Enclosure 1. 2011 NSO Survey Protocol – 2012 Revision

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

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U.S. Fish and Wildlife Service

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Table of Contents

Content **Page**

List of Tables

List of Figures

PROTOCOL FOR SURVEYING PROPOSED MANAGEMENT ACTIVITIES THAT MAY IMPACT NORTHERN SPOTTED OWLS
(2011 Protocol)

1.0 INTRODUCTION

The U.S. Fish and Wildlife Service (Service) developed this 2011 NSO Survey Protocol (2011 Protocol) to promote consistent and scientifically rigorous procedures to survey for northern spotted owls (*Strix occidentalis caurina*; spotted owl) in areas where management activities may remove or modify spotted owl nesting, roosting or foraging habitat (excluding areas defined as dispersal habitat). This protocol should also be applied to activities that disrupt essential breeding activities and to activities that may injure or otherwise harm spotted owl other than through habitat modification (e.g., noise disturbance, smoke from prescribed fire). This 2011 version of the survey protocol builds upon the 1992 Protocol and incorporates changes made to the Draft 2010 Protocol.

In recent years, research on spotted owls provided insights that raised 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*), an aggressive and potentially significant 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 insufficient information about spotted owl presence in the survey area, and lead to forest management activities that may impact spotted owls and be in conflict with the Endangered Species Act.

To address this concern, the Service and cooperators (see list below) conducted analyses of historical survey data during 2009 and 2010, leading to estimates of detection rates for spotted owls that account for the effects of barred owl presence. Information utilized to generate the detection rates came from long-term spotted owl demography studies (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 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 spotted owl site occupancy (Olson et al. 2005, Dugger et al. 2009, Kroll et al. 2010a), were utilized in developing this protocol. These analyses provided strong evidence that the 2-year, 3-visits-per-year requirement, as described in the 1992 protocol, was no longer sufficient to provide a reasonable likelihood of detecting territorial spotted owls where barred owls occur. Lastly, to improve the efficiency and practicality of this protocol, the professional opinion of researchers, survey practitioners, and regulators were integrated into this product.

Use of the 2011 Protocol should serve two primary purposes: (1) provide a methodology that results in adequate coverage and assessment of an 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. While this protocol utilizes the best available information for conducting project-level surveys, the protocol is not designed to monitor yearly trends of spotted owls or for many other research applications.

This protocol should be implemented across the northern spotted owl's range. However, in some areas local conditions, particularly when supported by appropriate data, may warrant deviations from this protocol. These deviations may occur through mutual cooperation between the landowner or their representative and the appropriate regulatory agency. Spotted owl surveys that are conducted as part of demographic long-term monitoring programs (see areas described in Forsman et al. 2011) can be considered reasonable alternatives to implementation of this protocol.

This document describes the methodology for surveying for spotted owls. It is the Service's expectation that practitioners should read and fully understand the details of the 2011 Protocol as described herein. The development of the Protocol has benefitted from data analysis, input, and reviews by the interagency Barred Owl Work Group (organizations listed below), established pursuant to 16 U.S.C. 1533(f)(2) to assist in implementing recovery plan actions.

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

2.0 COORDINATION AND SHARING OF INFORMATION

Spotted owl survey crews, consultants, and their clients are strongly encouraged to coordinate with others doing similar surveys in nearby areas, during all phases of the survey effort. Appropriate coordination involves:

- pre-season planning, including coordination of commitments by adjacent land managers on the areas to be surveyed by each party in the event that multiple parties are working in the same landscape; this limits unnecessary calling of owls and is a cost-savings for landowners;

- immediate communication of results, positive or negative, that may affect other land managers or regulatory actions; and
- exchange of post-survey season information summaries.

Common inefficiencies, such as overlapping or excessive known spotted owl site 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 enhance coordination efforts, the Service, through its local field offices, will participate in and, if needed, initiate pre-survey coordination meetings. The purpose of the meetings will be to:

- allow representatives from land management agencies and organizations conducting surveys to share information on the approximate extent of planned survey areas,
- look for ways to reduce potential survey overlap to avoid and minimize harassment of spotted owls,
- discuss opportunities for sharing information throughout the field season,
- provide discussion opportunities related to implementation of the survey protocol, and
- share information on techniques used in surveying spotted owls that will enhance the likelihood of obtaining responses.

The Service *strongly recommends* entities or their representatives conducting spotted owl surveys attend these coordination meetings. Local meeting coordinators should distribute information related to these meetings prior to the breeding season to federal, state, tribal and private landowner organizations. The Service also recommends that both federal and non-federal entities conducting spotted owl surveys provide frequent updates of new data to the state and federal agencies responsible for maintaining spotted owl databases as the information informs evaluation of potential impacts to spotted owls from forest management practices. In addition, the Service recommends that barred owl data also be reported to appropriate state and federal database managers.

3.0 ESTABLISHING THE AREA TO BE SURVEYED

Prior to doing any field survey, the appropriate area to be surveyed should be identified from maps, aerial photos, GIS, or other resources.

3.1 Identifying the Project Area

The first step in conducting surveys for spotted owls is to identify the *PROJECT AREA*[1]. This area includes all lands delineated for the proposed project that may be subject to activities potentially impacting spotted owls through habitat modification, direct injury, noise disturbance, or any other means. For the purposes of this protocol, the project area is the polygon (or multiple polygons) that forms the footprint of the proposed project. Examples of project areas include timber harvest units, prescribed fire areas, disposal sites, road rights-of-way, etc. (Figure 1.).

3.2 Delineating the Survey Area

Once the project area is determined, the *SURVEY AREA* can be established and mapped. The survey area is defined as the area extending one provincial median annual home range radius from the perimeter of the project area for projects that will remove or modify nesting, roosting, or foraging habitat (see Section 9.0 for guidelines for disturbance-only projects). Table 1 indicates appropriate home range radii to use for projects within each physiographic Province. Figure 1 provides a hypothetical example of a survey area established around a multi-unit project area, based on a provincial home range radius area established surrounding the multiple project units.

Table 1. Provincial survey radius to apply when determining the survey area around proposed projects that may impact northern spotted owls, by Physiographic Province[2].

