
NORTHERN SPOTTED OWL RESOURCE PLAN



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1.0 INTRODUCTION

Within the range of the Northern spotted owl (*Strix occidentalis caurina*) W.M. Beaty & Associates, Inc. (WBA) manages private forestland owned by four separate private owners. These private owners include Red River Forests, LLC, Shasta Forests Timberlands, LLC, Lassen Forest I Pondosa, LLC and Area H, LLC, hereinafter referred to as "WBA managed lands". The general philosophy of these land owners is to maintain and enhance the value of the land and resource base to pass on their legacy to their heirs. Aside from the economic incentives for maintaining the productivity of their forests, the landowners have strong conservation ethics and a willingness to manage their properties as healthy natural areas that provide aesthetic, recreational, wildlife, community, and other values.

The WBA managed lands are located near the eastern edge of the geographic range of Northern spotted owl (NSO). As expected for the peripheral margins of a species geographic range, NSO density is low in this region irrespective of land ownership and management history. Surveys for NSOs have been conducted on WBA managed lands since 1992. Over 1,000 calling stations have been surveyed and in no case has a NSO pair or nest site ever been detected on these lands. However, individual NSOs have been detected on rare occasions during surveys. Follow-up surveys conducted in the vicinity of these sporadic detections have rarely relocated NSOs that had responded at night. A nest, NSO pair, or an area that showed any signs of consistent use by NSOs (accumulations of whitewash, prey remains, regurgitated pellets, molted feathers, etc.) have never been located.

Only a portion of the WBA managed lands lie within the NSO evaluation area (Appendix A). California Forest Practice Rules (FPRs) specifically define the NSO Evaluation Area (14 CCR § 895.1) which includes portions of Shasta and Siskiyou Counties. Additionally, the U.S. Fish and Wildlife Service (USFWS) recommend several other areas be considered when planning timber operations (USFWS 2008^a). The Technical Assistance document states that these areas should be evaluated to determine if suitable NSO habitat exists and could be impacted by timber operations, and if so, then surveys or seasonal operating restrictions should be considered to avoid take of a NSO (USFWS 2008^a). Specifically, this Northern Spotted Owl Resource Plan (NSORP)(14 CCR § 939.9(f)) applies to approximately 91,286 acres of WBA managed lands that lie within the NSO Evaluation Areas and within or adjacent to the those areas specified in the 2008 USFWS guidance document (Appendix A).

2.0 PURPOSE AND NEED

State and federal requirements for the protection of NSOs are continuing to evolve. The understanding of what constitutes suitable habitat for NSOs has increased over time, thus enabling better predictions of NSO occurrence and likelihood of impacts to NSOs associated with timber operations in specific sites. By applying the best available scientific information

regarding NSO habitat combined with a long history of NSO survey information, this NSORP (14 CCR § 939.9(f)) establishes a programmatic approach that can be used by WBA and the California Department of Forestry and Fire Protection (CAL FIRE) to ensure that take of NSOs (14 CCR § 939.10) will not occur on WBA managed lands.

Surveys for NSOs are typically conducted using a two year protocol prior to timber operations that might affect NSO habitat or could potentially result in take of NSOs. Usually the first year of surveys is conducted the year prior to scheduled operations and the second year of surveys is conducted immediately prior to the onset of operations for that year. This timing ensures that the most currently available information is used to ensure take of NSOs will not occur. Most timber operations on WBA managed lands are single tree selection harvests that do not change the habitat type, and maintain mature forest cover, large trees, and other habitat elements important to NSOs (e.g. large snags, cull trees, hardwood, forested areas with multiple canopy layers). When timber operations may change the habitat type, measures are described in the NSORP (Section 5.2) to ensure take of NSOs will not occur.

Developing a programmatic approach to ensure take of NSOs will not occur has proven benefits for WBA managed lands, CAL FIRE and USFWS. Such an approach identifies specific information that will be provided in THPs, clearly identifies how habitat suitability is determined, and specifically describes how and when NSO surveys will be conducted, and establishes a procedure that will be applied in the event that a NSO is detected within an area that may be subject to timber harvesting. A feedback mechanism also ensures that as time passes and knowledge of where and how NSOs may be using habitat within the area covered by this NSORP increases, all parties share a common understanding as to how to ensure take of NSO does not occur. By establishing programmatic procedures, WBA and CAL FIRE can avoid duplicating efforts and analyses necessary to ensure take of NSOs will not occur.

WBA prepared the original NSORP in cooperation VESTRA Resources, Inc, under the direction of Robert L. Carey a Certified Wildlife Biologist, Private Consulting Biologist No. 0029, and Spotted Owl Expert (S.O.E.) designated by CAL FIRE to fulfill the requirements of 14 CCR § 939.9(a). Also, this NSORP has been edited and amended by Stuart L. Farber, WBA Wildlife Biologist, a S.O.E. designated by CAL FIRE. This NSORP meets the definition of a Spotted Owl Resource Plan (14 CCR § 939.9(f)) which is “a plan that demonstrates an approach to preventing a taking of the northern spotted owl while conducting timber harvest operations. A Spotted Owl Resource Plan necessarily involves more than one timber harvest plan area (14 CCR § 895.1). WBA has previously used programmatic methods to address concerns for NSOs with both the California Department of Fish and Wildlife (DFW) (NSORP 1997) and the USFWS (Northern Spotted Owl Management Plan 1999). While both of these prior agreements were effective, they became obsolete because of changes in how NSO regulations under the FPRs were being implemented. Based on past experience, there are proven benefits to be derived from this type of programmatic approach.

3.0 OBJECTIVES

A primary goal of this NSORP is to ensure take (14 CCR § 939.10) of NSOs will not occur during timber harvest operations conducted on WBA managed lands. An additional goal is to establish a programmatic approach to addressing NSOs in THPs prepared by WBA such that review of individual THPs as related to NSOs can be streamlined. To achieve these goals the objectives of this NSORP are to:

- (1) Describe a method to determine when NSO surveys are appropriate.
- (2) Establish a method that can be used to determine what areas of habitat will be surveyed when preparing THPs on WBA managed lands.
- (3) Describe the protection measures that will be used in THPs implemented on lands managed by WBA to prevent take of NSOs.
- (4) Provide baseline information to CAL FIRE as a prerequisite of this NSORP.
- (5) Describe a method of information exchange to assure CAL FIRE that WBA's operations are in compliance with the NSORP.

Approval of this NSORP by CAL FIRE will fulfill the requirements of 14 CCR § 939.9(f) with respect to NSOs for individual THPs filed under this NSORP. The criteria of 14 CCR § 939.10 has been used and it has been determined that when the terms and conditions detailed in this NSORP are fulfilled, that take of NSO will not occur.

