

# Whistling Ridge Energy Project

## Final Environmental Impact Statement

### Appendices C-F

August 2011



DOE/EIS-0419

Cooperating Agency:  
State of Washington, Energy Facility Site Evaluation Council





**Appendix C**  
**Wildlife Reports**

**C-1**

**Vegetation Technical Report: Saddleback Wind Project EIS,  
Skamania County, Washington**

**CH2M HILL**



Figures 1, 2, and 3 are missing from Appendix C-1 as the full report was not provided to  
URS

# **Vegetation Technical Report Saddleback Wind Project EIS Skamania County, Washington**

## **Criteria and Methodology**

The vegetation study area includes the area of a proposed substation, turbine strings, and their associated access roads, and existing secondary roads proposed for improvement. Vegetation was surveyed in a 300-ft corridor centered on proposed turbine strings and their associated access roads, in 50-foot corridors adjacent to existing roads proposed for improvement in conjunctions with this project, and in 25 additional acres in three locations proposed for staging areas and location of a substation (Figure 1).

Numerous vegetation classification systems are available for characterizing the plant communities across a landscape. The classification system used for this analysis was USDA Forest Service classification system (Brown 1985). It was selected for: (1) ability to address the variety of vegetation conditions in the study area; and (2) ability to interpret their function as wildlife habitat.

The aerial photographs are DNR orthophotos taken in January 2002 and were scaled to 1:600, and a maximum 3-foot resolution.

The available color photo coverage was overlain with the project base map, and vegetation types within the study area were digitally mapped using scanned color aerial photographs and ER Mapper 6.3 software by Earth Resources. Photographic signatures were calibrated using field observations. Final maps of the approximate vegetation type boundaries were adjusted using field survey observations, field notes, field maps, and oblique photos. Areas

The USDI Fish and Wildlife Service (USFWS), and the Washington Natural Heritage Information System (WNHIS) were consulted for information on the existence of special status plant species and important habitats that would support special status species in the project vicinity.

Special status plant species are native species that have been accorded special legal or management protection because of concern for their continued existence. There are several categories of protection, depending on the magnitude of threat to continued existence, and existing knowledge of population levels. Any plant species that is in danger of extinction throughout all or a significant portion of its range is defined as "endangered." A "threatened" species is a species that is likely to become endangered in the foreseeable future. Species of concern are candidates for listing as endangered or threatened.

Insert Figure 1 Study Area

A search of the WNHIS database for records of listed or proposed threatened or endangered plant species was conducted. Records of special status species documented within two miles of the proposed project area were obtained. Also, species records for a large area surrounding the project vicinity were obtained to indicate potentially occurring species that may not been recorded because of a lack of detailed surveys for these species.

## Affected Environment

### Vegetation Communities

The project area is located in the Southern Washington Cascades Province (Franklin and Dyrness 1988). This area is characterized by generally accordant ridge crests separated by steep, deeply dissected valleys. The project falls within the *Abies grandis* and *Pseudotsuga menziesii* major vegetation zones (Franklin and Dyrness 1988). Climate is wet and cool, receiving a significant portion of its precipitation in the form of snow which accumulates in winter snowpacks as deep as 1 to 3 meters.

The project area is located specifically on Underwood Mountain northwest of White Salmon, Washington. Major drainages in the area include the White Salmon and the Little White Salmon River basins to the east and west of the site respectively. Both basins drain to the Columbia River south of the site, which drains to the Pacific Ocean.

Historically, the project area was dominated by coniferous species – grand fir (*Abies grandis*), and Douglas-fir (*Pseudotsuga menziesii*). Historical species dominance was dependent on elevation, aspect, underlying soil, and previous disturbance history (Franklin and Dyrness 1988). Mixed conifer and deciduous forest stands usually followed disturbances, but occasionally deciduous-dominated stands developed, depending on the disturbance type and physical environment. Typical deciduous species were alder (*Alnus rubra*, *A. sinuata*), Pacific dogwood (*Cornus nutallii*), and big-leaf maple (*Acer macrophyllum*).

