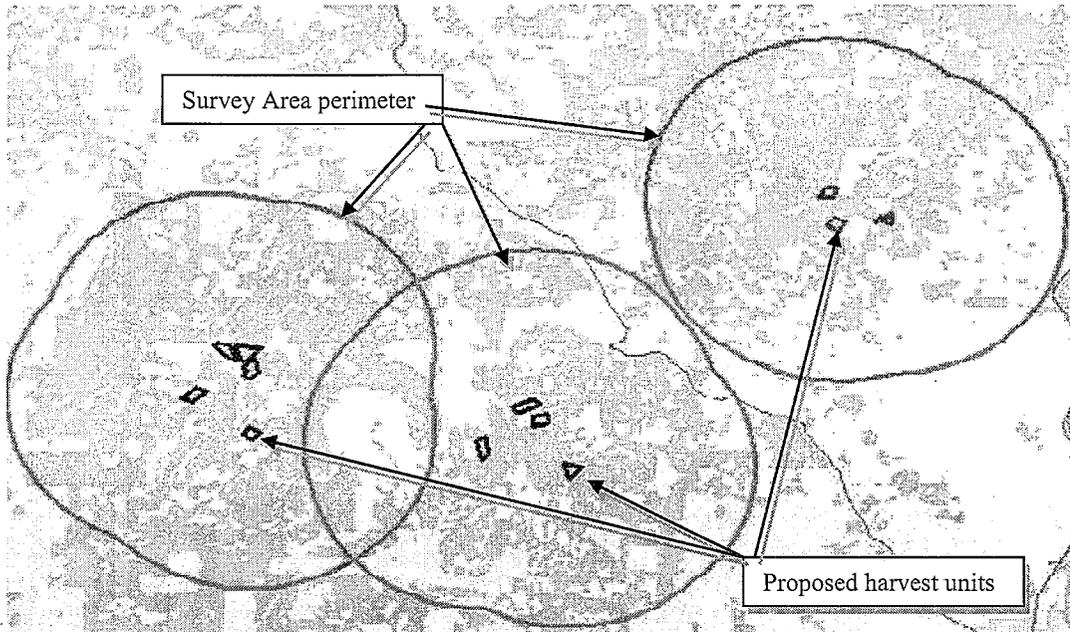


Figure shows a hypothetical landscape with spotted owl habitat (darker color) and proposed harvest units encompassed by a Survey Area perimeter.

PROJECT AREA

For the purposes of this protocol, a project area is the polygon that forms a 0.25 mile perimeter from the footprint of the proposed project. However, please see Appendix 2 for further descriptions of the project area/footprint. Any questions on this can be referred to your local Service office (Appendix 3 and/or contact person).

HABITAT TO SURVEY

For purposes of surveying, using both nighttime station calling and DAYTIME STAND SEARCHES AND SPOT CHECKS (see pages: 9, 10, and 11) spotted owl habitat is any habitat (i.e., nesting, roosting or foraging quality) where you may expect to elicit a response from a resident spotted owls. This does not include stands typically characterized as spotted owl dispersal habitat. Descriptions of spotted owl habitat for the various areas may be available from state wildlife and forestry agencies, or through technical assistance with local Service Field Offices (Appendix 3). Habitat descriptions can also be found in these references: Thomas et al. 1990, Courtney et al. 2004, USDI Northern Spotted Owl Recovery Plan 2008. Regulatory definitions may be of use where appropriate (e.g., definitions embedded within state forest practices regulations), however, please recognize that in some areas the Service doesn't always agree with state forest practice habitat definitions. Surveyors should seek out this information prior to implementing surveys.

Some landowners use detailed habitat maps to define these areas. However, in cases where maps are unavailable, landowners have utilized and appropriate state and federal agencies have accepted the application of surveys in a wider range of forest conditions. For example, in Washington, some landowners have surveyed all areas of forest greater than 40 years old. Using this approach can result in surveys being conducted in some areas of non-habitat, but it is conservative and is appropriate where detailed maps do not exist and pre-survey field visits or other methods of determining habitat is too time-consuming or not feasible.

SURVEY PERIOD

All surveys of proposed project areas must take place between March 1 and August 31, with some exceptions. The initiation of surveys should coincide with the time period that spotted owls are defending established territories. The survey start date of March 1 is recognized for only those areas (e.g., Oregon and California Coast Ranges) where there is biological information (e.g., published or unpublished reports for the specific area) that spotted owls are defending established territories. In most areas, territorial defense doesn't occur until around March 15th with April 1 the generally accepted start date for survey initiation. Conversely, survey initiation may be delayed (e.g., due to snow conditions) in some areas until late April and can be extended to later in the season, such as September 15 for example in the Washington Cascades where survey information has shown that spotted owls return to their established territories later and defend their territory well into September (D. Herter pers. comm. and unpublished data October 2009, R. Pearson pers. comm. and unpublished data November 2009). Please see Appendix 4 for generalized spotted owl breeding chronology. Positive responses outside these survey periods may still be valid, but will require evaluation of the data to determine if locations represent core use areas. Surveys outside these dates do not count towards the number of visits required for completing the year's survey without seeking concurrence from the Service. In areas where positive responses were obtained after the survey period, stand searches should be conducted the following year.

SURVEYORS (see Appendices 5 and 6)

GENERAL SURVEY DESIGN

The intent of any survey is to obtain complete coverage of spotted owl habitat within the SURVEY AREA where spotted owls will be able to hear the surveyor and the surveyor will be able to hear responding owl vocalizations.

- Develop transects and/or calling points to cover all spotted owl habitat (i.e., nesting, roosting or foraging) within the delineated survey area.
- Establish calling stations and survey routes to achieve complete coverage of the survey area. Spacing of calling stations can be determined by the topography and acoustical characteristics (e.g., background noise such as creeks) of the area. Take advantage of prominent points within the survey area when establishing calling stations. However, use of prominent points should not be at the cost of not being able to hear distant responding owls. To ensure hearing owls and obtaining complete coverage, supplement prominent

call points with intermediate calling stations, typically 0.25 to 0.5 mile apart or as acoustical conditions allow. Though not necessary, appropriate federal and state wildlife agencies may be available to provide assistance in reviewing this map.

- Where known spotted owl sites exist within the survey area, surveys should first begin at these site centers. Once the spotted owl site status (per your management need) for the year is known, habitat within a 0.5 mile radius of the site center can be excluded from further surveying for the remainder of the season.
- The Service recommends the use of digital callers rather than voice calling or tape recorded calls (see pages 11 and 12 for more details).
- The Service recommends that hearing enabling devices such as bionic ears not be used. This is because the devices generally only “listen” in one direction which is a disadvantage in determining the response locations.

DURATION AND EXPIRATION OF SURVEYS

A 1-year approach, as described in the 1992 Protocol is no longer recommended by the Service because the occupancy analysis provided by Dugger et al. 2009 shows a high likelihood of a 1-year gap in site occupancy by spotted owls. The Service recognizes that no longer having this approach can create challenges to some landowners/managers in need of getting project clearances done in a single year. Technical assistance may be provided by the Service for these exceptional situations.