4.0 SUITABLE HABITAT

The following methods will be used to determine when NSO surveys are appropriate and what areas of habitat will be surveyed. The FPRs describe forest stand conditions that are "functional" NSO nesting, roosting, and foraging habitat (14 CCR § 895.1). Additionally, CAL FIRE in cooperation with the USFWS has provided guidance to THP submitters on criteria that should be used to determine habitat suitability for NSOs in portions of interior northern California (USFWS^b). Both the FPRs and the USFWS use forest conditions to define NSO habitat. The USFWS adds other physiographic features and spatial elements that influence the likelihood that a particular area will support NSOs, however several of these parameters are not stated in quantitative terms. Both of these definitions include parameters such as tree diameter, basal area, density of trees of certain sizes, and canopy closure and include structural elements such as multi-storied canopies, large snags and trees with deformities, large woody debris, and decadence within the stand. Topographic relief and microclimate may also

influence suitability of habitat. This NSORP uses the USFWS guidance (USFWS 2008^b) document to categorize NSO habitat on WBA managed lands.

A critical component of the USFWS guidance (USFWS 2008^b) is proximity of one habitat type (nesting and roosting) to another (foraging). Recent scientific research efforts to predict the likelihood of a NSO inhabiting specific forest stands in northern California have used a model selection methodology (Zabel et al. 2003). This method uses statistical analytical procedures to identify precisely which forest attributes, in what types of spatial arrangement are common among many sites known to be used by NSOs. Based on radio telemetry data from several study sites in northern California that are similar to areas covered under this NSORP, the investigators developed individual regression models that evaluated the importance of an array of variables with respect to NSO habitat suitability. The individual models were then combined to include the variables that contributed the most to predicting habitat suitability. These variables were then ranked for importance and combined into a single regression equation. The combination of parameters that best explain the differences between sites that support NSOs, and sites that do not support NSOs are expressed in a model that best predicts NSO occupancy. The final model indicated that a combination of foraging and nesting and roosting habitat was a key predictor of occupancy by NSOs (Zabel et al. 2003).

It has also been shown in other studies that NSO habitat is a combination of nesting and roosting areas interspersed and juxtaposed with foraging areas (Farber and Crans 2000, Franklin et al. 2000, Hunter et al. 1995, Irwin et al. 2004, Zabel et al. 2003). In northern California, Zabel et al. (2003) used a model selection approach and found the availability of different types of habitat, specifically nesting, roosting, and foraging habitats within a NSO core use area, could predict the likelihood that a NSO would occur in a specific area. Zabel et al (2003) concluded that their results are a good predictor of NSO occupancy within a given 200 ha (500 acre) core area and that at the 0.20 to 0.50 probability level, these results may be useful in predicting absence of NSOs within their study area. As noted above, the area of inference from Zabel et al. (2003) is similar to the lands covered under this NSORP in terms of forest type, Klamath and Sierra Mixed Conifer types, with moderate topography and Mediterranean climate.

In conclusion, based on this best available scientific information, WBA has developed a method for determining where NSOs are likely to be detected during surveys (USFWS 2011). Thus in general, areas where a NSO is likely to be detected will be surveyed; areas where NSOs are not likely to be detected will be excluded from surveys. Where NSOs are more likely to be detected, all surveys shall follow the most current USFWS protocol (USFWS 2011), except for the deviations stated in the NSORP, and future changes to the USFWS protocol. The survey stations shown on the THP maps shall be used for all survey visits. Survey stations will be marked on the ground with paint or flagging if necessary to facilitate consistent station relocation or located at clearly identifiable locations (e.g. road intersections, marked Section lines).

4.1 Habitat Assessment Procedure

All WBA managed lands that will be subject to timber harvesting and are within the NSO Evaluation Area (14 CCR § 895.1) or within or adjacent to townships identified in the USFWS Guidance document (Appendix A), will be evaluated for the potential to provide habitat for NSOs. Habitat function will be determined based on the WBA timber inventory that identifies areas that meet the criteria of High Quality Nesting and Roosting Habitat, Nesting and Roosting Habitat, Foraging Habitat, and Low Quality Foraging Habitat as described in USFWS guidance (USFWS 2008^b). However, because stands that meet the criteria for Foraging or Low Quality Foraging Habitat are very unlikely to support NSOs if there is not at least some Nesting and Roosting habitat nearby, several conditions are included in determining which stands will be surveyed for NSOs. A combination of forest inventory data, aerial photograph interpretation, and field reconnaissance will be used to validate survey area delineation. The WBA inventory design and specifications are very robust in terms of collecting information regarding wildlife habitat. The forest inventory data concerning the habitat parameters of tree diameter, basal area, density of trees of certain sizes, and canopy closure used in the NSO habitat definitions produce results that have a low variance and a high degree of statistical certainty. The forest inventory data combined with the WBA geographic information system (GIS) allows for a robust spatial analysis that depicts proximity to other stands (habitat polygons) that are used in determining where surveys for NSOs will be conducted. The results of habitat assessments for NSOs are validated during field reconnaissance and through the use of aerial imagery. Annual updates to the WBA forest inventory are conducted and will be used to determine areas of NSO habitat on an annual basis. As recommended by Zabel et al. (2003), WBA uses a conservative interpretation of the available science and accepts a probability of use as low as 0.20 when classifying NSO habitat. For the purposes of this NSORP, NSO habitat is defined as:

4.2 Foraging Habitat

- (1) Foraging habitats are areas where forest stands meet the structural criteria for Foraging habitat or Low Quality Foraging habitat and are within 0.5 miles of areas that at least meet the criteria for Nesting and Roosting habitat (USFWS 2008^b).
- (2) Foraging habitats are also areas where stands meet the structural criteria for Foraging habitat or Low Quality Foraging habitat (USFWS 2008^b) and it is unknown whether any areas of at least Nesting and Roosting habitat exist within 0.5 miles (i.e. this assumes Nesting and Roosting habitat maybe present in areas where WBA does not have timber inventory data and remotely sensed data are unavailable or inconclusive).

4.3 Nesting and Roosting Habitat

- (1) Nesting and Roosting habitats are areas that meet the criteria for High Quality Nesting and Roosting Habitat or Nesting and Roosting Habitat (USFWS 2008^b).

4.4 THP Measures and Site-Specific Suitable Habitat Assessment

To ensure take of Northern spotted owls will not occur from any current and future WBA forest management activities a site-specific suitable habitat assessment shall be completed as part of all proposed THPs. USFWS (2008^b) guidance states the use of "thresholds" to guide habitat assessment often simplifies more complex habitat conditions. The USFWS also acknowledges that suitable habitat retention guidelines are based on means for the entire Northern Interior Region (USFWS 2008^b), and retention of suitable habitat should also be guided, when possible, by site specific abiotic considerations including: (1) Distance to nest, (2) Contiguity, (3) Slope position, (4) Aspect, (5) Elevation and (6) Tree species composition. THPs shall follow these guidelines as suggested by the USFWS, to complete a site-specific habitat assessment for all occupied NSO activity centers on or within 1.3 miles of WBA managed lands. Each assessment shall include review of:

- (1) Suitable habitat type maps based on USFWS 2008^b.
- (2) Forest inventory information including suitable habitat species composition, QMD, basal area, canopy closure and presence of larger trees and forest structures.
- (3) Digital ortho photography
- (4) Location of all previously known nest, roost and detection locations.
- (5) Abiotic factors include the suitable habitat distance to nest, distance to stream, slope and overall topography, elevation, aspect and habitat connectivity.