Physiographic Province	Provincial Survey Radius (mi.)
Olympic Peninsula	2.7
Washington Cascades	1.8
Oregon Coast Ranges	1.5
Oregon Klamath	1.3
Oregon Cascades	1.2
California Klamath	1.3
California Cascades	1.3
California Coast Range (Douglas-fir/mixed conifer zone	1.3
California Coast Range (redwood zone)[3]	0.7

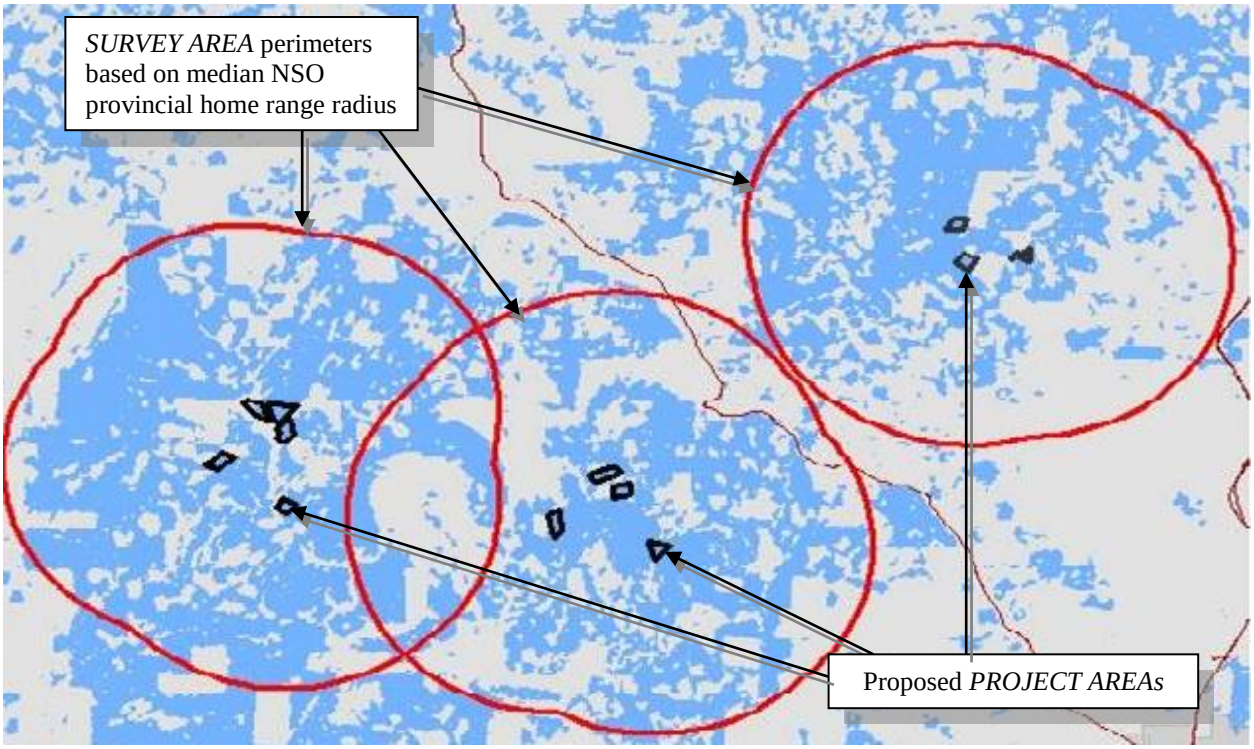
3.3 Habitat to Survey

For the purposes of this protocol, the *HABITAT TO SURVEY* includes any habitat within the survey area where protocol surveys may elicit a response from a resident owl or pair of owls (i.e., nesting, roosting, or foraging habitat). The survey effort need not include stands typically characterized as spotted owl dispersal habitat that does not normally function as nesting, roosting, or foraging habitat for territorial spotted owls. Descriptions of spotted owl habitat specific to various regions may be available from state wildlife or forestry agencies, or

[1] Terms specific to this document appear in *ITALIC CAPITALS* in their first use, and are defined in the Glossary of Terms (Appendix 1). These terms appear in normal font in subsequent use in this document.
[2] Appendix 7 provides a map of the Physiographic Provinces.
[3] The Arcata Fish and Wildlife Office will provide further guidance delineating the "redwood zone"

local Service Field Offices[4]. Habitat descriptions can also be found in these references: Thomas et al. 1990, Courtney et al. 2004, USDI Draft Revised 2010 Northern Spotted Owl Recovery Plan. Regulatory definitions may be of use where appropriate (e.g., definitions within state forest practices regulations; however, recognize that in some areas the Service does not support definitions of habitat used in current state forest practice regulations.) Surveyors should seek out this information from the appropriate regulatory agency prior to implementing surveys.

Figure 1. Hypothetical landscape with spotted owl habitat (darker color) and proposed project areas (project footprint) with the provincial median survey radius indicated by the three larger circular polygons.



4.0 SURVEY PERIOD

The *SURVEY PERIOD* is the time during which survey visits should occur to be counted toward meeting criteria for complete surveys (defined fully in section 11.0). For purposes of this protocol, the following survey periods are prescribed:

1. The *general* survey period throughout the range of the northern spotted owl is specified as March 15 through August 31. Forsman et al. (1984) indicate that courtship behavior

[4] Appendix 2 provides contact information for Fish and Wildlife Service Field Offices within the range of the northern spotted owl.

usually begins in February or March, with the timing of nesting and fledging varying upon elevation and latitude. April 1 coincides with incubation in most areas (exceptions addressed below). Appendix 3 provides a generalized spotted owl breeding chronology.

2. In the Oregon and California Coast Ranges, local information suggests that spotted owls defend established territories as early as March 1. Therefore, in the Oregon Coast Range Province and California Coast Range Province, the survey period can be initiated on March 1, and survey conducted at that time (and otherwise consistent with this protocol) may be counted toward a complete survey. Please recognize that determinations for nesting and non-nesting status are to be conducted during specific periods of the survey season (Section 17.0). To maximize efficiency, occupancy and nesting status surveys should coincide.

3. Specific to the western Washington Cascades, the fledgling period can extend to September 15. Here, local 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). Therefore, within the Western Washington Cascades Province, surveys may continue as late as September 15 and count toward meeting a complete survey.

There may be cases where positive responses occur outside the above survey periods. These responses may provide important information, but will require closer evaluation to determine if the responses represent core use areas. Surveys outside the above dates do not count towards the number of visits required for completing the year's survey without seeking concurrence from the Service.

5.0 GENERAL SURVEY DESIGN

The intent of any survey is to obtain complete coverage of spotted owl habitat within the survey area, and in a manner in which spotted owls will be able to hear the surveyor and the surveyor will be able to hear responding owl vocalizations.

5.1 Calling Routes

Establish calling stations and survey routes to achieve complete coverage of all habitat within 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; stations are typically spaced between 0.25 and 0.5 mile apart. Surveyors should take advantage of prominent points within the survey area when establishing calling stations. Use of prominent points should not be at the cost of not being able to hear distant responding owls. Tips on placing call stations to maximize acoustical coverage can be found on the Service's website (http://www.fws.gov/species/nso).