The predominant land use in the surrounding area between Underwood Mountain and the Little White Salmon River is commercial forest production. Some land east of the Little White Salmon is zoned for 2-, 5-, and 10-acre residential use, but the land is currently in commercial timber production and is owned by SDS Lumber Company and Broughton Lumber Company, and the Washington Department of Natural Resources. The rural communities of Mill A and Willard are both located west of the Little White Salmon River. Mill A, the closer of the two communities, is approximately 1.5 miles from the nearest turbine site. Willard is approximately 2.25 miles north of the nearest turbine site in the A string.

Current vegetation conditions are heavily influenced by forest management activities over the last century. Land in the project area is privately owned, managed industrial forest. While forest management has not reduced tree species diversity, it has resulted in a shift in species dominance to the commercially valuable Douglas-fir and in changes to stand structure and complexity, patch size, and species distribution. Average stand age probably declined from relatively short stand rotation ages. Few large, old conifer trees occur in the project area and there are no known late-successional or “old-growth” stands within or adjacent to the project area, though small groups of big trees occur.

Common understory plants include sword fern (*Polystichum munitum*), vanilla leaf (*Achlys triphylla*), false Solomon's seal (*Smilacena racemosa*), western starflower (*Trientalis latifolia*), Columbia windflower (*Anemone deltoidea*), snowberry (*Symphoricarpos albus*), vine maple (*Acer circinatum*), Oregongrape (*Berberis nervosa*), red-flowering currant (*Ribes sanguineum*), and red elderberry (*Sambucus racemosa*). A list of all plant species observed within the project area is found in Table 1.

The vegetation communities within the project area are common within the region and maintained through forest management, and to a lesser extent natural disturbance. Because of private ownership, rugged landscape, and the value of high-volume timber producing land, these vegetation communities are expected to persist within the region during the foreseeable future.

Five vegetation communities and wildlife habitats were identified within the project area:

- Grass-forb Stand (recent clearcuts)
- Brushfield/Shrub Stand
- Conifer-Hardwood Forest
- Conifer Forest
- Riparian - Deciduous

The approximate acreage of each habitat type within the study area by turbine string, road, and other proposed impact areas is shown in Table 2. The locations of the communities are shown in the vegetation community maps (Figure 2). These acreage figures and maps are based on June 2003 conditions. The locations and areas of plant communities will change over time through natural succession, forest development, and forest management.

## GRASS-FORB STAND

Grass-forb Stands are found in the project vicinity in recently clearcut areas. Grass-forb is the stand condition in the USDA Forest Service classification system defined as areas where shrubs comprise less than 40 percent crown cover and are less than 5 feet tall (Brown, 1985). This stand type occurs when a disturbance such as timber harvest, fires, or wind has killed or removed most or all of the larger trees, or when brush fields are cleared for planting. These units may range from mainly devoid of vegetation to dominance by herbaceous species (grasses and forbs). Tree regeneration in these units is generally less than 5 feet tall and 40 percent crown cover.

In Grass-forb stands within the project vicinity vegetation is minimal and consists predominantly of weedy herbaceous species, including bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*). These areas generally consist of ubiquitous coarse woody material (CWM), occasional slash piles, and large areas of bare ground. Within the project's proposed impact area there are approximately 22.3 acres of grass-forb vegetation community.

Insert Table 1 p1

Insert Table 1 p2

Insert Table 1 p3



Insert Table 1 p4

**TABLE 2** Vegetation Communities by Turbine String, Staging and Substation Areas, and Roads Proposed for Improvement  
Saddleback Wind Project