Based on the data analyzed and professional opinion, 2-year surveys are expected to provide more accurate results for a survey area because of annual variation in occupancy and detection probabilities between years across most of the range of the spotted owl. The following discussion outlines a 2-year survey approach and is intended to inform management throughout the species range.

In this document, a COMPLETE SURVEY is defined as complete coverage of suitable habitat throughout the survey area that finishes the required number of visits.

2-Year Survey Approach

2-year surveys with 6 visits per year are recommended for surveying a management activity or survey area to determine the presence or absence of spotted owls. Each year is comprised of 6 nighttime visits and 1 daytime stand search of project areas. Daytime stand searches of project areas are discussed below. Surveys may be completed sooner if a response is obtained and the highest status for the site (pages 17-21) is determined per management need.

If a 2-year survey is completed using the 2010 Survey Protocol, and no responses are obtained, activities in project areas may be implemented pending the results of spot check surveys, see below.

Example:

Year 1 (March - Sept.)	6 visits (6 nighttime and 1 daytime visit) with no response
Year 2 (March - Sept.)	6 visits (6 nighttime and 1 daytime visit) with no response
Year 3	Temporarily stop felling operations by March 15, unless nest initiation occurs earlier for your area then stop for that date, and conduct "spot check" surveys at least 5 days apart within Project Area.
Year 4	Temporarily stop felling operations by March 15, unless nest initiation occurs earlier for your area then stop for that date, and conduct "spot check" surveys at least 5 days apart within Project Area.
Year 5	Begin again per Year 1. For ongoing, consulted on projects, consider checking with your Service office to determine appropriateness of full survey vs spot check surveys starting in Year 5.

DAYTIME STAND SEARCHES, SPOT CHECK SURVEYS AND SURVEY OF KNOWN SITES

Daytime stand searches and spot check surveys apply under the following 2 conditions:

- 1) Only when a known spotted owl site center or its 0.25-mile buffer is within the perimeter of a SURVEY AREA

AND,

- 2) Only to those project areas where removal of spotted owl habitat (per HABITAT TO SURVEY) is planned. Removal is defined as activities that alter the function of habitat to remain as nesting, roosting or foraging habitat.

Alternatively, if SURVEY AREA does not contain a spotted owl site AND your project is not removing spotted owl habitat (see removal definition above), a daytime stand search of the PROJECT AREA is not needed.

Daytime Stand Searches

Objective: To search habitats most likely to contain roosting or nesting spotted owls.

A daytime stand search each year should cover spotted owl habitat within the PROJECT AREA. This daytime stand search should occur in June to increase the chances of finding accumulated spotted owl roost material (e.g., fecal matter, feathers, etc) and fledglings. It may take more than a day to completely cover the suitable habitat. However, to complete this visit, nighttime surveys should be conducted throughout the remainder of the SURVEY AREA which is counted toward the visit total.

When conducting the daytime stand search of the project area, broadcast calling will be at a lower volume than used for nighttime station calling. During the search, look for signs of whitewash, pellets, and feathers indicating potential presence of spotted owls. Also, keep your eyes to the forest canopy because spotted owls (and other owl species) may fly in to the surveyor

without responding. When calling, you may also hear jays or other birds giving scolding calls. Investigate these birds because they often mob roosting spotted owls.

Spot Check Surveys

Objective: Spot check surveys supplement 2 year complete surveys and attempt to detect spotted owls that may have recently established territories in PROJECT AREAS.

Spot check surveys in years 3 and 4 will consist of 3 nighttime surveys covering spotted owl habitat within the PROJECT AREA. These surveys should be conducted when remaining habitat being removed is part of contiguous habitat.

Historical, Known/Active Site Surveys

*Objective: To search and locate spotted owls in core areas used in previous years for nesting and roosting. **There may be situations where habitat conditions or other information at an historical site are such that spotted owl occupancy is not likely. For these situations, surveyors will need to decide whether or not to survey and document rationale for not surveying.*** It is recommended that discussions on these decisions occur between the surveyor and appropriate federal and state wildlife agencies prior to the field season.

Conduct a minimum of 1-time daytime stand search of any known or historical spotted owl site centers that are included in the SURVEY AREA. This is important because spotted owls commonly utilize the same, or nearby nest and roost stands year after year and searching the site center should increase the likelihood of detecting a spotted owl. Research has shown that this is still the case for some spotted owls even with barred owls present. Use aerial photographs and delineate stands of spotted owl habitat within 0.5 mile of the site center and conduct a thorough visual and auditory search of the identified stands. In conducting these surveys, the broadcast calling will be at a lower volume than used for nighttime station calling. During the daytime search, look for signs of whitewash, pellets, and feathers indicating potential presence of spotted owls. Also, keep your eyes to the forest canopy because owls may fly in to the surveyor without responding. Investigate jays or other birds giving scolding calls because they often mob roosting owls.

These daytime searches to site centers should be conducted as part of the initial visit to the survey area (generally late March or early April), prior to the initiation of nighttime routes. If it is possible to locate resident spotted owls without doing station visits, time and effort may be saved because portions of the survey area within hearing distance of that site center (generally 0.5-mile radius) can be omitted from surveys to avoid unnecessarily interacting with those owls. If the pair or resident single is located, record the location and go to *Methods for Determining Reproductive Success*, if this level of information is needed.

A 1-time daytime stand search of spotted owl site centers is recommended **each year** as a component of the 2-year survey approach and is included as part of the visit total. To complete the visit, nighttime surveys should be conducted throughout the remainder of the SURVEY AREA beyond a 0.5-mile radius of the site center.

If an activity center is located by a 2-year survey, and if habitat removal activities, per the definition above, will take place in the area in years following the initial surveys, "spot-check" surveys should be conducted each year until project is completed.

OVERLAP OF NEW AREAS WITH AREAS SURVEYED IN THE PREVIOUS YEAR

- In cases where a new survey area overlaps all or part of a previous year's survey area, a minimum of 6 visits should be completed for those areas covered by the previous year's surveys, and the new areas should be surveyed with the 2-year protocol, unless the area is covered with "spot check" surveys. Please refer to the cover memo for guidance on surveys conducted in 2009 and prior.

SURVEY PROCEDURES

For the 2010 Protocol, both nighttime and daytime surveys are recommended. Research data indicates that nighttime calling remains an efficient way of detecting spotted owls. In addition, some recent research data along with professional opinion by research personnel suggest that strategic daytime surveys is also an effective way for locating spotted owls. Thus, this protocol advises the use of both under certain situations and as described in "Daytime Stand Searches" above.