The intent of the assessments are to use site-specific (ie. activity center specific) information to identify current and future habitats on WBA managed lands that should be retained. The habitat retention is to ensure "take" of Northern spotted owl will not result from any current or future WBA forest management activities. This site-specific approach is completed in lieu of using a one-size-fits-all approach that uses robust habitat retention guidelines to ensure "take" does not occur (USFWS 2008^b). By using a site-specific assessment, as recommended by the USFWS (2008^b), specific local conditions and habitat shall be used to identify habitat retention

within the 0.5 mile Core Use Area and the 1.3 mile Foraging Area of each activity center. Habitat retention, for the purposes of this NSORP, are those habitat stands designated by the S.O.E. and CAL FIRE during the site-specific assessment that are necessary to ensure take will not occur from the proposed NSORP, and subsequent THPs relying on this NSORP.

Also, during the site-specific assessments, specific stands may be identified as having high abiotic conditions, but relatively lower, current suitable habitat conditions. In the future, if these high abiotic condition stands are managed for retention of suitable habitat structures (ie. snags, down logs, dense groups of trees, platforms) and are managed to grow into larger size and higher density suitable habitats, these stands have high value for nesting, roosting and foraging Northern spotted owls. Accordingly, voluntary retention means, for the purposes of this NSORP, are habitat stands designated by the S.O.E. and reviewed by CAL FIRE during the site-specific assessment as stands where voluntary retention and management would benefit conservation of NSO sites in the future. In other words, these voluntary retention stands are not necessary to ensure take will not occur from this proposed NSORP, and subsequent THPs relying on this NSORP, rather, these stands would benefit conservation of the species.

4.4.1 0.5 Mile Core Use Area

The concept of “core areas” was first proposed as areas within a home range receiving concentrated use by territorial animals (Samuel *et al*, 1985). Within habitats nearest the nest tree(s), core areas typically include the current nest tree, alternate nest trees, and frequently used roost trees, if known. More recently, numerous scientific studies have been conducted to determine which scales of habitat may be important for NSOs. An observation study in the Klamath province found the mean nearest neighbor distance between owl territories was 389 acres (Hunter *et al*, 1995). Another observation study found that owl core areas in the Klamath province are found to have significantly different habitats than random sites at the 494 acre scale (Gutierrez *et al*. 1998). Also, in the southern Cascades the best owl survival model used a 412 acre circle (Anthony *et al*. 2002). In other words, core use areas for Northern spotted owls are those 0.5 mile areas that are used disproportionately within home ranges (Bingham and Noon 1997; Irwin *et al*, 2004, Irwin *et al*. 2010, USFWS 2008^b). Also, studies have described both the amount and quality of habitat (biotic) and location of the habitat (abiotic) as important factors in retaining Northern spotted owls in forested landscapes (Clark 2002, Irwin *et al*. 2004, Irwin *et al*. 2010, USFWS 2008^b).

Accordingly, suitable habitats within the 0.5 mile Core Use Area shall be assessed to ensure that take will not occur as a result of any WBA forest management activities. The site-specific assessment shall use information described in Section 4.4 of this NSORP, and if necessary, designate habitat retention or identify voluntary habitat measures within the 0.5 mile Core Use Area. Accordingly, if a NSO activity center is located within WBA managed forestland or within

1.3 miles of WBA managed lands the following measures shall be assessed, or when a new activity center is established shall be assessed, and implemented:

**THP Measures and Maintenance
Summary of 0.5 Mile Core Use Area**

- (1) Nesting Core Use Area shall be a 0.5 mile radius circle (502 acre) centered on the Northern spotted owl activity center.
- (2) Suitable habitat shall be retained following site-specific review by an S.O.E. and CAL FIRE, using guidance provided by the USFWS (2008^b), in order of importance: (1) High Quality Nesting and roosting habitat (2) Nesting and roosting habitat (2) Foraging habitat (3) Low Quality Foraging habitat. Foraging and Low Quality Foraging habitat in abiotically favorable locations may be retained instead of nesting and roosting habitats in less favorable locations.
- (3) Suitable habitat shall be retained also considering: (1) Current nest trees (2) Alternative and historic nest trees (3) Current and historic detection locations (4) Natural and manmade landscape features such as ridges, streams, meadows, roads and previous harvest boundaries.
- (4) Abiotic factors are significant predictors of owl use. To meet the habitat standards the following abiotic factors (in order of importance) shall be considered when deciding between which habitats to retain: (1) Distance to nest (2) Distance to stream (3) Slope (4) Elevation (5) Aspect
- (5) Timber harvesting within habitats specifically retained on WBA managed lands within the Core Use Area are limited to silviculture which would reduce potential threats from wind throw, wildfire, forest pests, tree disease or overstocking, maintains the existing suitable habitat type and structures described in Item 2 and 3 above, and only following a field based assessment by a S.O.E. with concurrence from CAL FIRE.

4.4.2 1.3 Mile Foraging Outer Ring Area

Results of several studies have also indicated that roosting and foraging areas, represented by both daytime and nighttime telemetry locations, are best predicted by abiotic conditions (Clark 2002, Irwin et al. 2010). Suitable habitats within the 1.3 mile Foraging Outer Ring Area shall be assessed to ensure that take will not occur as a result of any WBA forest management activities. The site-specific assessment uses information described in Section 4.4 of this NSORP, and if necessary, designate habitat retention or identify voluntary habitat measures within the 1.3 mile Foraging Outer Ring Area. Accordingly, if a NSO activity center is located within WBA managed lands or within 1.3 miles of WBA managed lands the following measures shall be assessed, or when a new activity center is established shall be assessed, and implemented:

THP Measures and Maintenance Summary of 1.3 Mile Foraging Outer Ring Area

- (1) Foraging Ring Area includes habitats within a 1.3 mile radius circle (3,380 acre) ring area centered on the Northern spotted owl activity center.
- (2) Suitable habitat shall be retained following site-specific review by an S.O.E. and CAL FIRE, using guidance provided by the USFWS (2008^b), in order of importance: (1) Foraging habitat, (2) Low Quality Foraging habitat. Foraging and Low Quality Foraging habitat in abiotically favorable locations may be retained instead of nesting and roosting habitats in less favorable locations.
- (3) Abiotic factors are significant predictors of owl use. To meet the habitat standards the following abiotic factors (in order of importance) should be considered when deciding between which habitats to retain: (1) Distance to nest (2) Distance to stream (3) Slope (4) Elevation (5) Aspect (6) Connectivity.
- (4) Timber harvesting within habitats specifically retained by WBA managed lands within the Foraging Use Area are limited to silviculture which would reduce potential threats from wind throw, wildfire, forest pests, tree disease or overstocking, and maintains the existing suitable habitat type and structures described in Item 2 above.