5.2 Known Spotted Owl Sites

Where *KNOWN SPOTTED OWL SITES* exist within the survey area, surveys should be initiated at the *ACTIVITY CENTER* (see section 8.0). Once the occupancy and/or

reproductive status (per your management need) for the year is determined, spotted owl habitat within a 0.5 mile radius of the site center can be excluded from further surveying for the remainder of the season. Adjustments beyond the 0.5 mile area can be made to avoid unnecessary or excessive calling of spotted owls depending on topography. Rationale for this type of exception should be provided on field survey forms.

5.3 Survey Procedures

Both nighttime and daytime surveys are recommended. Research data indicate 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 are also an effective way for locating spotted owls. Thus, this protocol advises the use of both under certain situations, as described in "Daytime Stand Searches" (see section 13.0) below. Three types of surveys are accepted: spot calling, continuous walking and 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.

5.3.1 Nighttime Spot Calling

Set up a series of fixed calling points approximately 0.25 to 0.5 mile apart or as needed to account for local acoustical conditions, along 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, road landings situated above 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.

5.3.2 Continuous Walking Surveys

Continuous walking surveys occur during the night or day and are utilized when nighttime spot calling 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.

5.3.3 Leapfrog Surveys (Nighttime)

If two people are involved, you may use a leapfrog method along roads (see Forsman 1983).

5.4 Survey Components

Regardless of the procedures used above, implementation of the following components will meet the objectives of the protocol.

5.4.1 Qualifications of Crew Leaders and Surveyors

Information regarding the qualifications, training, and experience of surveyors and crew leaders is presented in Appendix 4.

5.4.2 Digital Wildlife Callers

As of 2011, the Service advises use of high quality digital callers with well recorded spotted owl calls, and **strongly discourages** human mimicking of spotted owls calls. Increasing evidence suggests that use of human mimicking calls has a lower response rate than do quality digital devices, resulting in territorial spotted owls not being detected despite a complete protocol survey. The use of the digital caller ensures more consistent and equitable calling methods. The amplified sound generally should be about as loud as a spotted owl, but must be audible to the distance of 0.25 – 0.5 mile depending on topography. While playing calls and listening for a response, surveyors must be stationed outside their vehicle. In areas of high densities of spotted owls (e.g., California coastal areas), over-amplification may confound survey results by eliciting simultaneous responses from spotted owls representing multiple territories.

1. ***Digital Callers.*** As policy, the Service cannot recommend or endorse a specific company or device for digital callers. Surveyors are encouraged to use digital callers with quality speakers and digital recordings of high fidelity, as these devices and recordings are more likely to elicit a spotted owl response. Quality devices may also prove to be cost-effective, by reducing the number of survey visits to detect spotted owls, as well as being more durable in typical field conditions. The Service encourages surveyors to seek out others in the surveying business for suggested devices.

2. ***Bionic Ears.*** Hearing enabling devices such as "bionic ears" should not be used, as these devices generally only "listen" in one direction and may impeded determining response locations.

5.4.3 Spotted Owl Calling Procedures

1. ***Calling Methods and Sequencing.*** Start the caller and let it run for 3-4 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.

2. ***Call Variation.*** When conducting the daytime stand searches or activity center searches, use a variety of calls, with some emphasis on the female whistle. Do not broadcast loudly and do not use agitated or barking calls near a potentially active nest – this could agitate the female more than necessary or draw females off the nest.

3. ***Varying Call Patterns Between Visits.*** 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/recordings of a different individual that had not been used previously at the site or survey area (http://www.fws.gov/species/nso). This "new" spotted owl may elicit a stronger reaction (e.g., because it is considered a "stranger" rather than

a known "neighbor") from a resident but relatively non-vocal 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. **Optional:** If spotted owls have not been detected in visits 1-4, use barred owl calls for five minutes following the 10-minute calling period on visits 5 and 6. Please note these efforts on your field forms.

4. ***Duration of Calling Effort.*** Continue this process for at least 10 minutes at each calling station. **Discontinue calling once a spotted owl responds.** Allow the spotted owl to respond and listen for the remainder of the 10 minutes to determine if there is more than one spotted owl. See section 14.0 RECORDING DATA for recommendations on recording data and triangulation procedure. Prompt triangulation should occur soon after the first owl starts responding.

5. ***Daily Timing of Surveys.*** Conduct night surveys between official apparent sunset and sunrise (see the NOAA website for area and times: http://www.srrb.noaa.gov/highlights/sunrise/sunrise.html).
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.

6. ***Acceptable Weather Conditions.*** Do not survey under inclement weather conditions, such as high wind speed (e.g. > 15 mph), 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. Generally, surveys should be conducted under conditions described as a gentle breeze (wind speed 8-11 mph, or less. Under such conditions, flags may extend, and leaves move. As wind levels reach >12mph (small branches move, dust begins to blow) conditions are not acceptable as background sound level substantially reduces ability of the owl to hear the caller, and vice versa. For additional information, see:
http://www.unc.edu/~rowlett/units/scales/beaufort.html.

7. ***Systematically survey all 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.

8. ***Characterize and document behavioral observations.*** Make note of agitated calls, continuous responses, movement (toward or away the calling stations), 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.

5.5 Complete Visits

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 day and night surveys and may include a daytime *FOLLOW-UP* OUTING. 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 spotted 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 to be considered one complete visit.

1. ***Subdividing Survey Areas.*** If the project area is too large to be surveyed in 7 days, it should be divided into smaller areas based on habitat distribution, topography, road networks, and/or drainages. Survey areas need to be small enough to be completely surveyed within the specified time period.

2. ***Daytime Follow-up to a Spotted Owl or Unidentified Strix.*** If a surveyor detects a spotted owl or unidentified *Strix* species (including owls that fly-in without calling) at night and conducts a daytime follow-up, the combination of the night outing and the daytime follow-up would be counted toward one complete visit. If a surveyor does not obtain a response during a survey, a daytime follow-up would not be necessary. In that case, the night outing alone would be considered as one complete visit provided all remaining spotted owl habitat within the Survey Area has been called (See section 6.0 for Follow-up visits).

3. ***Temporal Spacing of Visits.*** Complete visits must be spaced at least 7 calendar days apart. For example, assume a complete visit ends May 1. Using a proper 7 day spacing, the next possible visit date would be begun on May 8.

4. ***Three Visits by June 30.*** At least 3 of the complete visits should be conducted before 30 June; this includes at least one visit in April, one in May and one in June. 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 conclusions for the survey area.
5. ***Documenting Unavoidable Operational Conditions.*** Where survey seasons or individual visits are restricted due to snow, landslides, mandatory road closure, or other unavoidable operational and access conditions, the survey period may be adjusted to accommodate such restrictions; documentation should be provided to explain the causes of the modified survey period.