Station Calling – three types of surveys are accepted: spot calling, continuous walking calling, and leapfrog surveys. 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) Nighttime Spot calling: Set up a series of fixed calling points approximately 0.25 to 0.5 mile apart or as acoustical conditions allow, along the road, trails and/or transects. When possible, pick prominent points which allow coverage of large areas. Spend at least 10 minutes at each point. Topography with prominent features (e.g., high ridges, end of road landings over a large drainages, etc) may lend itself to more effective coverage. Whatever the topographic situation, be sure that you have sufficient overlap in calling coverage from point to point, whereby you are able to hear responding owls and that all spotted owl habitat within the entire survey area is adequately covered.
- 2) Continuous walking surveys: Continuous walking surveys are utilized when nighttime coverage from roads or trails cannot be accomplished. Walk the designated route playing the electronic caller and pause at prominent points and at regular intervals throughout the area to conduct informal stations that are at least 3 minutes in duration. Walking surveys can also be used along forest trails or abandoned forest roads that can be safely walked at night.
- 3) Leapfrog surveys (nighttime) - If two people are involved, you may use a leapfrog method along roads. (Forsman 1983 - Methods and Materials for Locating and Studying Spotted Owls, USFS Gen. Tech. Rept. PNW-162).

Regardless of the procedures used above, the following is recommended:

1) Use a digital wildlife caller with recorded spotted owl calls. The use of the digital caller enables surveyors to assure consistent and equitable calling methods. The amplified sound must be audible to the distance of at least 0.25 mile. Surveyors must be stationed outside their vehicle. In areas of high densities of spotted owls (e.g., California coastal area), over-amplification may confound survey results by eliciting responses from spotted owls representing multiple territories.

- Digital Caller Specifications. As policy, the Service cannot recommend nor endorse a specific company or device for digital callers. The Service encourages surveyors to seek out others in the surveying business for suggested devices.

Spotted Owl Calls

- Start the caller and let it run for 3-7 complete calls, listen for 1 to 2 minutes, then play another set of calls. A recommended call sequence includes: standard 4-note hoot, barking calls, contact whistle both normal and agitated, and agitated call (also referred to as the monkey call). Use both male and female examples of all these calls as available but use of calls from both sexes is best. Recorded spotted owl calls can be downloaded from the following website: www.fws.gov/species/nso. These same calls may come with commercial calling devices.
 - When conducting the daytime stand searches or known site surveys, it is advised that a lower volume be used along with the use of all calls above, but with some emphasis on the female whistle.
 - If several visits to the area have used the same set of spotted owl calls, the surveyor should consider switching to a different set of calls that had not been used previously at the site or survey area. This "new" spotted owl may elicit a stronger reaction from a resident but quiet spotted owl. It is recommended that surveyors always hold in reserve such calls until late in the survey, as they may be more effective at eliciting a response if the owl has become habituated to the calls earlier in the season.
 - When calling at active spotted owl sites, the higher stress calls, such as the barking and agitated contact calls may draw incubating females off the nest. This situation should be avoided. Therefore, lower stress calls, such as four-note and whistle calls are encouraged during the nesting period.
- 2) Continue this process for at least 10 minutes at each calling station. Discontinue calling once a spotted owl responds. This will lessen the potential of the owl being lured away from a perch site making it more vulnerable and endangering the spotted owl. Allow the spotted owl to respond for the remainder of the 10 minutes until or until you have determined if there is more than 1 spotted owl. Please see the RECORDING DATA section below for recommendations on recording data and triangulation procedure. Prompt triangulation should occur soon after the first owl starts responding.

- 3) Characterize and document behavioral observations. 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.
- 4) Conduct night surveys between official apparent sunset and sunrise (see the NOAA website for area and times: <http://www.srb.noaa.gov/highlights/sunrise/sunrise.html>). Forsman et al. 1984 also shows that about one-half hour prior to sunset is an active time for spotted owls, consider calling during this time period as well. Be sure not to call the same section of a survey route at the same time on each survey effort, that is, vary the time you start and the section of the route from which you start.
- 5) Do not survey under inclement weather conditions, such as high winds (e.g. > 15 mph) (see beaufort scale (<http://www.unc.edu/~rowlett/units/scales/beaufort.html>), rain, heavy fog, or at high noise levels which would prevent hearing of responses (e.g., stream noise, continuous tree drip after a rain event, machine noise, etc.). If weather conditions or noise levels are in doubt, be conservative. Consider placing call stations away from streams to reduce noise interference. Surveys 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.
- 6) Systematically survey spotted owl habitat within each Survey Area until an owl responds or if no response is heard, until the recommended number of survey visits have been completed.
 - 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 may include a daytime follow-up survey. If reasonable effort was made to cover the Survey Area in one outing, but this was not accomplished, then the remaining unsurveyed area should be surveyed as soon as possible but within 7 days for the entire Survey Area. To reduce the chance of owls moving between portions of the Survey Area and not being detected, complete the visit on consecutive days as much as possible. The entire area should be covered within 7 days in order to be considered 1 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 and drainages. Survey areas need to be small enough to be completely surveyed within the specified time period.
 - If a surveyor detects a spotted owl or unidentified *Strix* sp. (including fly-in) 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**. If a surveyor does not obtain a response during a survey, daytime follow-up would not be necessary.

In that case, the night outing alone would be considered as 1 complete visit provided all habitat within the Survey Area has been called.

- Visits must be spaced at least 10 days apart. For example, assume a visit ends on the 3rd of May. Using a proper 10 day spacing, the next possible visit date would be 14 May.
- When possible, at least 2 of the night and 1 day visits to should be conducted before 30 June; this includes at least 1 visit in May and one in June. In addition, at least 1 visit in August is recommended so as to help inform where to survey in Year 2 if spotted owls are detected in Year 1. Ideally, the survey effort should be spread out over the entire survey season. Concentrating surveys too early or late in the survey season may result in inaccurate site status determinations.
- 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 as to why night surveys could not be conducted.
- Note: while the protocol provides some flexibility to account for field conditions, it is recommended that adequacy of survey effort be discussed with local Service offices (Appendix 3).

RECORDING DATA

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

- Brief description of survey route, with accompanying topographic map of route.
- Survey start and stop time at stations (total amount of time spent calling) and total time of survey if calling between stations.
- Weather conditions (including estimated wind speed and precipitation). Note stop and restart times if weather during your survey momentarily exceeds recommended conditions.

If raptors or ravens are detected during a survey:

All sightings or responses by spotted owls, barred owls, spotted-barred owl hybrids, great horned owls, northern goshawks, or any other large raptor species and ravens should be recorded. The presence of barred owls, great horned owls, goshawks, or other large raptors and ravens may affect spotted owl responses.

Note on map and on data form (both should have survey date recorded):

- Compass bearing and approximate distance
- Sex and age if known (adult and subadult spotted owls cannot be distinguished based solely on vocals),
- Time of first response,
- Type of detection (e.g., audio, visual or both). For multiple or moving owls, map and list information and number of each response or observation. This will allow for more accurate determination of activity centers.

Estimate the bird's original and final location. One method is to triangulate on the owl's call, taking compass bearings from 2-3 road or trail locations. Make sure compass bearings are taken in as short a time-frame as possible and recorded on the survey form. Do not force the spotted owl to call again if bearings cannot be completed before the spotted owl stops calling. Simply use the best compass bearing(s) you have. The intent of the triangulation and mapping is to provide a means to find the location in a subsequent survey. Triangulation should begin soon after the first owl's response.