VEGETATION COMMUNITIES	TURBINE STRINGS													
	A		B		C		D		E		F		G	
	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent
Grass-forb							9.7	0.17						
Brushfield/Shrub			3.9	0.12			5.2	0.09						
Conifer-Hardwood Forest	30.8	1.00	29.9	0.88	14	1.00	23.7	0.41			8.2	1.00		
Conifer Forest							18.8	0.33	17.5	1.00			15.1	1.00
Riparian Deciduous														
<b>Subtotal</b>	<b>30.8</b>	<b>1.00</b>	<b>33.8</b>	<b>1.00</b>	<b>14</b>	<b>1.00</b>	<b>57.4</b>	<b>1.00</b>	<b>17.5</b>	<b>1.00</b>	<b>8.2</b>	<b>1.00</b>	<b>15.1</b>	<b>1.00</b>
VEGETATION COMMUNITIES	STAGING AND SUBSTATION AREAS													
	Substation		Staging Area 1		Staging Area 2		Staging Area 3		Staging Area 4		Staging Area 5		Staging Area 6	
	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent
Grass-forb														
Brushfield/Shrub	15	1.00												
Conifer-Hardwood Forest			5	1.00			2	1.00	2	1.00				
Conifer Forest					5	1.00					2	1.00	2	1.00
Riparian Deciduous														
<b>Subtotal</b>	<b>15</b>	<b>1.00</b>	<b>5</b>	<b>1.00</b>	<b>5</b>	<b>1.00</b>	<b>2</b>	<b>1.00</b>	<b>2</b>	<b>1.00</b>	<b>2</b>	<b>1.00</b>	<b>2</b>	<b>1.00</b>
VEGETATION COMMUNITIES	EXISTING ROADS PROPOSED FOR IMPROVEMENT													
	1		2		3		4							
	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent						
Grass-forb		0.00	6.9	0.18										
Brushfield/Shrub	26.3	0.49												
Conifer-Hardwood Forest	27.1	0.51	5.5	0.15	6.7	1.00	8	1.00						
Conifer Forest			25.4	0.67										
Riparian Deciduous														
<b>Subtotal</b>	<b>53.4</b>	<b>1.00</b>	<b>37.8</b>	<b>1.00</b>	<b>6.7</b>	<b>1.00</b>	<b>8</b>	<b>1.00</b>						

Insert Figure 2 Vegetation Community Map

## BRUSHFIELD/SHRUB STAND

Brushfields are defined as the shrub stand condition in the USDA Forest Service classification system (Brown 1985). They develop on land following clearcut tree harvesting or other disturbances that remove vegetation. In keeping with Washington Forest Practices Rules, Chapter 222 WAC, all harvest units are planted within 3 years after harvest or a period of from 1 to 10 years as determined by the department in the case of a natural regeneration plan and must maintain minimum stocking levels of 150 vigorous, well-distributed undamaged seedlings per acre of commercial tree species.

Thus the majority of brushfields are actually young plantations (typically Douglas-fir, although many landowners are now planting mixed species) that have not yet reached the closed canopy stage or shaded out the shrub species. The type may have large amounts of bare soil, and often has slash and other logging debris on the ground. Vegetation (other than planted conifers) often consists of remnants from the forest understory and early successional annuals. There are vine maple, Sitka alder, beaked hazelnut (*Corylus cornuta*), serviceberry (*Amelanchier alnifolia*), Himalayan blackberry (*Rubus discolor*), bracken fern (*Pteridium aquilinum*), sword fern, oceanspray (*Holodiscus discolor*), fireweed (*Epilobium angustifolium*), wooly yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea*) and grasses as ground cover.

Vegetation control has occurred in conjunction with forest management and includes herbicide application, mechanical control, or both. These areas are visually and functionally different from areas where control has not occurred. Despite control efforts, or where they have not occurred, dense shrub thickets frequently occur, dominated by the native vine maple. Within the thickets are small alders and Douglas-fir that occasionally grow taller than the vine maple. These areas also may have patches of alder saplings, salmonberry (*Rubus spectabilis*), vine maple, red elderberry, oceanspray, lupine (*Lupinus* sp.), Oregon oxalis, and grass. Small diameter coarse woody material (CWM) is common. Within the project's proposed impact area there are approximately 45.8 acres of brushfield/shrub vegetation community.

## CONIFER-HARDWOOD FOREST

Conifer-Hardwood Forest is found in the project vicinity in the closed sapling-pole stand condition, under the USDA Forest Service vegetation classification system (Brown 1985). The forest canopy in these stands is dominated by a mix of bigleaf maple and Douglas-fir, with some red alder. Canopy height typically ranges from 40 to 60 feet. Canopy closure is between 60 and 80 percent. Maple forms about 30 percent of the canopy cover with Douglas-fir forming most of the rest of the canopy. Stands may have distinct tree canopy layers with deciduous overtopping emerging conifer or remnant conifer over the deciduous component. Stands with shrub layers that merge with the canopy layers are found in the project vicinity. The shrub layer varies from open to dense and contains vine maple, salmonberry, thimbleberry (*Rubus parviflora*), red elderberry, beaked hazelnut, and Pacific dogwood (*Cornus nutallii*). The herbaceous layer contains sword fern, trailing blackberry, oxalis, grasses, and moss. Within the project's proposed impact area there are approximately 147.9 acres of conifer-hardwood vegetation community.