4.4.3 Abiotic Factors

As previously described, abiotic factors are an important predictor of owl use (Clark 2002, Irwin et al. 2004, Irwin et al. 2010). Other studies in the Klamath province have also found that abiotic factors like elevation and slope position help discriminate between owl use areas and

random sites (Blakesley et al. 1992). As recommended by the USFWS (2008^b), when reviewing habitats within 1.3 mile of a known NSO activity center the following descriptions of abiotic factors are used to evaluate habitat quality and potential use:

- | | | |
|-------|--------------------|---|
| (1) | Distance to Nest | Distance from the habitat to the active nest site
(ie. smaller distance means more use) |
| (2) | Distance to Stream | Distance from the habitat to either an annual or intermittent stream (ie. smaller distance means more use) |
| (3) | Slope | Slope position of the habitat (ie. lower third of slope) |
| (4) | Elevation | Habitat and use is generally a non-linear relationship with a negative coefficient (ie. lower is generally means more use). |
| (5) | Aspect | Aspect of the habitat (ie. North and East favored). |
| (6) | Connectivity | Degree of connectivity to other abiotically favorable habitats. |

4.5 Suitable Habitat Assessment for New Activity Centers

In the event a NSO is detected in a location not previously occupied, and the detection(s) meet USFWS (2011) standards for an activity center, a site-specific suitable habitat assessment shall be completed. The assessment shall be completed by a S.O.E., designated by CAL FIRE to fulfill the requirements of 14 CCR § 939.9(a). The assessment shall follow the procedures described in Section 4.4.1 and 4.4.2, suitable habitat descriptions in Section 4.4, and submitted to CAL FIRE as described in Section 7.0 of this NSORP.

5.0 SURVEYS

A key component of the USFWS guidance (USFWS 2008^b) is the proximity and arrangement of one suitable habitat type to another. In other words, the spatial relationship between nesting and roosting habitat where owls reproduce and high quality foraging and low quality foraging habitats where owls can roost and forage. Recent research in northern California predicts the probability of Northern spotted owls using specific suitable habitats (Zabel et al. 2003). This study used statistical modeling to identify the location and spatial arrangement of suitable habitat used by Northern spotted owls. Based on radio telemetry data from several study sites in northern California, that are similar to areas covered under this NSORP, the research identified a combination of variables that best explain habitat differences between sites that do or do not support Northern spotted owls. The final model indicated that a combination of nesting and roosting habitat and foraging habitat was a key predictor of occupancy.

Results of other Northern spotted owl habitat studies also indicate a combination of nesting and roosting areas interspersed with foraging areas are beneficial for owls (Farber and Crans 2000, Franklin et al. 2000, Hunter et al. 1995, Irwin et al. 2004, USFWS 2008^b, Zabel et al. 2003). Franklin et al. 2000, found that territory specific owl survival was associated with the amounts of older nesting and roosting habitats and edge foraging habitats within a core use area of 390 acres (0.4 mile circle). Irwin et al. 2010, telemetered owls and found that abiotic conditions and habitat conditions within 400 meters (0.25 mile circle) of nest sites best predicted habitat use.

Based on the results of these studies, WBA has developed a local site-specific method for determining where Northern spotted owls are likely to be detected (USFWS 2011). The local site-specific method concludes that Northern spotted owls are only likely to occur and occupy sites in a landscape when High Quality Nesting and Roosting habitat or Nest and Roosting habitat exists within 0.5 mile of existing Foraging habitat. Accordingly, for operations within 1.3 miles of a known occupied Northern spotted owl activity center or within the Northern spotted owl evaluation area (14 CCR 895.1) or within the USFWS recommend areas to be considered when planning forest management operations (USFWS 2008^a), a survey will be conducted prior to commencement of forest management activities considering the following:

5.1 Surveys: Silviculture prescriptions that maintain suitable habitat

As previously stated, uneven-aged silvicultural prescriptions such as low intensity individual tree selection and group selection are widely used within WBA managed lands. These low intensity silvicultural practices typically retain mature forest cover, large trees, and other habitat elements important to Northern spotted owls such as large snags, cull trees, hardwoods, and densely forested areas with multiple canopy layers. When suitable habitat exists prior to harvest, and uneven-aged silvicultural prescriptions will retain pre-habitat types

(ex. foraging as foraging), survey of suitable habitat will be conducted when the following criteria are met:

- (1) If no suitable habitat exists within the THP boundary or within 0.5 miles of the THP boundary, then NSO surveys will not be necessary.
- (2) If no suitable habitat exists within the THP boundary, but suitable High Quality Nesting and Roosting or Nesting and Roosting habitat exists within 0.5 miles of the THP boundary, surveys shall be conducted in all suitable High Quality Nesting and Roosting, Nesting and Roosting and Foraging habitat that lies within 0.5 miles from the THP area, that is legally accessible to WBA. If timber harvesting is to occur outside the breeding season of February 1st to August 31st, no surveys shall be necessary or conducted.
- (3) If suitable habitat exists within the THP and suitable High Quality Nesting and Roosting or Nesting and Roosting habitat exists within 0.5 miles of the THP boundary, surveys shall be conducted in High Quality Nesting and Roosting, Nesting and Roosting, and Foraging habitat that lies within the THP and within 0.5 miles from the THP area, that is legally accessible to WBA.

5.2 Surveys: Silviculture prescriptions that do not maintain suitable habitat

When suitable habitat exists prior to harvest, and uneven-aged silvicultural prescriptions will not retain suitable habitat or will be degraded (ie. nesting reduced to foraging) immediately following operations, survey of suitable habitat will be conducted when the following criteria are met:

- (1) If no suitable habitat exists within the THP boundary or within 1.3 miles of the THP boundary, then NSO surveys will not be necessary.
- (2) If no suitable habitat exists within the THP boundary, but suitable High Quality Nesting and Roosting or Nesting and Roosting exists within 1.3 miles of the THP boundary, surveys shall be conducted in the suitable High Quality Nesting and Roosting and Nesting and Roosting, and Foraging habitat that lies within 1.3 miles from the THP boundary, that is legally accessible to WBA. If timber harvesting is to occur outside the breeding season of February 1st to August 31st, no surveys shall be necessary or conducted.
- (3) If suitable habitat exists within the THP and suitable High Quality Nesting and Roosting, Nesting and Roosting habitat exists within 1.3 miles of the THP boundary, surveys shall be conducted in High Quality Nesting and Roosting, Nesting and Roosting, and Foraging

habitat that lies within the THP boundary and within 1.3 miles from the THP area, that is legally accessible to WBA.