Once a spotted owl responds at night, discontinue calling at the station, but keep listening for the remainder of the station visit; consider listening for a few minutes beyond the 10 minutes to ascertain if other owls are present. Once the station survey is complete, continue to survey the remainder of the survey route. However, to avoid 'leading' a spotted owl through continued calling nearby, we recommend that once an owl responds, the surveyor should go to the other parts of the survey route and complete the rest of the survey visit, returning later to complete the station visits near the detection. 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 0.5 mile straight-line distance from the owl. Completing the route will provide an opportunity to detect other owls that may be present.

- If no response is heard, proceed to the next calling point. Continue until the survey area is completely covered.
- If a spotted owl (or an unidentified *Strix*) is detected during survey, return to the area during the day and conduct a follow-up visit as soon as possible (preferably within 48 hours) to verify status as needed, unless reproductive status has already been determined. Diurnal surveys can be interrupted to accomplish the follow-up immediately after the detection.

FOLLOW-UP SURVEY

- The objective of the daytime follow-up is to locate spotted owls (pairs or singles) by conducting an intensive search of spotted owl habitat, within the general vicinity (approximately a 0.5-mile radius) of the response location that prompted the follow-up. Daytime locations are very important in determining more precise management (activity) centers. All spotted owl and barred owl detections should be recorded to the Township, Range, Section, 1/4 and 1/16 as possible. Daytime follow-up surveys consist of both active calling with a digital device and visual searching.

- A review of aerial photos is suggested to assist surveyors in identifying the available habitat in which to focus a search. *Searches should start as close as possible to the owl's mapped response.* Surveys may begin from the road closest to the nighttime response area. If owls do not respond to vocalizations given from road survey stations nearest the nighttime detection, surveyors should conduct daytime stand searches throughout the 0.5 mile area around the detection. This may take several hours, depending on the terrain. *Do not conduct your follow-up entirely from the road* – spotted owls may be using a patch of habitat at a distance from the road and may not respond unless surveyors are close in proximity. Observers should watch for owls approaching without responding and other evidence of occupancy, such as pellets, whitewash, and molted feathers. Pellets, whitewash, or feathers alone may not be sufficient to document spotted owl presence or residency. Mobbing jays and other birds are also a potential indicator of spotted 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 the second part of a complete visit if a spotted owl is detected. The follow-up route must be delineated on a map and accompanying outing form and should include the start, end, and total survey time.

MINIMIZATION OF CALLING

- Do not hoot any more than is necessary; hoot only as much as needed to identify *Strix* sp. and determine status. By stimulating the spotted 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. Limit the use of calling, in particular higher stress calls, when calling near a known nest site. Soft contact whistles and squeaking like a mouse sometimes works well to have spotted owls respond.

WHEN BARRED OWLS or *STRIX* UNKNOWN SPECIES ARE DETECTED

Because barred owls now completely overlap the distribution of northern spotted owls and have reduced detection rates (response behavior) of spotted owls, it is important to properly ascertain the species of *Strix* owls detected, either visual or auditory means, during the survey. Without proper follow-up, it is not possible to conclusively identify the species. Therefore, the following follow-up approach is advised:

- Continue to call using spotted owl calls for the entire 10-minute duration.
- Wait for 5 additional minutes without playing any calls while listening and watching for owls.
- If the barred owl is in close proximity and/or aggressive to responding spotted owls discontinue calling the station, listen for 5 minutes for spotted owls, then, move beyond earshot (see page 15) to continue calling the route. This guidance applies to other owls and raptors that may be acting aggressively toward spotted owls.
- If the unidentified *Strix* owl detections cannot be identified to species by spending extra time at the station where it was originally detected, extra visits should be conducted to attempt to determine species identity. The same procedures as used to determine resident

status should be used—conduct a day-time follow-up and up to two additional night visits, if needed. Do not “guess” on the species determinations without reasonably confident visual or audio information, simply record the species as *Strix* unknown.

- If all parameters of the protocol are met and the *Strix* species detection is either attributed to a barred owl or is unable to be confirmed, it can be interpreted that there is no conclusive evidence that a spotted owl is present. These field observations need to be well documented so that it can be taken into consideration during technical assistance or consultations with the state and federal wildlife agencies.

ADDITIONAL VISITS

- If a single spotted owl responds, and after 6 complete visits and resident status has not been determined (i.e., follow-ups unsuccessful), then up to 2 additional visits may be necessary in that year. Additional visits are visits conducted beyond the number of complete visits required by the 2-year survey protocol and are conducted only in the general area of the response (a 0.5-mile radius around the detection location). 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 still require further surveys to complete annual visits.
- For additional visits, maintain the standards (timing, intervals, weather condition limitations, etc.) outlined elsewhere in this document. Additional visits can be conducted any time during the survey season after the first detection. If additional visits cannot be completed prior to the end of the survey season (August 31 or September 15, depending on location) while still maintaining intervals required between visits, they may be conducted as soon as necessary to stay within the normal survey season, or up to as late as September 30.

The additional visits are to be conducted the same year as the response.

If the last response occurs on:

visits # 1-4, no additional visits are required

visit #5, conduct 1 additional visits

visit #6, conduct 2 additional visits, beyond the regular survey season if necessary.

DETERMINING STATUS

Verify the activity center 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 (< ¼ mile apart) to each other on the same visit;

- 2) a male takes a mouse to a female (see "mousing" clarification under REPRODUCTIVE SUCCESS SURVEYS); or
- 3) a female is detected (seen or heard) on a nest; or
- 4) one or both adults are observed with young; or
- 5) young identifiable based on plumage characteristics observed late in the season by knowledgeable surveyors.

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 meets the resident single requirements.

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 survey season, with no response by an owl of the opposite sex after a complete survey; or
 - 2) three or more responses over several years (e.g., 2 responses in year 1 and 1 response in year 2) from the same general area.
- 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.

STATUS UNKNOWN is established by:

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

REPRODUCTIVE SUCCESS SURVEYS

Reproductive success surveys are usually conducted to determine if breeding season restrictions will be applied to activities so as to avoid and/or minimize noise-disturbance and protect owl reproduction in a given year.

The following is the recommended protocol for determining reproductive status of spotted owls. Reproduction surveys may provide information on nest tree locations which provide the most accurate management (activity) center locations.

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

1) NESTING STATUS SURVEYS

- 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.
- Spread the surveys throughout the months of April and May. Avoid collecting all nesting status surveys early in the breeding season.
- 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. Also, do not cause owls to unnecessarily become more habituated to humans by using more mice than necessary.

MOUSING

- Locate 1 or both members of a pair during the day and offer to them mice or other small prey items.
- 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) along with the sex of the owl that captured the prey. The fate of the prey is used to classify nesting status.
- 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.
- 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.

A) Nesting Success

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 identifiable as spotted owls or young detected in the presence of 1 or both adults.