CWM is dependent on stand age, but is typically low to moderate. Deciduous snags outnumber conifer snags, although depending on stand origin, short well decayed conifer snags may be present.

## **CONIFER FOREST**

Coniferous Forest is found in the project area in closed sapling-pole-sawtimber stands and large sawtimber stands. Within the project area and most of the region, Coniferous Forests are dominated by Grand fir and Douglas-fir. The closed sapling-pole-sawtimber is a continuum of tree diameter sizes with saplings being relatively small, poles being in the 8-12 inch range, and sawtimber ranging from 12 to 23 inches. Important to these stand types is the closed canopy and relative short live crowns found in the pole and sawtimber stages. The closed canopy results in the exclusion of most shrub species and many herbs.

CWM in this stage is typically low and consists of remnants from previous stands. Snags are typically rare, although small diameter snags become more frequent in the pole and sawtimber stages as shading and resource competition kills subdominants.

Large sawtimber is considered to be at least 21 inches in DBH. Within-stand differentiation has begun and dominants are beginning to overtop and out-compete other tree species. Competition for space results in more light reaching the forest floor and shrub and herbaceous communities typically become more diverse. CWM and snags are generally rare, although the number of snags and amount of CWM may be variable amount stands, dependent on past harvest practices, stand management, and actual stand age.

These forests are used for commercial forestry, and are generally regenerated after harvest, although some may be the result of natural disturbance combined with commercial planting. They are subject to timber management activities including harvest, replanting, and stand improvement activities. These forests are widespread in the project vicinity. Within the project's proposed impact area there are approximately 85.8 acres of conifer vegetation community.

## **RIPARIAN DECIDUOUS FOREST**

Natural and anthropogenic disturbances frequently result in domination by deciduous species in near-stream areas. Within the project area this type occurs in the area identified on the USGS topographic map as "Cedar Swamp." Historically this area was dominated by very large, old cedar, which have been logged. The area is now dominated by willow and cottonwood (*Populus balsamifera*) with scattered occurrences of young cedar.

The Cedar Swamp area consists of approximately 24 acres is located adjacent to the proposed impact area for Turbine String F.

## **Special Status Plants**

### **Field Reconnaissance Surveys**

Reconnaissance and inventory surveys were conducted for sensitive species on two occasions. The survey chronology is presented in Table 3.

**TABLE 3**  
Field Survey Chronology for Sensitive Species  
Saddleback Wind Project

Date	Primary Purpose
May 28-30, 2003	General habitat survey and survey for spring-blooming rare plant species
July 28-29	Survey for summer blooming rare plant species

The project study area for potential habitats included the following areas:

- 300-foot corridors centered on all proposed turbine strings and their associated access roads,
- 50-foot corridors on either side of existing all roads proposed for improvement in conjunction with the project,
- an approximately 5-acre plot for proposed substation construction, and
- one 15-acre and two five-acre areas identified as proposed construction staging areas.

Study area boundaries are shown in Figure 1. Field surveys were performed by CH2M HILL botanists and ecologists familiar with rare plant species of the region. Surveys were conducted on May 28-30 and July 28-29, 2003 during optimum time for identification of target species. Total survey area was approximately 302 acres. Potential habitats supporting rare species within the project study area were surveyed on foot at an intensity level sufficient to confirm the presence or absence of targeted rare plant species identifiable at the time of the surveys. The surveyors kept a list of all vascular plants encountered. Observations of plant associations, land use patterns, and unusual habitats were recorded.

## Investigation Results

### Sensitive Plant Species.

**Pre-field Review.** The search of the WNHIS database disclosed four rare plant populations documented as currently occurring within 2 miles of the project vicinity (Figure 3):

- branching montia (*Montia diffusa*),
- Suksdorf's desert parsley (*Lomatium suksdorfii*),
- Siskyou false hellebore (*Veratrum insolitum*), and
- golden chinquapin (*Chrysolepsis chrysophylla*).