5.3 Modification of USFWS 2011 Protocol: 3-visit surveys

Since listing of NSOs under the federal ESA, protocol surveys have been conducted following guidance provided by the USFWS 1992 protocol (Forsman 1983, USFWS 1992). Based on almost 20 years of surveys and new scientific information regarding detectability of Northern spotted owls (Dugger et al. 2011, Kroll et al. 2010, Olson et al. 2005), the USFWS proposed new guidance in the USFWS 2010 protocol. Subsequently, based on additional new information and public comments the USFWS recommended the USFWS 2011 protocol, an errata and revisions in 2012.

The USFWS 2011 protocols were developed for NSOs over the entire range of the species from California to Washington. Recent research has indicated that the effectiveness of surveys conducted to detect NSOs has been reduced across a wide portion of the species distribution by the occurrence of barred owls (*Strix varia*) which is reflected in the current USFWS 2011 protocol. Based on this research, surveys conducted where barred owls occur more frequently the USFWS has recommended a two-year 6-visit survey.

Recent research in landscapes where barred owls occur in lower densities, in portions of the Southern Cascades and Klamath provinces of California, detection probability of Northern spotted owls using operational surveys can support presence and site status determination at USFWS desired levels of confidence (Farber and Kroll 2012)(Figure1)(Appendix C). In addition, the USFWS Technical Assistance 81333-2011-TA-0027 (USFWS 2011^d) concurred that a 3-visit survey effort was appropriate for this landscape. The research included both stand-based searches and nighttime station-based surveys. The stand-based searches are informed daytime searches conducted within Northern spotted owl core use areas (Bingham and Noon 1998, Zabel et al. 2003) centered on activity centers. Informed daytime searches are routes developed by biologists using current and historical biological information important in finding owls, which includes: (1) Historic or current location of spotted owl nest and roost sites, (2) Suitable habitat with core areas, (3) Location of previous night and daytime spotted owl detections and, (4) Location of abiotically favored suitable habitats. This information is readily available in WBA managed lands GIS database and is used to develop the informed daytime stand search routes. Recently, the USFWS has recommended informed daytime searches as part of the most current survey protocol (USFWS 2011).

Figure 1

Northern Spotted Owl Detection Probability

Detection probability is the 1-visit probability (p_{ij})(probability matrix below) that a Northern spotted owl is detected when an owl is actually present. The original USFWS (1992) survey protocol assumed a one-visit detection probability of Northern spotted owls was 0.65. Using the probability matrix below, the original USFWS (1992) protocol then recommended a 3-visit survey that would produce a 3-visit confidence interval of 0.97, or in other words, during a 3-visit survey 97 out of 100 times a Northern spotted owl would be detected, if in fact, the owl was present.

Several studies conducted in landscapes with high densities of barred owls, have indicated that detection probability of Northern spotted owls has been reduced by the presence of barred owls (Dugger et al. 2005, Olson et al. 2005, Kroll et al. 2010). In 2010, the USFWS reviewed the results of these studies and proposed that the average 1-visit detection probability, across the entire range of the species, was currently 0.40. Based on this 1-visit detection probability and the probability matrix below, the USFWS (2011) recommended a 6-visit survey that would produce a 6-visit confidence interval of 0.95.

Recently, in the Southern Cascades and Klamath provinces of California, in landscapes where barred owls occur in lower densities, Farber and Kroll (2012) found a current average 1-visit detection probability of 0.67. Based on this 1-visit detection probability and the probability matrix below, Farber and Kroll (2012) recommended a 2-visit night survey in combination with one informed day search that would produce a confidence interval greater than 0.95, the USFWS standard for confidence in determining Northern spotted owl site status.

		p_{ij}								
		0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90
No. visits		p_i^*	p_i^*	p_i^*	p_i^*	p_i^*	p_i^*	p_i^*	p_i^*	p_i^*
1		0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90
2		0.51	0.58	0.64	0.70	0.75	0.84	0.91	0.96	0.99
3		0.66	0.73	0.78	0.83	0.88	0.94	0.97	0.99	1.00
4		0.76	0.82	0.87	0.91	0.94	0.97	0.99	1.00	1.00
5		0.83	0.88	0.92	0.95	0.97	0.99	1.00	1.00	1.00
6		0.88	0.92	0.95	0.97	0.98	1.00	1.00	1.00	1.00
7		0.92	0.95	0.97	0.98	0.99	1.00	1.00	1.00	1.00
8		0.94	0.97	0.98	0.99	1.00	1.00	1.00	1.00	1.00
9		0.96	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00
10		0.97	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00

Accordingly, conducting one informed daytime stand-based search and two nighttime station-based surveys each year for two years will meet the USFWS standard for confidence (>0.95) in site status (Farber and Kroll 2012). Also, based on this level of detection probability, conducting two informed daytime stand-based searches and three nighttime station-based surveys for one year will meet the USFWS standard for confidence (> 0.95) in site status. The stand-based searches should be focused earlier in the nesting season, either March, April, May or June, although, the month (ie. Julian date) during the nesting season was not a significant variable in improving detection probability (Farber and Kroll 2012).

However, Farber and Kroll (2012) infrequently found 13 barred owls during 1,282 surveys which detected 480 spotted owls. In addition, barred owls were never detected more than once within 0.5 miles of a known spotted owl activity centers. Accordingly, based on the scientific scope of inference for this study, where barred owls are repeatedly detected (more than once) within Northern spotted owl 0.5 mile core use areas, the recommended survey procedures may be less effective in determining presence or absence of NSOs.

In summary, based on the results and recommendations of research conducted within portions of the Southern Cascades and Klamath provinces of California, surveys shall be conducted following the USFWS (2011) protocol with the following modification.