B) 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 (April-June 1), with at least 3 weeks separating these observations to ensure that late nesting attempts are not missed. The second observation should occur after 1 May. 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) prey is offered to 1 or both members of the pair and they cache the prey, sit with prey for an extended period of time (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. Some spotted owls may be reluctant to take prey at all; therefore, nesting status

should be determined by other means. If in doubt, be sure to schedule 1 or more visits in mid-June to check for fledglings.

C) Nesting Status Unknown

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

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

2. 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 from late May to late June depending on latitude or elevation.

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.

- 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.
- 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 3 days, 0 young are recorded.

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

- On the first reproductive success visit, count the number of fledged young seen or heard.
- Conduct a minimum of 1 additional 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.
- 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.
- 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.

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Appendix 1. General chronology for conducting the 2010 Northern Spotted Owl Survey Protocol.

- 1) Are you planning to forest management activities that may remove or modify spotted owl habitat or create disturbances such that breeding activities may be affected?

No? No surveys needed.

Yes? Go to 2.

- 2) Map the location of these PROJECT AREAS (page 6). These areas include the footprint of the project and a 0.25 mile buffer around the project. See Glossary of Terms (Appendix 2) for more information.
- 3) Delineate appropriate provincial size SURVEY AREA (pages 5 and 6) around the footprint of the PROJECT AREA. This forms the perimeter of area to survey. However, for some disturbance only related activities, please defer to local agreements and methods for determining the amount of area around these projects.
- 4) Determine HABITAT TO SURVEY (nesting, roosting and foraging (NRF)) (pages 6 and 7) within the SURVEY AREA; the habitat should be represented spatially on a map. Surveys will focus on NRF habitat (not dispersal only type habitat). Technical assistance for developing survey routes or figuring out habitat to survey may be available through your local Service office (Appendix 3).
 - Use topographic maps and field reconnaissance to layout call stations and routes following the recommended SURVEY PROCEDURES (pages 11, 12 and 13). Where feasible, call stations should be located away from noise sources such as streams to reduce noise interference when calling and listening. Again, the goal is to obtain COMPLETE COVERAGE (pages 7 and 8) of NRF habitat within the SURVEY AREA.
- 5) Acquire the recommended survey equipment (Appendix 6) and electronic calling devices (pages). The calling device should have the appropriate spotted owl calls and a library of other owl and raptor species calls. This library will help make species determinations of unknown detections while in the field or back in the office.
- 6) Data forms specific to the agency or organization should accompany the surveyor to the field and SHOULD be completed in the field during and immediately after survey. A Service provided data form is also attached to the 2010 Protocol (Appendix 7). The Service encourages voluntary completion of this form, if the surveyor's data form does not already include the information. This information will be used to map spotted owl and barred owl locations and record species interactions. The Service will request this data electronically, will analyze and use it to update the protocol in 2011.

- 7) Surveys should be conducted during the SURVEY PERIOD (page 7) from March 1 – August 31, unless biological information and exceptions determine otherwise (Page 7). Appendix 4 provides an overview of spotted owl breeding chronology.
- Do not survey under inclement weather conditions (page 13); when in doubt be conservative and do not survey. Surveys conducted under marginal conditions will reduce the quality of the survey effort.
 - Conduct nighttime surveys between apparent sunset and sunrise (page 13). However, calling can occur within 30 minutes of sunset. Vary the start times and sections of call routes each time out. Minutes per call station is provided below (#9).
- 8) To begin surveys within the SURVEY AREA, first survey the spotted owl site(s) (page 10) using at least 1 daytime stand search within a 0.5 mile radius of the site center(s). Daytime stand searches need to start at the site center with the goal of finding auditory and visual signs of spotted owl presence within this radius. Broadcast calling will be at a lower volume than nighttime calling and spotted owl female contact whistles and 4-note calls of both sexes will be the primary calls used. Keep your eyes to the forest canopy to watch for spotted owls flying in without responding; look for signs of feathers, pellets and whitewash as well. Investigate mobbing behavior of jays or other birds because they often mob roosting spotted owls.
- If a spotted owl responds, immediately record time, sex and direction of response from your location. Then, rapidly move to the responding owl to obtain a visual location (record this location as well) and begin procedures of determining STATUS (starting on page 17). If a spotted owl no longer responds during your pursuit, stop moving, continue to listen and look to the canopy for spotted or barred owls flying-in. Call every few minutes to solicit a response. After 5-10 minutes in this position, renew your calling and searching in the direction of the responding owl. Search the possible response area until you believe you have sufficiently covered the area with a visual search. After this, continue searching and surveying the radius until complete.
 - If a barred owl responds during this daytime site survey, immediately record time, sex and direction of response. Discontinue calling and move toward the direction of the responding owl; look for owls flying in. Try to obtain a visual on the responding owl and to see if other owls are in the vicinity. Once the response area is sufficiently covered with a visual search, renew the daytime stand search with calling and searching.
 - If both spotted owls and barred owls respond, move to the spotted owl location and try to determine STATUS (#16). However, do not stimulate the spotted owls any more than necessary to avoid aggressive encounters between the two. You may have to return to the site another day to determine STATUS and hopefully avoid barred owls the next time.
 - If the STATUS of the site is determined on your initial visit or you have evidence that supports you having a good idea of what the STATUS may be, buffer the site by a 0.5 radius; surveys are no longer needed within this area. You may need to return however,

to the areas of visual observations, to complete determination of STATUS. Also, you may need to have a wider search pattern in subsequent STATUS visits if you are not locating the owls where they previously were.

- 9) Outside of the 0.5 mile site radius, conduct nighttime calling per the predetermined routes and stations until complete coverage of habitat within the SURVEY AREA has occurred. This complete nighttime coverage along with the daytime stand search of the site, counts as 1 complete visit.
 - At least 10 minutes calling per station is recommended. Discontinue calling once a spotted owl responds. This will lessen the potential of the owl being lured away from a perch site making it more vulnerable and endangering the spotted owl. Allow the spotted owl to respond for the remainder of the 10 minutes until or until you have determined if there is more than 1 spotted owl. Please see the RECORDING DATA (pages 14 and 15) for recommendations on recording data and triangulation procedure. Prompt triangulation should occur soon after the first owl starts responding.
 - Once a spotted owl responds at night, discontinue calling at the station, but keep listening for the remainder of the station visit; consider listening for a few minutes beyond the 10 minutes to ascertain if other owls are present. Once the station survey is complete, continue to survey the remainder of the survey route. However, to avoid 'leading' a spotted owl through continued calling nearby, we recommend that once an owl responds, the surveyor should go to the other parts of the survey route and complete the rest of the survey visit, returning later to complete the station visits near the detection. 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 0.5 mile straight-line distance from the owl. Completing the route will provide an opportunity to detect other owls that may be present.
 - If no response is heard, proceed to the next calling point. Continue until the survey area is completely covered.
- 10) If a spotted owl is detected during the nighttime survey, conduct FOLLOW-UP SURVEYS (pages 15 and 16) as necessary. The goal of the FOLLOW-UP SURVEYS is to determine STATUS as needed.
- 11) Does the SURVEY AREA contain spotted owl site centers AND PROJECT AREAS with proposed habitat removal (see HABITAT REMOVAL definition in Glossary of Terms Appendix 2)

No? No daytime stand searches and spot check surveys needed. See 15 below

Yes? Go to 12

12) DAYTIME STAND SEARCHES

Objective: To search habitats most likely to contain roosting or nesting spotted owls.