Three rare plant populations are documented as historically occurring in the project vicinity:

- bolandra (*Bolandra oregana*),
- white-top aster (*Aster curtis*), and
- branching montia.

Insert Figure 3

One plant community identified as a *Known High-Quality or Rare Plant Community and Wetland Ecosystem of Washington* (WNHIS 2003) is documented as occurring within 2 miles of the project site. It is an Oregon white oak/Idaho fescue (*Quercus garryana*/*Festuca idahoensis*) vegetation community and is located along the drainage of the White Salmon River, approximately ½ mile north of its confluence with the Columbia River.

In addition to the six plants species discussed above, twenty-three additional plant species were added to the survey list, based on the WNHIS list of rare plant species known to occur in Skamania County. Twenty-two of these species were documented by WNHP as occurring within 2 miles of the project site prior to 1977. Rare plant data collected prior to 1977 were vaguely mapped (a five-mile-diameter circle was used to map general location). Rare plant records collected since 1977 are more accurately mapped and have been included in this report. No rare plant species have been documented on the project site since 1977.

The list of potential rare plant species for the project area, identified through prefield review, is presented in Table 4.

**Field Reconnaissance Surveys.** Field reconnaissance surveys failed to locate any rare plant species or plant communities within the proposed project area.

## Environmental Consequences

### No Build Alternative

The types and distribution of vegetation would be similar to the existing conditions because land use patterns would be about the same. The age and structure of vegetation in commercial timberland would change over time in a shifting mosaic. It is reasonable to assume that relatively small percentages of existing vegetation types would be affected by roadway maintenance and operations activities, and required modifications to maintain functionality of the roadway.

### Build Alternative

See discussion of environmental consequences for the Build Alternative under the Wildlife section of this technical memorandum.

## Mitigation Concepts

See discussion of mitigation concepts for the Build Alternative in the Wildlife section below.



Insert Table 4 p1

Insert Table 4 p2

## References

Brown, E.R. Technical editor. 1985. *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington*. U.S. Forest Service USFWS), Pacific Northwest Region.

Washington Forest Practices Act.

Franklin, Jerry F., and C.T. Dyrness. 1988. *Natural Vegetation of Oregon and Washington*. Oregon State University Press.

Niehaus, Theodore F. 1976. *A Field Guide to Pacific States Wildflowers: Washington, Oregon, and Adjacent Areas*. Houghton Mifflin Company, Boston, MA.

Whitney, Stephen R. 1983. *A Field Guide to the Cascades and Olympics*. The Mountaineers, 306 2nd Avenue West, Seattle, WA 98119.

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Aceraceae</b>				
	<i>Acer circinatum</i>	vine maple	X	
	<i>Acer macrophyllum</i>	big leaf maple	X	
<b>Apiaceae</b>				
	<i>Daucus carota</i>	Queen Anne's lace		X
	<i>Oenanthe sarmentosa</i>	Pacific water -parsley	X	
	<i>Osmorhiza chilensis</i>	mountain sweet-cicely	X	
	<i>Sanicula crassicaulis</i>	Pacific sanicle	X	
<b>Apocynaceae</b>				
	<i>Apocynum androsaemifolium</i>	spreading dogbane	X	
<b>Araliaceae</b>				
	<i>Oplopanax horridus</i>	Devil's club	X	
<b>Aristolochiaceae</b>				
	<i>Asarum caudatum</i>	wild ginger		
<b>Asteraceae</b>				
	<i>Achillea millefolium</i>	wooly yarrow	X	
	<i>Adenocaulon bicolor</i>	pathfinder		
	<i>Anaphalis margaritacea</i>	pearly-everlasting	X	
	<i>Antennaria luzuloides</i>	woodrush pussytoes	X	
	<i>Centaurea cyanus</i>	bachelor's button		X
	<i>Centaurea diffusa</i>	diffuse knapweed		X
	<i>Chrysanthemum leucanthemum</i>	ox-eye daisy		X
	<i>Cichorium intybus</i>	chicory		X
	<i>Cirsium arvense</i>	Canada thistle		X
	<i>Cirsium vulgare</i>	bull thistle		X
	<i>Gnaphalium palustre</i>	marsh cudweed	X	
	<i>Hieracium albiflorum</i>	white-flowered hawkweed	X	
	<i>Hieracium scouleri</i>	wooly-weed	X	
	<i>Lactuca serriola</i>	prickly lettuce		X
	<i>Taraxacum officinale</i>	dandelion		X
	<i>Tragopogon dubius</i>	yellow salsify		X
<b>Berberidaceae</b>				
	<i>Achlys triphylla</i>	vanilla leaf	X	
	<i>Berberis nervosa</i>	Cascade Oregongrape	X	
	<i>Vancouveria hexandra</i>	white insideout flower	X	
<b>Betulaceae</b>				
	<i>Alnus sinuata</i>	Sitka alder	X	
	<i>Corylus cornuta</i>	beaked hazelnut	X	
<b>Boraginaceae</b>				
	<i>Cryptantha flaccida</i>	common cryptantha	X	
<b>Brassicaceae</b>				
	<i>Erysimum occidentale</i>	pale wallflower	X	
<b>Campanulaceae</b>				
	<i>Campanula scouleri</i>	Scouler's bluebell	X	