5.4 Modification of USFWS 2011 Protocol: Multiple Season and Single Surveys

For all forest management activities where surveys are required, the following modifications shall be followed for all surveys:

- (1) Prior to conducting surveys, all available historic and current Northern spotted owl information shall be reviewed. Information shall include; historic or current location and status of activity centers, suitable habitat maps for activity centers, location of previous detection locations, previous nest and roost locations and location of abiotically favored suitable habitat.
- (2) Where a barred owl has been previously detected more than once within an existing occupied Northern spotted owl 0.5 mile core use area the survey shall be conducted following the USFWS (2011) protocol guidance and USFWS Technical Assistance.
- (3) Where a barred owl has not been previously detected more than once within an existing occupied Northern spotted owl 0.5 mile core use area the following survey shall be conducted:
 - (a) Where a 2-year survey is conducted, each survey year shall include:
 - (i) One informed daytime stand-based search of the best abiotic locations of suitable habitat with 0.5 miles of a known occupied activity center. The

- stand-based search shall be conducted as early in the nesting season, as feasible, in either March, April, May, or June.
- (ii) Two nighttime station-based surveys following USFWS (2011) guidance regarding survey station placement and procedures.
 - (iii) Survey results for a 2-year survey are valid until the beginning of the following breeding season Feb 1st. Years following 2-year survey shall follow USFWS (2011) guidance regarding spot-check surveys.
- (b) Where a 1-year survey is conducted, the each survey shall include:
- (i) Two informed daytime stand-based search of the best abiotic locations of suitable habitat with 0.5 miles of a known occupied activity center. The stand-based search shall be conducted as early in the nesting season, as feasible, in either March, April, May, or June.
 - (ii) Three nighttime station-based surveys following USFWS (2011) guidance regarding survey station placement and procedures.
 - (iii) Survey results for a 1-year survey are valid until the beginning of the following breeding season Feb 1st.

5.5 Modification of USFWS 2011 Protocol: Early Season Determination of Nesting

The USFWS 2011 protocols were developed for NSOs over the entire range of the species from California to Washington. As stated in the USFWS 2011 protocol if surveys commence during the early period of the nesting season (March and April), the protocol requires that 2 visits of a 6-visit survey be conducted during the month of June. Due to interior Northern California's more southern latitude, relative to the entire NSO range (Timber Products Company 2005) and nesting season chronology (Irwin et al. 2004), an additional modification to the USFWS 2011 protocol applies to all surveys conducted under this NSORP.

- (1) If barred owls are present as described in Section 5.4 (2) of this NSORP, a 2-year, 6-visit USFWS protocol is required and 2 visits of the 6 visit survey survey shall be conducted after May 15th of the nesting season.
- (2) If barred owls are not present as described in Section 5.4 (3a) of this NSORP, and a 2-year survey is conducted, 1 of the 2 nighttime station-based surveys shall be conducted after May 15th of the nesting season.
- (3) If barred owls are not present as described in Section 5.4 (3b) of this NSORP, and a 1-year survey is conducted, 1 of the 2 informed daytime stand-based searches and 1 of the 3 nighttime station-based surveys shall be conducted after May 15th of the nesting season.

6.0 DISTURBANCE MEASURES AND GUIDELINES

Forest management activities conducted on WBA lands may also include operations which have the potential to disturb or disrupt Northern spotted owls. These disturbances represent relatively short-term effects compared to the long-term effects of habitat modification or removal (USFWS 2011^b). The USFWS has provided guidance that estimates the distances that sound or visual disturbances "take" Northern spotted owls (USFWS 2006). Typically, for most forest management activities like timber falling, harvesting and hauling the estimated distance to prevent disturbance of Northern spotted owls is 1,320 feet or 0.25 mile (Figure 2). This is based on the assumptions that natural ambient sound levels of a forest environment are less than 50 dB and general forest management activities are greater than 91 dB (Figure 2).

Figure 2 (USFWS 2006)
Estimated Harassment Distance Due to Elevated Sound Levels

Existing (Ambient) Pre-Project Sound Level (dB)	Anticipate Action-Generation Sound Level (dB)			
	Moderate (71-80 dB)	High (81-90 dB)	Very High (91-100 dB)	Extreme (101-110 dB)
Natural Ambient (≤ 50 dB)	165 feet	500 feet	1,320 feet	1,320 feet
Very Low (51-60 dB)	0 feet	330 feet	825 feet	1,320 feet
Low (61-70 dB)	0 feet	165 feet	825 feet	1,320 feet
Moderate (71-80 dB)	0 feet	50 feet	330 feet	1,320 feet

The USFWS guidance also suggests the use of project-specific sound measures, if available, to determine when potential disturbances may harass Northern spotted owls. In Northern California, several small-scale studies have been conducted focused on ambient or project-specific sounds levels in managed coniferous forests. On the redwood coast of Northern California, where natural ambient sound levels were low (≤ 60 dB) and log truck and water truck sound levels were measured as moderate (70-80 dB), recommended project-specific disturbance buffers were 165 feet (Ahmadi 2008). Also, a similar study on the redwood coast of Northern California, natural ambient sound ranged from 40 to 57 dB and logging haul trucks

ranged from 70 to 82 dB (Thill and McDaniel). In interior Northern California, natural ambient sound ranged from 40 to 46 dB, and timber harvesting, running skyline yarding, truck hauling and water truck sound levels ranged from 60 to 82 dB (Farber et al. 2003). The results of these studies confirm that natural ambient sound levels in managed forests are typically below 50 to 60 dB. Also, sound levels from typical forest operations are lower (60 to 82 dB) than sound levels suggested by the USFWS (91-100 dB)(USFWS 2006). When maximum sound levels of these studies are considered, and USFWS (2006)(Figure 2) guidance is used, 500 foot disturbance buffers will ensure "take" from noise or visual disturbance will not occur from forest management activities

6.1 Noise Disturbance Only Operations

Forest management activities that do not modify suitable habitat, but may create a potential noise disturbance and represent short-term seasonal effects on Northern spotted owls (USFWS 2011^b), are noise disturbance only operations. These potential disturbances typically occur during only one breeding season, but may occur over a series of seasons. Information used to ensure "take" will not occur from the proposed forest management activities include; whether noise disturbance will occur during the nesting season of February 1st to July 10th, suitable habitat types within project area, and locations of known occupied Northern spotted owl activity centers.

Based on this information, for disturbance only activities that will not modify suitable habitat but may create a potential noise disturbance, within suitable habitats, the following guidelines shall be followed:

- (1) Disturbance only operations conducted in Low Quality Foraging, Foraging and Non-habitat that occurs greater than 0.25 mile from High Quality Nesting and Roosting or Nesting and Roosting habitat, can occur year around with no additional surveys.
- (2) Disturbance only operations conducted in any suitable habitat less than 0.25 mile from High Quality Nesting and Roosting or Nesting and Roosting habitat or Foraging habitat, outside the nesting season of February 1st to July 10th, or Earlier if a single season 3-visit spot check survey is conducted and the survey covers all High Quality Nesting and Roosting and Nesting and Roosting habitat or Foraging habitat within 0.25 from the project area, and either owls are not detected or are determined to be non-nesting.

6.2 Haul Disturbance

Log truck hauling can potentially cause sound disturbance and represent short-term seasonal effects on Northern spotted owls (USFWS 2011^b). General guidance provided by the USFWS has suggested that log truck hauling within 0.25 mile of an active, nesting Northern spotted owl pair will cause noise disturbance that would result in "take" of Northern spotted owls. However, the USFWS has also suggested that site-specific review of potential noise disturbance should include:

- (1) Environmental conditions including natural ambient sound levels,
- (2) Road use patterns which may contribute to natural ambient sound levels,
- (3) Proposed project conditions including the type of equipment to be used and,
- (4) Significant topographic features which may increase or decrease sound attenuation and disturbance (USFWS 2006).