6. ***Safety and Night Surveys.*** 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 the appropriate regulatory office.

7. ***Number of Complete Visits.*** To meet the objectives of this protocol, 2-year surveys with 6 complete visits per year are required to determine the presence or absence of spotted owls.

5.6 Additional Visits

If a single spotted owl responds, and after 6 complete visits resident status has not been determined, then up to 2 additional visits may be necessary in that year. Additional visits are visits conducted beyond six complete visits 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.

For additional visits, maintain the standards (timing, temporal spacing of visits, weather condition limitations, etc.) outlined elsewhere in this document. If additional visits cannot be completed prior to the end of the survey season (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.

If the last response occurs on:

- Visits 1 through 4 - no additional visits are required
- Visit 5 - conduct 1 additional visit
- Visit 6 - conduct 2 additional visits

6.0 FOLLOW-UP OUTINGS

The objective of the daytime follow-up outing is to locate spotted owls by conducting an intensive daytime 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 key nesting and roosting sites, which in turn provides more precise information for management. All spotted owl and barred owl detections should be recorded to the Township, Range, Section, 1/4 and 1/16, and appropriate UTM datum when 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 response area. If owls do not respond to vocalizations given from road survey stations nearest the 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 may alert the observer to the presence of a spotted owl or other *Strix* species. 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.

Do not hoot any more than is necessary; hoot only as much as needed to identify *Strix* species and determine status. Excessive surveyor vocalization may modify spotted owl behavior and stimulate them to move around more than is typical and possibly 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 "mouse squeaks" sometimes works to elicit responses near nests.

7.0 WHEN BARRED OWLS or *STRIX* UNKNOWN SPECIES ARE DETECTED

Because barred owls now completely overlap the distribution of northern spotted owls in Oregon and Washington and substantially overlap the species in California, and have reduced detection rates (response behavior) of spotted owls, it is important to properly ascertain the species of *Strix* owls detected, either visually or auditory, during the survey.

7.1 When Barred Owls Are Detected

If a barred owl is heard or seen:

1. Continue to call for spotted owls for the entire 10-minute period, or until a spotted owl responds,

2. If a spotted owl responds and the barred owl is in close proximity and/or acting aggressively toward the responding spotted owl, **discontinue calling at that station immediately**. Continue to listen at that station for at least the entire 10-minute period so that any spotted owl or additional barred owl responses will be heard and recorded. Complete the rest of the survey beyond hearing distance to continue calling the route (generally at least 0.5 mi.). This guidance applies to other owls and raptors *that may be acting aggressively toward (or represent a capable predator of) spotted owls*.

7.2 When *Strix* Unknown Species Are Detected

If a *Strix* Unknown Species is heard or seen:

1. Continue to call using spotted owl calls for the entire 10-minute duration, or until the spotted owl or barred owl identification is confirmed.

2. Wait silently for 5 additional minutes after the 10-minute calling period while listening and watching for owls.

3. If the unidentified *Strix* owl detections cannot be identified to species by spending extra time at the station where it was originally detected, a follow-up should be

conducted to increase the probability of identifying which species is present.

4. If follow ups are unsuccessful in establishing the species identity of the owl, additional visits should be conducted. The same procedures as used to determine resident status should be used; up to two additional visits should be conducted (see section 5.6 Additional Visits).

5. If all parameters of the protocol are met and the *Strix* species detection is either attributed to a barred owl or remains uncertain, do not "guess" on the species determinations without reasonably confident visual or audio information; simply record the species as Strix unknown. All field observations need to be well documented so that all information associated with the survey can be taken into consideration during technical assistance or consultations with the state and federal regulatory agencies.

8.0 ACTIVITY CENTER SEARCHES WITHIN SURVEY AREA[5]

Objective: *To search habitat and locate spotted owls in known core areas used in previous years for nesting and roosting.*

A minimum of one daytime stand search "Activity Center Search" is to be completed for each activity center within the survey area, each year, as a component of the 2-year survey. This is important because spotted owls commonly utilize the same, or nearby nest and roost stands year after year and searching the activity center and core use area during the day may 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 with the likelihood of containing nesting and roosting owls within 0.5 mile of the activity center to focus a thorough visual and auditory search of the identified stands. Similar to follow-up surveys, these searches may take up to several hours to thoroughly search the habitat. In conducting these surveys, the broadcast calling will be at a lower volume than used for nighttime station calling (approximating the volume of an actual spotted owl hoot). Avoid the heat of the day to increase the chances of finding spotted owls. During the daytime search, be sure to look for incidental 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 known spotted owl sites ("Activity Center Search") 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 known spotted owl site (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 Section 17, Determining Reproductive Success, if

[5] Please see Glossary (Appendix 1) for definitions of "known/historical" sites.

this level of information is needed.

This search area may be included as part a complete visit if the daytime search is conducted during the seven days required for a complete visit (Ex: if daytime stand search occurs within the 0.5 mile area on visit one, nighttime calling of that same habitat will not be necessary for that visit). Please note that on subsequent visits, nighttime calling of this 0.5 mile circle should be included in the overall survey area for the remainder of the complete visits if owls were not detected during the Activity Center Search.

IF Activity Center Searches are being conducted to locate NSOs adjacent to project activities and determine nesting status for projects operating in the breeding season of years 3 and 4, follow methodology for determining nesting status (this may include more than one visit).

9.0 SURVEYS FOR DISTURBANCE-ONLY PROJECTS

Activities that do not modify spotted owl habitat but will result in disturbance to spotted owls usually represent short-term effects compared to the long-term effects of habitat modification, especially when such projects are limited to one season. Therefore, a one-year six visit survey can apply to smoke or noise-disturbance only actions. Six visits that cover all spotted owl habitat within 0.25 mile from the project area will be effective until the beginning of the following breeding season. If operations are not completed by year two, three spot check survey visits each year should occur in years two and three OR project proponents can choose to utilize the 2-year, six visit survey protocol. Field forms should indicate that these are disturbance-only projects.

10.0 SPOT CHECK SURVEYS

With the invasion of the barred owl, spotted owls have shown increasing tendency to move from established, activity centers and establish, or attempt to establish, alternate activity centers or core use areas to avoid agonistic encounters with barred owls. Spotted owls establish activity centers in stands that have not previously been documented more frequently than typically occurred prior to the barred owl invasion. Because of this movement, there is an increased risk that spotted owls may establish activity centers and core use areas within or near project areas subsequent to completion of protocol surveys. If gone undetected, spotted owls at these new site centers are at risk of direct harm, injury, or harassment from project activities that result in direct physical modification (e.g., tree felling, prescribed fire, cable yarding, helicopter downdraft, etc.) or biological modification (e.g., noise exceeding ambient conditions).