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Caprifoliaceae</b>	<i>Linnaea borealis</i>	twin flower	X	
	<i>Lonicera hispidula</i>	hairy honeysuckle	X	
	<i>Lonicera sp.</i>	honesuckle	X	
	<i>Sambucus racemosa</i>	red elderberry	X	
	<i>Symphoricarpos albus</i>	snowberry	X	
<b>Caryophyllaceae</b>	<i>Stellaria jamesiana</i>	sticky chickweed		
<b>Cornaceae</b>	<i>Cornus nutallii</i>	Pacific dogwood	X	
<b>Cupressaceae</b>	<i>Thuja plicata</i>	western red cedar	X	
<b>Cyperaceae</b>	<i>Eleocharis palustris</i>	creeping spikerush	X	
<b>Dryopteridaceae</b>	<i>Athyrium filix-femina</i>	lady fern	X	
<b>Equisitaceae</b>	<i>Equisetum arvense</i>	field horsetail	X	
<b>Ericaceae</b>	<i>Arctostaphylos patula</i>	green-leaf manzanita	X	
	<i>Chimaphylla menziesii</i>	little pipsissewa	X	
	<i>Chimaphylla umbellata</i>	common pipsissewa	X	
	<i>Pyrola picta</i>	white vein pyrola	X	
	<i>Vaccinium sp.</i>	huckleberry	X	
<b>Fabaceae</b>	<i>Cytisus scoparius</i>	Scotch broom		X
	<i>Lathyrus latifolius</i>	everlasting peavine		X
	<i>Lathyrus polyphyllus</i>	leafy peavine	X	
	<i>Lotus purshiana</i>	spanish-clover	X	
	<i>Lupinus caudatus</i>	Kellog spurred lupine	X	
	<i>Lupinus polyphyllus</i>	large-leaf lupine	X	
	<i>Lupinus sp.</i>	lupine	X	
	<i>Trifolium dubium</i>	least hop clover		X
	<i>Trifolium sp.</i>	clover		
	<i>Vicia sp.</i>	vetch		
<b>Grossulariaceae</b>	<i>Ribes sanguineum</i>	red-flowering currant	X	
<b>Hydrophyllaceae</b>	<i>Nemophila parviflora</i>	small-flowered nemophila	X	
	<i>Phacelia hastata</i>	silver-leaf phacelia	X	
<b>Hypericaceae</b>	<i>Hypericum perforatum</i>	common St. John's-wort		X
<b>Juncaceae</b>	<i>Juncus effusus</i>	common rush	X	
	<i>Luzula parviflora</i>	small-flowered wood rush	X	