Based on this USFWS guidance, prior to operations, if a proposed THP includes an appurtenant haul road within 0.25 mile of a known, occupied Northern spotted owl activity center, then the THP shall include an assessment of the items 1 through 4 above.

7.0 TIMBER HARVEST PLAN PREPARATION PROCEDURES

The following reporting procedure for THPs in the NSO evaluation area shall demonstrate that take of NSOs will not occur and has been avoided as per 14 CCR § 939.10. The following information shall be submitted to CAL FIRE with the THP or amendment(s) that may impact NSOs to demonstrate that the terms, conditions, and procedures in the NSORP have been followed.

Surveys: If Surveys are Necessary

A survey summary shall be provided with each THP and NSO related amendment, including a map showing all calling stations, the location of all active and historic NSO nests and activity centers within 1.3 miles, the THP boundary, roads (appurtenant, seasonal private, permanent private, seasonal public, permanent public, and temporary), landings, helicopter landings and flight corridors, and the NSO habitat types shall be provided at the time of filing. The highest known status (resident single, pair, nesting,) shall be used to determine if an historical activity center is located within this area. Locations recorded within the database that do not adequately establish a valid activity center will be considered but will not require buffer zones or habitat protection.

The following information shall be provided to Cal Fire at the time of THP submittal in Section III of the THP and in NSO related amendments:

- Map of call stations and current year survey results
- Habitat analysis around all activity centers within 1.3 miles and THP boundary
- Estimates of pre harvest and post-harvest habitat acres within the THP area

Surveys: If Surveys are Not Necessary

For THPs within the NSO Evaluation Area or those areas referenced in the USFWS guidance (Appendix A) a map showing the lack of NSO habitat shall be provided. This map shall show the boundaries of all timber stands that meet the criteria within 0.5 miles of the THP boundary.

THP Measures

When the location of a NSO or activity center dictate the need, the following information shall be provided to Cal Fire at the time of THP filing and also be included in Section II, Item 32 of the THP and in NSO related amendments:

- A list of all applicable THP Measures
- A map showing the THP boundary, nest and roost buffer zones, and any seasonal restrictions

If THP Measures will be applied during any stage of THP implementation, information shall be provided with the THP which demonstrates that the habitat requirements around areas where THP Measures are applied have been or will be met immediately following harvesting. A copy of the CAL FIRE NSORP approval letter shall accompany each THP and shall fulfill the requirements of 14 CCR § 939.9(f) and § 939.10.

Amendments

Amendments that if applied could potentially result in an impact to NSOs or NSO habitat but are lacking current NSO information shall be considered not in compliance with the NSORP. Amendments that if applied could potentially result in an impact to NSOs or NSO habitat must include a statement describing any changes to the NSO protection measures included in the original THP. Amendments that if applied could potentially result in an impact to NSOs or NSO habitat and involve changes in yarding, silviculture, acreage, road placement or use, shall be reassessed to ensure that proper buffer zones and restriction areas are identified.

8.0 OTHER CONDITIONS

In each THP conducted pursuant to this NSORP, the California Registered Professional Forester (RPF) must certify that he possesses sufficient knowledge and experience to properly interpret NSO survey results or has consulted with a S.O.E. Conditions which preclude adoption of the THP Measures (Section 4.4) will require USFWS technical assistance and CAL FIRE shall be notified at least 30 days prior to operations that could result in take of a NSO. The following baseline information is a prerequisite of this NSORP:

1. Map(s) of WBA managed lands within the NSO Evaluation Area as defined by 14 CCR § 895.1 and those within 0.5 miles of the townships identified by the USFWS Guidance (Technical Assistance 81333-2008-TA-0058 USFWS^a) including all known NSO activity centers on or within 1.3 miles of those areas (Appendix A)
2. A list of all NSO activity centers on or within 1.3 miles of WBA managed lands that are in the NSO Evaluation Area as defined by 14 CCR § 895.1 or within 1.3 miles of the townships identified by the USFWS Guidance (Technical Assistance 81333-2008-TA-0058 USFWS^a). This list shall contain a legal description of each activity center and any pertinent information regarding annual status or productivity (Appendix B).

When preparing for timber harvesting operations (e.g. THP, Exemption, Emergency), all appropriate information sources shall be checked to determine whether any NSOs are known to be present in the general vicinity. Appropriate information sources may include: adjacent land managers/owners, the NSO database maintained by DFW, the WBA database, and/or the California Natural Diversity Data Base (CNDDDB) maintained by DFW. The THP Measures (Section 4.4) shall be applied around any known activity centers when conducting timber harvesting operations when NSOs are present during the current year as verified by surveys. Currently unoccupied activity centers, as verified by surveys, shall be protected by applying the THP Measures with regard to habitat modification but not auditory disturbance. If the THP Measures will not be applied or will be modified around currently unoccupied activity centers, a USFWS technical assistance shall be required and CAL FIRE shall be notified at least 30 days prior to operations.

This NSORP eliminates the need for further consultation with CAL FIRE with respect to NSOs provided that all aspects of the NSORP are adhered to as agreed and described above, the THP Measures are applied as described above, and the THP Measures are adopted as an enforceable condition of any THP relying on this NSORP. Upon request, WBA will provide an opportunity for a CAL FIRE and/or USFWS representatives to periodically inspect NSO habitat within project areas. The purpose of these inspections is to coordinate with WBA personnel with respect to the designation of NSO habitat and to evaluate the effectiveness and implementation of agreed upon THP Measures.

9.0 INFORMATION EXCHANGE

WBA shall submit an annual report to CAL FIRE by February 1 of each year that this NSORP is in effect. This annual report shall contain:

- (1) Summary of survey results including the surveyors name(s) and qualifications in that year. Survey results (positive and negative) shall also be submitted to the DFW for inclusion in the NSO database.
- (2) The dates and times of surveys and a map of the areas surveyed including NSO habitat types used to determine survey areas in that year.
- (3) Information that summarizes potential impacts to NSOs or NSO habitat from the timber operations that have occurred for THPs filed under this NSORP in that year.
- (4) THP maps of all THPs operated under the NSORP in that year.
- (5) NSO survey stations, survey results, and NSO detections including NSO observation reports and any information on pair status or productivity in that year.
- (6) Maps showing how habitat retention measures associated with activity centers have been met in that year.

This NSORP will become effective upon signature of all parties of this NSORP and shall continue in force and effect until terminated upon 30 days notice by either of the parties. The NSORP may be amended only by mutual written consent of the parties. The contact person for this NSORP representing CAL FIRE will be the Forest Practice Manager, Northern Region, 6105 Airport Road, Redding, CA 96002, (530) 224-2481. The contact person representing WBA for this NSORP will be the Chief Forester or Wildlife Biologist, WBA, P.O. Box 990898 Redding, CA 96099-0898, (530) 243-2783. Changes in the contact persons noted above shall be considered minor changes to this agreement and not alter the validity or enforceability of this agreement.