A daytime stand search each year should cover spotted owl habitat within the PROJECT AREA; this survey should be conducted in June. It may take more than day to completely cover the suitable habitat. However, to complete this visit, nighttime surveys should be conducted throughout the remainder of the SURVEY AREA which is counted toward the visit total. For these searches, follow guidance for surveying spotted owl sites above (#8).

13) For all visits under this protocol, they must be spaced at least 10 days apart (page 13).

- When possible, at least 2 of the night and 1 day visits to should be conducted before 30 June; this includes at least 1 visit in May and one in June. In addition, at least 1 visit in August is recommended. Ideally, the survey effort should be spread out over the entire survey season (pages 13 and 14).

14) SPOT CHECK

Objective: Spot check surveys supplement 2 year complete surveys (page 9 and 10). Spot check surveys consist of 3 nighttime surveys (per nighttime calling routes) covering spotted owl habitat within the PROJECT AREA.

15) COMPLETE SURVEY (pages 8, 9 and 13)

If a 2-year survey is completed using the 2010 Survey Protocol, and no responses are obtained, activities in project areas may be implemented pending the results of spot check surveys, see below.

Example:

Year 1 (March - Sept.)	6 visits (6 nighttime and 1 daytime visit) with no response
Year 2 (March - Sept.)	6 visits (6 nighttime and 1 daytime visit) with no response
Year 3	Temporarily stop felling operations by March 15, unless nest initiation occurs earlier for your area then stop for that date, and conduct "spot check" surveys at least 5 days apart within Project Area.
Year 4	Temporarily stop felling operations by March 15, unless nest initiation occurs earlier for your area then stop for that date, and conduct "spot check" surveys at least 5 days apart within Project Area.
Year 5	Begin again per Year 1. For ongoing, consulted on projects, consider checking with your Service office to determine appropriateness of full survey vs spot check surveys starting in Year 5.

16) OCCUPANCY STATUS – determined March 15 through August 31(pages 17 and 18).

Categorized as one of the following:

- Pair
- Pair Status Unknown
- Resident Single
- Status Unknown

17) REPRODUCTIVE STATUS – conducted to determine if breeding season restrictions will be applied to activities and/or to minimize noise-disturbance and protect spotted owl reproduction in a given year (pages 18, 19, 20, and 21).

- Nesting Status Surveys: conduct April 1 – June 1 using mousing procedures
- Reproductive Success Surveys: starting in late May using mousing procedures.

18) REPORTING OF INFORMATION (page 5)

The Service **strongly recommends** that entities conducting spotted owl surveys provide frequent updates of new data to the state agency or spotted owl database holder responsible for evaluating forest practice applications. When possible, spotted owl response data should be shared with these agencies without delay, as the information may inform evaluation of pending forest practices.

Appendix 2. Glossary of terms used in the 2010 Northern Spotted Owl Survey Protocol.

Activity Center – Interchangeable term with ‘known and/or historic site center’. This area represents the area surrounding concentrations of ‘the best of’ detections such as nest stands, stands used by roosting pairs or territorial singles, or areas of concentrated nighttime detections.

Adult: A northern spotted owl ≥ 2 years old.

Breeding Season: The time period from 1 March through 31 August that includes courtships, nesting, nestling and fledgling dependency periods. This is the period of time in which surveys should be conducted. This time period may vary by geographic locale.

Calling Route: An established route within a survey area where recorded calls of northern spotted owls are used to elicit a response.

Calling Stations: Point locations used to conduct surveys, distributed throughout an area so as to attain complete coverage of the survey area.

Complete Coverage: Complete coverage is obtained when the calling stations have been located within a survey area so that a northern spotted owl anywhere in the survey area would be able to hear surveyors and vice-versa.

Complete Visit: A complete visit is when all calling stations or calling routes within a survey area have been called with the seven day period, including daytime follow-up surveys for all spotted owl responses. If every reasonable effort has been made to cover the survey area in one outing but this was not accomplished, then additional surveys will be scheduled to cover the remaining area. The entire survey area must be covered within seven consecutive days in order to be considered a complete visit. Although adverse weather conditions may present problems, an effort should be made to complete survey visits on consecutive days. If the survey area is too large to be completely surveyed in seven days, it may be divided into smaller areas based on available habitat, topography, drainages, etc.

Complete Survey: complete coverage of suitable habitat throughout the survey area that finishes the required number of visits.

Daytime Stand Searches: *The objective is to search habitats most likely to contain roosting or nesting spotted owls.* A daytime stand search should cover spotted owl habitat within the Project Area. To complete this visit, however, nighttime surveys should be conducted throughout the remainder of the survey area, which is counted toward the visit total.

Follow-up Survey: The objective of the daytime follow-up is to locate spotted owls (pairs or singles) by conducting an intensive search of spotted owl habitat, within the general vicinity (approximately a 0.5-mile radius) of the response location -that prompted the follow-up. A review of aerial photos is suggested to assist surveyors in identifying the available habitat in which to focus a search. *Searches should start as close as possible to the owl's mapped location.* Surveys may begin from the road closest to the nighttime response area. If owls do not respond

to vocalizations given from road survey stations nearest the nighttime detection, surveyors should conduct daytime stand searches throughout the 0.5 mile area around the detection. 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 the second part of a complete visit if a spotted owl is detected. The follow-up route must be delineated on a map and accompanying outing form and should include the start, end, and total survey time.

Habitat Removal: Removal is defined here as activities that alter the function of habitat to remain as nesting habitat, roosting habitat or foraging habitat for spotted owls. These activities typically include regeneration harvest, heavy thinning and other silvicultural activities that reduce the canopy cover and other elements of spotted owl habitat at the stand-level, post-harvest, that it no longer has similar function to its pre-harvest condition. Wildlife biologists with the appropriate federal and state agencies may be able to provide technical assistance assessing these types of activities.

Home Range: the area annually traversed by spotted owls that provide important habitat elements for breeding, feeding, and sheltering.

Juvenile: A northern spotted owl is considered as juvenile age class in the first 5 months after hatching. Juveniles 1 to 3 months old are very white with downy plumage over all of the body or evident on breast and head; at 4 to 5 months old, juvenile begin losing downy plumage.

Known Site - Interchangeable term with 'activity center'. This area represents the area surrounding concentrations of 'the best of' detections such as nest stands, stands used by roosting pairs or territorial singles, or areas of concentrated nighttime detections.

Known Site Surveys: Stand searches of any known or historic sites centers that are within the survey area perimeter. These should be accomplished prior to initiating nighttime surveys. Daytime stand searches are important because spotted owls commonly utilize the same, or nearby nest and roost stands year after year and searching the site center should increase the likelihood of detecting a spotted owl.