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003  
Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Lamiaceae</b>	<i>Stachys cooleyae</i>	Cooley's hedge-nettle	X	
<b>Liliaceae</b>	<i>Clintonia uniflora</i>	bead lily	X	
	<i>Disporum hookeri</i>	Hooker's fairy-bell	X	
	<i>Lilium columbianum</i>	Columbia lily	X	
	<i>Smilacina racemosa</i>	western false Solomon's seal	X	
	<i>Smilacina stellata</i>	star-flowered false Solomon's	X	
	<i>Trillium ovatum</i>	western trillium	X	
<b>Onagraceae</b>	<i>Epilobium angustifolium</i>	fireweed		X
	<i>Epilobium sp.</i>	epilobium		
	<i>Oenothera strigosa</i>	common evening-primrose	X	
<b>Orchidaceae</b>	<i>Calypso bulbosa</i>	fairy-slipper	X	
	<i>Corallorhiza maculata</i>	spotted coral-root	X	
	<i>Corallorhiza mertensiana</i>	Merten's coral-root	X	
	<i>Corallorhiza striata</i>	striped coral-root	X	
<b>Pinaceae</b>	<i>Abies grandis</i>	grand fir	X	
	<i>Pseudotsuga menziesii</i>	Douglas-fir	X	
	<i>Tsuga heterophylla</i>	western hemlock	X	
<b>Plantaginaceae</b>	<i>Plantago lanceolata</i>	English plantain	X	
	<i>Plantago major</i>	common plantain	X	
<b>Poaceae</b>	<i>Bromus tectorum</i>	cheat grass		X
<b>Polemoniaceae</b>	<i>Microsteris gracilis</i>	midget phlox	X	
<b>Polygonaceae</b>	<i>Rumex acetosella</i>	sheep sorrel		X
	<i>Rumex occidentalis</i>	western dock	X	
<b>Polypodiaceae</b>	<i>Adiantum pedatum</i>	maidenhair fern	X	
	<i>Polystichum munitum</i>	sword fern	X	
	<i>Pteridium aquilinum</i>	bracken fern	X	
<b>Portulacaceae</b>	<i>Claytonia perfoliata</i>	miner's lettuce	X	
	<i>Claytonia siberica</i>	Siberian spring beauty	X	
<b>Primulaceae</b>	<i>Trientalis latifolia</i>	western starflower	X	
<b>Ranunculaceae</b>	<i>Actaea rubra</i>	baneberry	X	
	<i>Anemone deltoidea</i>	Columbia wind flower	X	

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003  
Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Rhamnaceae</b>				
	<i>Ceanothus integerrimus</i>	deerbrush	X	
	<i>Ceanothus sanguineus</i>	redstem ceanothus	X	
	<i>Ceanothus velutinus</i>	tobacco-brush	X	
<b>Rosaceae</b>				
	<i>Aruncus sylvestris</i>	goatsbeard	X	
	<i>Fragaria virginiana</i>	wild strawberry	X	
	<i>Holodiscus discolor</i>	oceanspray	X	
	<i>Prunus emarginata</i>	bitter cherry	X	
	<i>Prunus virginiana</i>	common chokecherry	X	
	<i>Rosa gymnocarpa</i>	baldhip rose	X	
	<i>Rosa woodsii</i>	Wood's rose	X	
	<i>Rubus leucodermis</i>	blackcap	X	
	<i>Rubus parviflora</i>	thimbleberry	X	
	<i>Rubus ursinus</i>	blackberry	X	
<b>Rubiacea</b>				
	<i>Galium aparine</i>	cleavers	X	
<b>Salicaceae</b>				
	<i>Populus balsamifera</i>	black cottonwood	X	
	<i>Salix lasiandra</i>	Pacific willow	X	
	<i>Salix scouleriana</i>	Scouler's willow	X	
	<i>Salix sitchensis</i>	Sitka willow	X	
<b>Saxifragaceae</b>				
	<i>Mitella diversifolia</i>	varied-leaved mitrewort	X	
	<i>Tellima grandiflora</i>	fringecup	X	
	<i>Tiarella trifoliata</i>	foamflower	X	
<b>Scrophulariaceae</b>				
	<i>Linaria dalmatica</i>	dalmatian toadflax		X
	<i>Penstemon sp.</i>	penstemon	X	
	<i>Penstemon subseratus</i>	fine-toothed penstemon	X	
	<i>Verbascum thapsus</i>	wooly mullein	X	
	<i>Veronica scutellata</i>	marsh speedwell	X	
<b>Valerianaceae</b>				
	<i>Plectritis macrocera</i>	white plectritis	X	
<b>Violaceae</b>				
	<i>Viola glabella</i>	stream violet	X	