10.0 CONCLUSION

By concurring with CAL FIRE on the methods and protection measures outlined, WBA can incorporate a more efficient means of conducting timber harvesting operations, allow for increased efficiency of regulatory agencies, and provide better management for NSOs and other wildlife species. For the NSO, management and take avoidance guidelines are in place, as is a program designed to evaluate their effectiveness. Flexibility within this NSORP allows WBA to modify, and refine our current efforts to manage all the resources on WBA managed lands.

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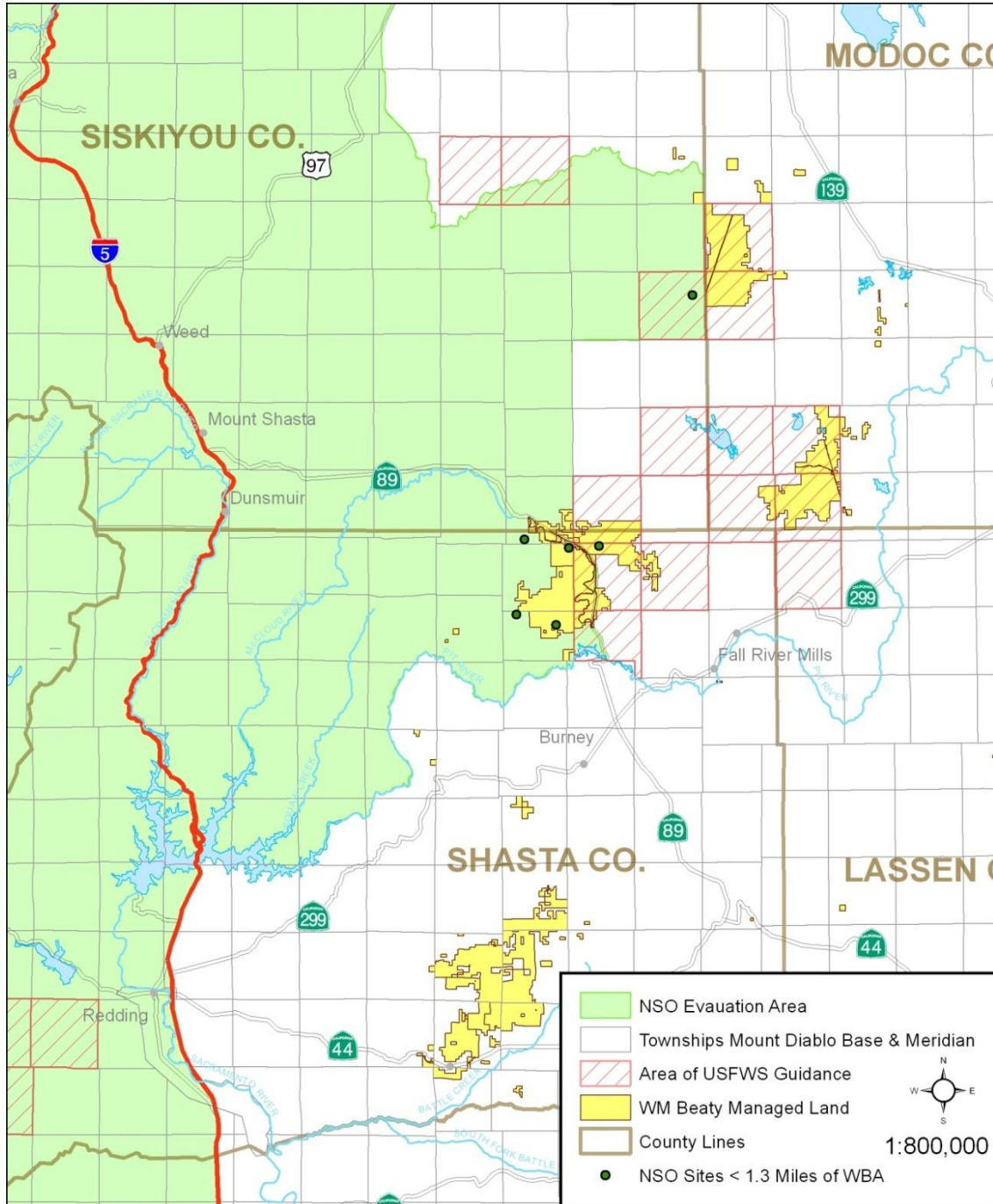
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APPENDIX A

Map(s) of WBA managed lands within the NSO Evaluation Area as defined by 14 CCR § 895.1 and those within 0.5 miles of the townships identified by the USFWS Guidance (Technical Assistance Regarding the Southern and Eastern Regulatory Boundaries for the Northern Spotted Owl in California 81333-2008- T A-0058, attached) including all known NSO activity centers on or within 1.3 miles of those areas.



APPENDIX B

A list of all NSO database records depicted areas where detections have occurred on or within 1.3 miles of WBA managed lands that are in the NSO Evaluation Area as defined by 14 CCR § 895.1 or within 1.3 miles of the townships identified by the USFWS Guidance (Technical Assistance Regarding the Southern and Eastern Regulatory Boundaries for the Northern Spotted Owl in California 81333-2008- T A-0058, attached). This list shall contain a legal description of each activity center and any pertinent information regarding annual status or productivity.

Owl Number	Location Name	Owl Number Legal Location (1/64, 1/16, 1/4)	First Year Owl Number Status	Last year NSO Detected at this Location	Survey, Detection, and Activity Center Status
SHA033	Clark Creek	SE, SW, Sec 14, T37N, R2E	Single 1982	Res. Single 1998	No detections since 1998.
SHA075	Dickson Flat SW	SW, NE, Sec 1, T38N, R2E	Pair w/ Young 1990	Pair 1991	Declared Unoccupied by CAL FIRE 2013
SHA101	Dickson Flat E	NW, Sec 4, T38N, R3E	Res. Single 1993	Res. Single 1993	Not Valid Activity Center (NVAC) by USFWS and CAL FIRE 2013
SHA113	Rock Creek	SE, SE, Sec 7, T37N, R2E	Single 2001	Reproducing, Pair, 2015	Nest found adjacent on USFS forestlands
SIS250	Bear Creek W	NW, SE, Sec 32, T39N, R2E	Res. Single 1983	Single 1992	1998 USFWS Consultation NSO#R1308 considers site abandoned.
SIS429	Border Mountain	NW, NE, NE, Sec 14, T42N, R4E	Single 1980	Nesting, Pair, 2013	Nest found adjacent on USFS Forestlands.

APPENDIX C