The 2-year, 6-visits per year, surveys establish a reasonably high likelihood of detecting spotted owls in occupied activity centers within the survey area. However, the Service believes it prudent that project proponents to do *SPOT CHECK SURVEYS* of the project area and immediate vicinity (i.e., within 0.25 mile) prior to conducting activities in years 3 and 4. Spot checks are prescribed to detect spotted owls that may have moved into the project area subsequent to completion of general surveys. A new site center could be established in the project area by (a) known territorial individuals within the survey area; (b) undetected spotted owls from known sites within the survey area; or (c) dispersing juveniles, floaters, or territorial

spotted owls displaced from outside the survey area. These factors, plus the history of barred owl detections in the survey area, are taken into account when determining the need for spot checks. Spot checks are intended to supplement the general project-level surveys and avoid the potential direct take of spotted owls from project implementation.

Adjustments to project timing or other project modifications may be required under some circumstances where spotted owls initiate breeding activities within or immediately adjacent to a project area (See 10.3 below).

10.1 Design of Spot Check Surveys
Spot check surveys include the following components:

1. Spot checks supplement the full 2-year, 6 visits-per-year protocol surveys and are conducted during years 3 and/or 4 of the survey cycle.

2. Spot check surveys will cover all spotted owl habitat within the project footprint and within 0.25 mile of the project footprint (hereafter referred to as the *SPOT CHECK AREA*).

3. Spot check surveys consist of three nighttime surveys spaced a minimum of 7 days apart.

4. Spot checks may begin on the appropriate Survey Period date for the physiographic province (see section 4.0), and should be completed prior to or concurrent with project activities (see conditions described in10.2.2. below) on or before April 15, or as soon as feasible during the early portion of the breeding season (See Appendix 4) if there are conditions of limited accessibility, such as due to snow or seasonal road closures. If spot checks cannot be completed by April 15, reasons for delayed completion should be documented in the survey record.

5. Should the project continue into the year 4 breeding season, spot checks should be repeated, with similar consideration of spotted owl nesting status and consideration of take avoidance measures.

6. Any detection of spotted owls during a spot check survey should be followed up as soon as possible, but not later than 7 days after the nighttime detection, by a daytime follow-up visit to confirm the location and status of detected owls.

10.2 Circumstances Establishing the Need for Spot Checks.
Not all projects need spot check surveys. The surveyor should apply the circumstance that best describes actual history of known spotted owl sites and survey data for the project and survey area, as described below. Figure 2 provides a flow chart to assist in determining cases where spot checks are needed.

10.2.1 Circumstances Precluding the Need to Conduct Spot Check Surveys
For project areas meeting ***ALL*** of the following conditions, the likelihood of territorial

spotted owls occupying the project area is discountable. The action may occur in years 3 and 4 without additional surveys.

1. No resident single owls, territorial owl pairs, or pairs/two owls of unknown status are detected during protocol survey visits, including any additional visits, in the survey area (i.e., survey area not occupied by a territorial pair or single detected during year 1 and/or year 2 surveys); and

2. No activity centers are known to occur in the survey area; and

3. No barred owls are detected in the survey area during protocol surveys or are otherwise known to occur in the survey area; and

4. All spotted owl habitat within the survey area has been **completely** covered during protocol surveys (i.e. there is no habitat that was omitted due to inaccessibility, landowner restrictions, incomplete surveys, or other constraints).

10.2.2 Situations Where Spot Checks Are Necessary

The following bullets describe situations when spot check surveys **are** necessary. The project proponent should complete spot checks and schedule/implement projects as appropriate:

1. If no resident single owls, territorial owl pairs, or pairs/two owls of unknown status are detected within the survey area (project footprint plus one home range for projects that will modify habitat; 0.25 mile footprint for disturbance-only surveys) during year 1 or 2 of protocol surveys, and no known spotted owl sites are known from the survey area, BUT barred owls are known to occur within the survey area (through project surveys or other scientifically credible methods), spot checks are necessary. In this case, projects may be initiated during the breeding season (or continue if ongoing) concurrent with spot checks.

2. If no resident single owls, territorial owl pairs, or pairs/two owls of unknown status are detected within the survey area during year 1 or 2 protocol surveys, but known spotted owl sites are known to occur in the survey area, spot checks are necessary. In this case, projects may be initiated during the breeding season (or continue if ongoing) concurrent with spot checks.

3. If no resident single owls, territorial owl pairs, or pairs/two owls of unknown status are detected within the survey area during year 1 or 2 protocol surveys, and no known spotted owl sites are known to occur in the survey area, BUT portions of spotted owl habitat within the survey area is unsurveyed during protocol surveys due to inaccessibility, landowner restrictions, or other constraints, spot checks are necessary. Under these circumstances, spot checks must be completed prior to operations occurring after February 1.

4. If resident single owls, territorial owl pairs, or pairs/two owls of unknown status are detected within the survey area during years 1 and/or 2 protocol surveys, spot checks are necessary. Under these circumstances, spot checks must be completed prior to operations occurring after February 1**.**