Mousing: Mousing describes the act of offering prey items to spotted owls. The purpose of mousing spotted owls is to determine pair status and/or reproductive status. A male spotted owl may take a prey item to an unseen female, likewise, adult owls may take prey items to unseen young.

Nest: Northern spotted owls use broken-topped trees, old raptor nests, witches brooms, cliff ledges, mistletoe brooms, and tree cavities for nests. A spotted owl must be observed using the structure or have mice taken to a nesting female positively identified in the structure to designate a nest tree.

Nest Stand: An area of vegetation that contains a northern spotted owl nest, and which is homogeneous in terms of tree size, forest structure and species composition.

Nestling: A young owl that is still in the nest.

Northern Spotted Owl: one (*Strix occidentalis caruina*) of three subspecies of spotted owl that ranges from southern British Columbia, Canada, through western Washington and Oregon, and into northwestern California. Listed as a threatened species by the U.S. Fish and Wildlife Service.

Physiographic Province: a geographic area having a similar set of biophysical characteristics and processes because of the effects of climate and geology that result in patterns of soils and broad-scale plant communities. Habitat patterns, wildlife distributions, and historical land use patterns may differ significantly from adjacent provinces.

Project Area: For the purposes of this protocol, a project area is generally the polygon that forms the 0.25 mile perimeter from the footprint of the proposed project. Projects involve alternation of spotted owl habitat, typically through regeneration harvest or heavy thinning. Project areas may also include disturbance related activities associated with roads, burning etc. While the 2010 Protocol can be used to survey these types of activities, many existing methods adopted through Federal Level 1 Team processes and other similar agreements such as limited operating periods, etc, are encouraged.

Roost: Typically a tree used by a spotted owl for extended daytime rest periods. A roost site consists of the roost itself and the immediate vicinity. Roost areas are identified by observations of spotted owls, and/or the presence of pellets, white-wash and other evidence.

Spot Check Surveys: Conducted in years 3 and 4 and consists of 3 nighttime surveys covering spotted owl habitat within a 0.25 mile radius of the project area.

Spotted Owl Habitat: For purposes of surveying, spotted owl habitat is any habitat (i.e., nesting, roosting or foraging quality) where you may expect to elicit a response from a resident owl or pair of owls. This does not include younger stands typically characterized as spotted owl dispersal habitat. Descriptions of spotted owl habitat for the various areas may be available from state wildlife and forestry agencies, or through technical assistance with local Service Field Offices (Appendix 3). Habitat descriptions can also be found in these references: Thomas et al. 1990, Courtney et al. 2004, USDI Northern Spotted Owl Recovery Plan 2008. Regulatory definitions should be used where appropriate (e.g., definitions embedded within state forest practices regulations).

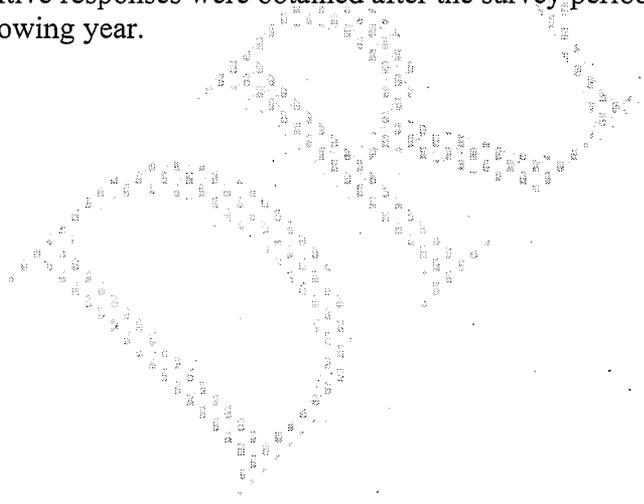
Subadult: A spotted owl in the first or second years of life. Identified by characteristic tail feathers with white tips tapering to sharp points (i.e., triangular shape). For more information on identifying subadult spotted owls, please see Moen et. al. 1991.

Survey Area: to the maximum extent possible, all suitable spotted owl habitat within the specified spotted owl provincial home range radius from the perimeter of the proposed project area should be surveyed. These same radii apply when surveying known spotted owl sites. The provincial radii are as follows:

Olympic Peninsula	=	2.7 miles
Washington Cascades	=	1.8 miles
Oregon Coast Ranges	=	1.5 miles

Klamath Province = 1.3 miles
Oregon Cascades = 1.2 miles
California Cascades = 1.3 miles
California Coast Range: to be determined by appropriate state and federal wildlife agencies in California.

Survey Period: All surveys of proposed project areas must take place between March 1 and August 31, with some exceptions. The initiation of surveys should coincide with the time period that spotted owls are defending established territories. The survey start date of March 1 is recognized for only those areas (e.g., Oregon and California Coast Ranges) where there is biological information (e.g., published or unpublished reports for the specific area) that spotted owls are defending established territories. In most areas, territorial defense doesn't occur until after March 15th with April 1 the generally accepted start date for survey initiation. Conversely, survey initiation may be delayed (e.g., due to snow conditions) until late April but can be extended to later in the season, such as September 15 for the Washington Cascades where survey information has shown that spotted owls return to their established territories later and defend their territory well into September (D. Herter pers. comm. and unpublished data October 2009, R. Pearson pers. comm. and unpublished data November 2009). Please see Appendix 4 for generalized spotted owl breeding chronology. Positive responses outside these survey periods may still be valid, but will require evaluation of the data to determine if locations represent core use areas. Surveys outside these dates do not count towards the number of visits required for completing the year's survey without seeking concurrence from the Service. In areas where positive responses were obtained after the survey period, stand searches should be conducted the following year.



Appendix 3. U.S. Fish and Wildlife Service Office Contact Information.

U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825-1846. Telephone: 916-414-6000.

U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, 1655 Heindon Road, Arcata, CA 95521-5582. Telephone: 707-822-7201.

U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, 10950 Tyler Road, Red Bluff, CA 96080. Telephone: 530-527-3043.

U.S. Fish and Wildlife Service, Yreka Fish and Wildlife Office, 1829 South Oregon Street, Yreka, CA 96097. Telephone: 530-842-5763.

U.S. Fish and Wildlife Service, Roseburg Field Office, 2900 NW Stewart Parkway, Roseburg, OR 97471. Telephone: 541-957-3470.

U.S. Fish and Wildlife Service, Bend Field Office, 20310 Empire Avenue, Suite A100, Bend, OR 97701. Telephone: 541-383-7146.

U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office, 2600 SE 98th Avenue, Suite 100, Portland, OR 97266. Telephone: 503-231-6179.

U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, 510 Desmond Drive, SE, Suite 102, Lacey, WA 98503. Telephone: 360-753-9440.

U.S. Fish and Wildlife Service, Central Washington Field Office, 215 Melody Lane, Suite 119, Wenatchee, WA 98801. Telephone: 509-665-3508.

Appendix 4. Generalized chronology of the breeding season of the northern spotted owl.