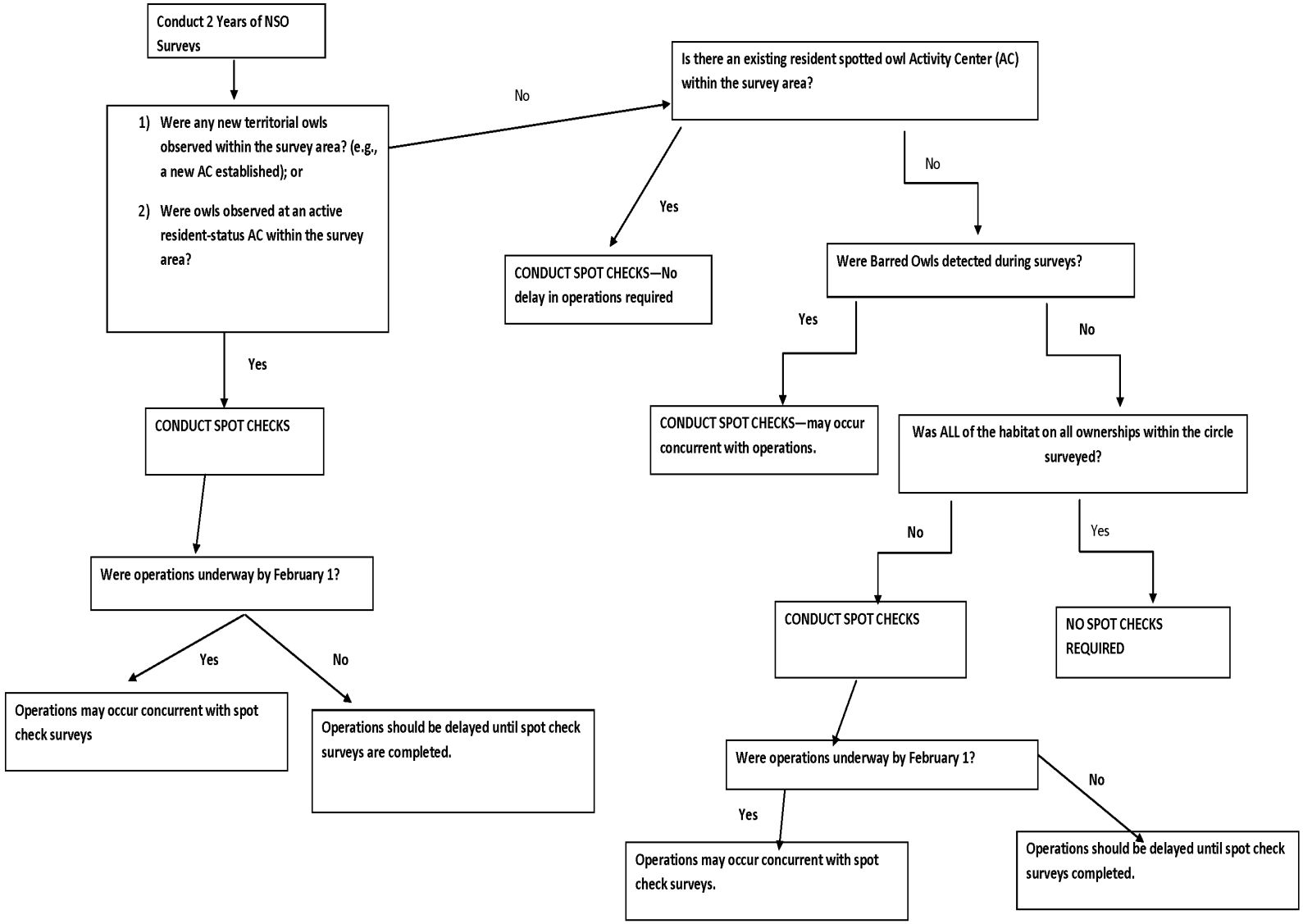
10.3 If Spotted Owls Are Detected in the Spot Check Area

If spotted owls are detected in the spot check area, ALL ongoing operations that have a likelihood of direct harm to a spotted owl and/or creating above-ambient noise shall be postponed. Conduct follow-up outings to determine location and pair/nesting status, as described in Section 16.0-17.0 of this document. Location data should be reviewed by the appropriate regulatory office to ensure that appropriate protection measures that avoid incidental take are implemented.

10.4 If Spotted Owls Are Not Detected in the Spot Check Area

If spotted owls are not detected, the project may continue through that breeding season. Should the project continue into the following breeding season, spot checks should be repeated.

Figure 2. Flow Chart to determine when spot check surveys are required.



11.0 COMPLETE SURVEY

A COMPLETE SURVEY includes:

- Two years of six visits per year, including activity center searches, and, if appropriate;
- Spot Checks and activity center searches, as described in section 10.0 and 8.0 respectively.

12.0 DURATION AND EXPIRATION OF SURVEYS

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. As described above, two years of spot checks may be necessary in years 3 and 4 depending on the results of two years of survey. If spot checks have not been completed, full protocol surveys are recommended beginning in year 5. If spot checks have been completed in years 3 and 4, technical assistance with appropriate regulatory agency will be required to evaluate scope of remaining harvest and appropriate survey needs in year 5 for remaining harvest areas.

13.0 DAYTIME STAND SEARCHES (OPTIONAL)

Objective: *To search habitats most likely to contain roosting or nesting spotted owls.* Optional daytime stand searches are intended to provide an extra level of assurance that non-responsive spotted owls are not residing in a project area by searching nesting/roosting habitat within the project area using methodologies used for follow-up surveys. Examples of situations when daytime stands searches might be warranted include projects near known activity centers without recent verified owl use, projects near activity centers that have been taken over by barred owls, or project areas proposed in high-quality nesting or roosting habitat.

14.0 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.
- Clearly document areas of overlap on survey area maps indicating years of surveys for each area.

If raptors 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 should be recorded. The presence of barred owls, great horned owls, goshawks, or other large raptors may affect spotted owl responses.

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

- Compass bearing and approximate distance to spotted owl or other raptor;
- 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 and indicate on a map the bird's original and final location. One method is to triangulate on the location from which the owl's call originated, taking compass bearings from 2-3 identifiable positions (e.g., at road junctions; or record GPS coordinates at each triangulation point) along the road or trail. 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 effort (e.g., follow-up; see below). Triangulation efforts should begin soon after the owl's first 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 visit at which the detection was obtained has been completed, continue to survey the remainder of the survey route. However, to avoid 'leading' a spotted owl across the survey area through continued calling nearby, we recommend that once an owl responds, the surveyor should go to other parts of the survey route and complete the rest of the survey visit, omitting the area within 0.5 mile around the detection location. If that is not practical, survey only the remaining points that are *beyond hearing distance of the responding bird*. The range of hearing distance is generally any distance beyond a ridge or about 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* owl) is detected during the survey, return to the area during the day as soon as possible (preferably within 48 hours) and conduct a follow-up outing to verify status as needed, unless reproductive status has already been determined. Diurnal surveys should be interrupted to accomplish the follow-up immediately after the detection.

15.0 MOUSING

The purpose of mousing is to determine if spotted owls are nesting and reproducing. By offering one or more mice to spotted owls, their nesting status can be determined based on the behavior of the adult. Mousing will also be used to locate nests (and brooding females) by inducing the male to lead the surveyor to the nest tree and, later in the nesting season, can be used to locate and count young recently out of the nest. Mousing consists of the following steps.

1. Locate one or both members of a pair during the day and offer to them at least two mice or other small prey items.

2. 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.

3. 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.

4. 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. A long pole or stick can be used to place mice higher in a tree where an owl may more likely take it.

The known spotted owl site will be classified as nesting, non-nesting, or unknown nesting status (see section17. Determining Nesting & Reproductive Status) based on your observations.

16.0. DETERMINING ACTIVITY CENTER STATUS

Depending on the use for which the survey data will be applied, determining the occupancy/reproductive status of sites may be necessary. This section provides guidance on the appropriate techniques to collect necessary information, and in correctly interpreting that information, to make the relevant determination. Verify the activity center status according to the following definitions (status visits can be day or night). The 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.

16.1 Determining Resident/Territorial Spotted Owl Pairs or Singles

The following subsections for determining if an activity center is occupied by a territorial pair, and pair with status unknown, a resident single, or status unknown.

16.1.1 Territorial Pair Status.

Any one of the following criteria establishes *TERRITORIAL PAIR* status:

1. A male and female are heard and/or observed (either initially or through their movement) in close proximity (< ¼ mile apart) to each other on the same visit; or
2. A male takes a mouse to a female (see "mousing" clarification under section 15.0 or REPRODUCTIVE SUCCESS SURVEYS 17.5); 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 or young identifiable based on molecular data.

16.1.2 Two Birds/Pair Status Unknown.
The presence or response of 2 birds of the opposite sex where pair status cannot be determined and where at least 1 of the owls meets the resident single requirements establishes *TWO BIRDS, PAIR STATUS UNKNOWN*.

16.1.3 Resident Single Status
RESIDENT SINGLE STATUS is established by any one of the following criteria:

1. The presence or response of a single owl within the same general area on 3 or more occasions within the breeding season, with no response by an owl of the opposite sex after a complete survey; or
2. Multiple 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 of either sex 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.

16.1.4 Status Unknown
STATUS UNKNOWN is the appropriate determination, following a complete survey, whenever the response of a male and/or female does not meet any of the above site status definitions.

17.0 DETERMINING NESTING & REPRODUCTIVE STATUS

Reproductive surveys are usually conducted to determine if breeding season restrictions intended to protect nesting owls can be lifted.

Reproduction surveys include two stages: nesting status and reproductive success. 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 relevant management (activity) center locations.

17.1 Nesting Status Surveys
Nesting Status Surveys should be done whenever it is necessary to determine if spotted owl may be nesting. The following criteria determine appropriate timing and procedures for

conducting such surveys:

1. 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.

2. Spread the surveys throughout the months of April and May. Avoid collecting all nesting status surveys early in the breeding season.

3. Use a standard "mousing" procedure as described above to determine nesting status. However, do not mouse birds any more than is necessary to determine nesting status. Stimulating the owl to move around excessively during the day, may increase their risk of predation. Similarly, 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.

4. Two observations, at least one 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.

17.2 Determining Nesting Status

Nesting is confirmed if, on 2 visits before 1 May, or 1 visit after 1 May, any of the following conditions are observed:

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 one observation is required). Dates may vary with the particular areas. Be careful not to confuse the normal small area of bare skin (i.e., 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 requires such a permit); or

4. Young identifiable as spotted owls or young detected in the presence of one or both adults.

17.3 Non-Nesting Status

The activity center is classified as non-nesting if any of the following are observed. Again,

except for brood patch information, two observations are required during the nest survey period (April 1-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 any of the following conditions is met:

1. The female is observed roosting and away from the nest for at least 60 minutes on two occasions, more than 3 weeks apart between 1 April and 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 one 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 it is not possible to determine the fate of the prey do not count toward the required 2 visits because nesting status could not be classified. Some spotted owls may be reluctant to take prey at all. If in doubt, be sure to schedule 1 or more visits in mid-June to check for fledglings.

17.4 Nesting Status Unknown

If nesting status is not determined before 1 June, it is not possible to classify the owls as non-nesting using the criteria listed above.

1. If owls are found after 1 June, without young, nesting status is unknown.

2. If no owls are found after 1 June (at those sites where owls were present prior to 1 June), nesting status is unknown.

17.5 Reproductive Success Surveys (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. The following methods should be adopted to detect fledged young.

1. 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 avoid missing young that may be lost to predation later in the season.

2. Attempt to locate fledged young. Use visual searches and/or mousing of adults. 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.

3. 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.

To determine the true number of fledged young, do the following:

4. On the first reproductive success visit, count the number of fledged young seen or heard.

5. 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.

6. If no response is elicited on a minimum of 2 visits, separated by at least 1 week during the fledging period, then classify the production of young as unknown.

7. If young are counted on 1 visit but a second visit is not conducted, or find no owls were found on the second visit, classify the number of young as 1+ or 2+ etc., based on the results of the initial visit.

8. 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. Glossary of Terms

Many of these terms have a long history and various meanings in regard to spotted owl biology and management. This glossary defines the context in which they are used in this document.

Abandoned Activity Centers: Activity centers that have been determined through appropriate analyses with state or federal agencies, as no longer likely to be supporting territorial owls due to habitat changes and/or long-term surveys with negative responses. Synonymous with abandoned historical spotted owl site.

Activity Center: Spotted owls have been characterized as central-place foragers, where individuals forage over a wide area and subsequently return to a nest or roost location that is often centrally-located within the home range (Rosenberg and McKelvey 1999). Activity centers are a location or point representing 'the best of' detections" such as nest stands, stands used by roosting pairs or territorial singles, or concentrated nighttime detections. Activity centers are within the core use area and are represented by this central location.

Activity Center Search: Stand searches of any known or historical core use areas that are within the survey area perimeter. (See Section 8.0 for specific guidance on methods to conduct these searches).

Additional Visits: Supplemental visits needed to locate and determine spotted owl pair status or reproductive status. May also be necessary to determine species of unknown Strix owl responses.

Adult: A northern spotted owl $\geq$ 2 years old.

Breeding Season: The time period from 1 February through 31 August that includes courtships, nesting, nestling and fledgling dependency periods. 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 spotted owl habitat within the survey area.

Complete Coverage: Complete coverage of suitable owl habitat 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 occurs 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. See Section 5.5 for specifics.

Complete Survey: Complete coverage of suitable habitat throughout the survey area that

consists of two years of six visits per year, including activity center searches, and, if appropriate, spot checks and additional activity center searches in years 3 and 4, as described in section 10.0 and 8.0 respectively.

Core Use Area: An area of concentrated use within a home range that receives disproportionally high use (Bingham and Noon 1993), and commonly includes nest sites, roost sites, and foraging areas close to the activity center. Core use areas vary geographically, and in relation to habitat conditions. This is a biological definition of core use area and is not the same as a 70-acre core as defined by the Oregon Forest Practices Act nor is it equivalent to the 100acre LSRs referred to as NSO cores on federal lands.

Daytime Stand Searches: Optional. *The objective is to search habitats most likely to contain roosting or nesting spotted owls.* A daytime stand search should cover nesting/roosting habitat within the project area.

Dispersal Habitat: Juvenile owls often must disperse through a range of forest types prior to finding habitat on which to establish a territory. These forest types include nesting, roosting, and foraging habitat in addition to other forest stand types that provide minimum diameter and canopy closure of trees. Definition of this habitat type vary by physiographic province.