Prelying												
Laying												
Incubation												
Nestling												
Fledgling												
Initial dispersal												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Prelying Stage (duration variable)

Beginning about a week before laying, the female spends most of her time near the nest. Because the prelying stage has no clearly definable beginning, we have arbitrarily designated the first several weeks prior to laying of the first age as the prelying stage.

Laying Stage (1-6 days; Forsman et al. 1984)

When egg laying begins, the female spotted owl typically spends almost all of her time in the nest, her mate provides nearly all of her food. Copulation continues on a daily basis throughout the egg-laying stage and for up to about 4 days after incubation begins.

Incubation Stage (30 plus or minus 2 day; Forsman et al. 1984)

Incubation begins shortly after laying of the first egg and is done solely by the female, who may leave the nest at night for up to 2 hours during the first couple of days of incubation. Thereafter, she only occasionally leaves the nest for periods of 10 to 20 minutes at night to regurgitate pellets, defecate, preen, or accept food from her mate.

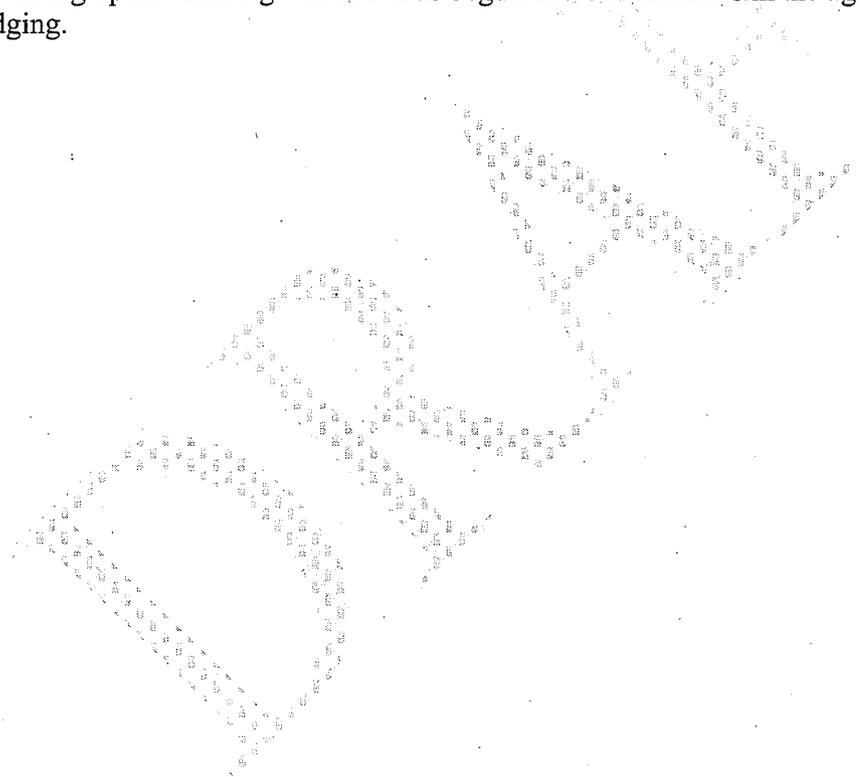
Nestling Stage (normally 34-36 days; Forsman et al. 1984)

The female broods the new hatchlings almost continuously for 8-10 days, still depending on her mate to provide food for herself, and now for the young. By the time her young are 2-3 weeks old, the female begins to forage for increasingly longer periods at night, typically 1-4 hours. The male continues to bring food to the nest, but the female passes the food to the young.

Most young observed by Forsman et al. (1984) fledged (left the nest) when 34-36 days old, occasionally moving off the nest to perch on nearby limbs for a few days before leaving the nest permanently. Occasionally young leave their nest earlier than normal. Because such young are less developed physically, they may spend more time on the ground than young that remain in the nest for the full nestling period. This may increase their mortality rate compared to that of later-fledged young.

Fledgling Stage (80-120 days; Forsman et al. 1984)

The fledgling stage covers the period after the young leave the nest until they become independent of their parents. Within about 3 days after fledging (assuming a normal nestling period of 34-36 days), most young can flutter or climb to elevated perches; usually in a week they can fly clumsily between trees. Within about 3 weeks after fledging, they can hold and tear meat from prey brought by their parents. Both parents regularly bring food to the fledgling and generally continue to do so until mid- to late September, apparently regardless of the age or capabilities of the young. Because of this, the fledgling stage may be relatively long or short, depending upon when a given nest was begun and on variations in the age of the young at fledging.



Appendix 5. Recommended credentials and qualifications for Crew Leaders and Surveyors.

**RECOMMENDATIONS FOR SPOTTED OWL SURVEYORS
CREDENTIALS and QUALIFICATIONS**

Surveyor qualifications are provided as recommendations for evaluation of personnel that are proposed to be involved in spotted owl surveys. These recommendations are advisory.

Crew Leader:

Responsibilities: Supervises survey crew, data collection, prepares basic data summary, and coordinates with other surveyors. Additional responsibilities include supervision of: 1) survey route layout, and 2) determination of area coverage requirements.

Minimum requirements:

- Normal hearing abilities are requisite. A crew leader must be able to hear the owl(s) if they were calling (a hearing test is advised); AND
- One year (one field season) of spotted owl survey experience, plus training in spotted owl survey techniques, including identifying the various calls of northern spotted owls, barred owls, and NSO-barred owl hybrids as attested to by letters of reference;
- OR-
- Two years (two field seasons) of spotted owl calling surveys.

Owl Caller or Surveyor:

Responsibilities: conducts owl surveys and collects data.

Minimum requirements:

- Normal hearing abilities are requisite (a hearing test is advised). An owl caller must be able to hear the owl(s) if they were calling; AND
- Training in spotted owl survey techniques, including identifying the various calls of northern spotted owls, barred owls, and NSO-barred owl hybrids as attested to by letters of reference;
- OR-
- One year (one field season) of spotted owl survey experience.

Both Crew Leader and Owl Surveyor must have the physical ability to work in mountainous terrain and willingness to work during nighttime conditions. In some cases, Crews Leads and Surveyors may be asked to conduct both day and nighttime work.

Orienting skills, including the use of map and compass is essential.

Surveyor safety should be of primary importance.

Appendix 6. Suggested but necessary equipment to conduct surveys

- 1) Digital caller. An example of this would be an MP3 player and a chip containing the spotted owl calls identified for use in this protocol (page XX).
- 2) Call recordings of other owl species. This would include the range of barred owl calls along with other owl species from the Pacific Northwest. Surveyors should become familiar with the vocalizations of all of the owls they might hear. Part of this familiarization is to distinguish the difference between spotted owl and barred owl female contact calls or whistles. Identification of unknown calls should be attempted to in the field with the recorded calls on hand.
- 3) Binoculars. Many times, spotted and barred owls fly in to surveyors and will not vocalize. The potential of identification increases with the use of binoculars with sufficient magnification.
- 4) Lighting. Have a good flashlight to help with spotlighting and identification of individuals at night. Owls may perch for only a short time and having this lighting available will increase your chances of positive identification and save on subsequent survey effort. Have a good headlamp to assist with getting around.