Fledgling: Young of the year that are off of the nest.

Follow-up Outing: Follow-ups are conducted with 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. (See Section 6.0 for recommended methodology for conducting these searches).

Foraging Habitat: Foraging habitat is defined as habitat that provides foraging opportunities for spotted owls, but without the structure to support nesting and roosting (USFWS 1992*b*). Owls often forage in forest conditions that meet the definition of nesting/roosting habitat, but also use a broader range of forest types for foraging. This definition identifies habitat that functions as foraging habitat, but does not meet requirements for nesting /roosting

Habitat-capable area: Forests below the elevation limits of occupancy by territorial spotted owls that are capable of growing and sustaining structural (Davis and Lint 2005:30) and ecological conditions of spotted owl habitat.

Habitat Modification: Activities that occur in spotted owl nesting, roosting, or foraging habitat that reduce the canopy or other elements of spotted owl habitat at the stand-level. Wildlife biologists with the appropriate federal and state agencies may be able to provide technical assistance assessing these types of effects.

Historical Site: Spotted owl sites that contained territorial spotted owls in the past. For the purposes of this protocol, these spotted owl sites are considered a subset of known spotted owl sites (see glossary below).

Home Range: The area in which a spotted owl conducts its activities during a defined period of time (USFWS 1992b) that provides important habitat elements for nesting, roosting, and foraging. Home range sizes vary generally increase from south to north and vary in relation to habitat conditions and prey availability and composition

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 downing plumage.

Known Spotted Owl Site: Includes both owl sites found during the current survey period and owl sites identified in previous years ('historical site). Known spotted owl sites include both the activity center and 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.

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.

Nesting and Roosting Habitat: Habitat that provides nesting and roosting opportunities for spotted owls. Important stand elements may include high canopy closure, a multi-layered, multi-species canopy with large overstory trees and a presence of broken-topped trees or other nesting platforms (*e.g.*, mistletoe clumps (USFWS 1992*b*). The appearance and structure of these forests will vary across the range of the spotted owl, particularly in the dry-forest provinces.

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

Northern Spotted Owl (*Strix occidentals caurina*): One 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: The polygon that forms the perimeter (footprint) of the proposed project. (Refer to Section 3.1 for specifics on determining the polygon).

Provincial: This is a qualifying term used with home range and core use area to reflect the fact that both vary in size according to latitude, amount of available habitat, prey availability, and forest structure and composition. Typically, home range and core use area sizes increase from south to north, and decrease as amount of high quality habitat available to owls increases.

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 Area: All suitable spotted owl habitat within the project area, plus suitable spotted owl habitat within 0.25 mile of the perimeter of the project area.

Spot Check Surveys: Conducted in years 3 and 4, consisting of 3 nighttime surveys spaced a minimum of 7 days apart, covering the spot check area (see section 10.0).

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 or more open 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 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: All suitable spotted owl habitat within one spotted owl provincial median home range radius from the perimeter of the proposed project area should be surveyed for projects that will modify spotted owl nesting, roosting, or foraging habitat. Table 1 provides appropriate survey area radius values, by physiographic province. (See Section 3.2 for additional specific guidance). For disturbance-only projects that will not modify habitat but will result in disturbance to spotted owls (short-term effects compared to the long-term effects of habitat modification), surveys should be conducted within 0.25 miles of the project area (see Section 9.0 for specific guidance).

Survey Period: All surveys of proposed project areas must take place between March 15 and August 31, with some exceptions. (See Section 4.0 for specifics related to province differences and weather related exceptions).

Appendix 2: **U.S. Fish & Wildlife Service Field 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, Klamath Falls Office, 1936 California Ave, Klamath Falls, OR 97601. Telephone: 541 885-2525

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 3. Generalized Northern Spotted owl Breeding Season Chronology[6].

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

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

[6] This information is intended to depict the generalized breeding chronology, recognizing slight variations in all stages may occur depending on individual owls, elevation, in-season weather conditions, and/or latitude.

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 4. 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 but highly encouraged.*

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-
        - At least 2 field seasons conducting spotted owl calling surveys, preferably under the guidance of another biologist with experience in conducting successful spotted owl 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-
        - At least one field season of spotted owl survey experience, preferably working closely with other biologists experienced in conducting successful spotted owl surveys.

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 5. Suggested but Necessary Equipment to Conduct Surveys

- **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).
- **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.
- **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.
- **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. For safety, as well as to avoid wasted surveys, remember to carry spare, fully charged batteries in your vehicle.

Appendix 6: Template Field Data Collection Form
SITE VISIT FORM

SITE ID NUMBER: _____ SITE NAME_____STATE: _____

VISIT #: _____ OUTING #: _____ YEAR: _____ OUTING DATE: _____

LANDOWNER: _____ PHYSIOGRAPHIC PROVINCE_____

COMPLETE VISIT: (Y/N) _____OBSERVERS:_____

TYPE OF SURVEY: _ACS__SC__CC__FO__RV_____AV_____OPP_____
ACS=Activity Center Search **SC**=Station Calling **CC**= Continuous Calling **FO**=Follow Up Outing **RV**=Reproductive Visit
AV=Additional Visit **OPP**=Opportunistic Siting

HISTORICAL SITE CENTER LOCATION (use if historical site center is being surveyed)
T_____R_____Sec_____1/4_____1/16_____ WEATHER:_____

OWLS DETECTED: (Y/N) _____

Station	Start	End	SPP	Obs Type[1]	Sex	Bearing/ Distance	T / R / Sec	¼	1/16	UTM East	UTM North

[1]**ObsType** = V=Visual A=Audio S=Sign

Field Data Form - Data Dictionary

Age – Age is verifiable only upon visual detections.
AD=Adult
IMM = Immature (adult plumage but white tipped tail feathers observed)
F1=young; all downy **F2** = young, partial adult/partial down feathers **F3** = Young of the year with almost all adult feathers; may see a few downy feathers sticking through
UNK=Age unknown

Detection Time – Record in military time

Location Name – Enter name of survey area (i.e., Jackson Timber Sale)

Master Site Number - Enter state-identified activity center number

Physiographic Province – e.g., CA or OR Klamath, OR Coast, WA Cascades, etc.

SEX – M= Male **F=**Female **Unk =** Unknown**.** Contact whistles can be made by male or female**.**

SPP – **NSO** = Northern spotted owl **BAOW** – Barred Owl

Appendix 7. Physiographic Provinces Within the Range of the Northern Spotted Owl

Figure A1. Physiographic Provinces in the range of the spotted owl in the United States.