**TABLE 4 Special Status Plant Species Potentially Occurring Within the Project Area  
Saddleback Wind Project**

Family	Scientific Name	Common Name	WA State Status	Federal Status
<b>Asteraceae</b>				
	<i>Balsamorhiza deltoidea</i>	Puget balsamroot	Review	
	<i>Erigeron howellii</i>	Howell's daisy	Threatened	SC
	<i>Erigeron oregonus</i>	Gorge daisy	Threatened	SC
	<i>Microseris borealis</i>	northern microseris	Sensitive	
<b>Boraginaceae</b>				
	<i>Hackelia diffusa</i> var. <i>diffusa</i>	Diffuse stickseed	Sensitive	
<b>Brassicaceae</b>				
	<i>Rorippa columbiae</i>	persistentsepal	Threatened	SC
<b>Campanulaceae</b>				
	<i>Githopsis specularioides</i>	common blue-cup		
<b>Caryophyllaceae</b>				
	<i>Silene douglasii</i> var. <i>monantha</i>	Douglas' silene	Review	
<b>Cyperaceae</b>				
	<i>Carex macrochaeta</i>	large-awn sedge	Sensitive	
<b>Fagaceae</b>				
	<i>Chrysolepsis chrysophylla</i>	golden chinquapin	Sensitive	
<b>Fumariaceae</b>				
	<i>Corydalis aquae-gelidae</i>	Clackamas corydalis	Threatened	SC
<b>Iridaceae</b>				
	<i>Sisyrinchium sarmentosum</i>	Pale blue-eyed grass	Threatened	SC
<b>Juncaceae</b>				
	<i>Juncus howellii</i>	Howell's rush	Review	
<b>Lentibulariaceae</b>				
	<i>Utricularia intermedia</i>	Flat-leaved bladderwort	Sensitive	
<b>Lycopodiaceae</b>				
	<i>Lycopodiella imundata</i>	bog clubmoss	Sensitive	
<b>Ophioglossaceae</b>				
	<i>Botrychium lunaria</i>	moonwort	Sensitive	
	<i>Botrychium minganense</i>	Victorian's grape-fern	Review	
	<i>Botrychium pinnatum</i>	St. John's moonwort	Sensitive	
<b>Orchidaceae</b>				
	<i>Cypripedium fasciculatum</i>	Clustered lady's slipper	Threatened	SC
	<i>Plantathera sparsifolia</i>	canyon bog-orchid	Sensitive	
	<i>Spiranthes porrifolia</i>	Western ladies-tresses	Sensitive	
<b>Polemoniaceae</b>				
	<i>Polemonium carneum</i>	great polemonium	Threatened	
<b>Portulacaceae</b>				
	<i>Montia diffusa</i>	Branching montia	Sensitive	



**TABLE 4 Special Status Plant Species Potentially Occurring Within the Project Area  
Saddleback Wind Project**

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>WA State Status</b>	<b>Federal Status</b>
<b>Ranunculaceae</b>				
	<i>Cimicifuga elata</i>	Tall bugbane	Threatened	
<b>Saxifragaceae</b>				
	<i>Bolandra oregana</i>	Bolandra	Sensitive	
	<i>Parnassia fimbriata</i> var.	fringed	Sensitive	
	<i>Sullivantia oregana</i>	Oregon sullivantia	Threatened	SC
<b>Scrophulariaceae</b>				
	<i>Collinsia sparsiflora</i> var.	Few-flowered collinsia		
	<i>Penstemon barrettiae</i>	Barrett's beardtongue	Threatened	SC

**C-2**

**Wetland Delineation Report: Saddleback Wind Project,  
Skamania County, Washington.**

**CH2M HILL (Peggy O'Neill). 2007**

# Wetland Delineation Report

## Saddleback Wind Energy Project

### Skamania County, Washington

PREPARED FOR: Dana Peck/Horizon Wind Energy LLC

PREPARED BY: Joel Shaich /CH2M HILL/PDX

REVIEWED BY: Peggy O'Neill/CH2M HILL/PDX

COPIES: Mike Pappalardo/CH2M HILL/CVO

DATE: January 9, 2007

## Summary

CH2M HILL conducted a delineation of potentially jurisdictional wetlands and waters of the State/U.S. and a determination of potential county-required buffer widths adjacent to wetlands and waters within the proposed project areas for the Saddleback Wind Energy Project. The investigation was conducted in the vicinity of Underwood Mountain, approximately 7 miles northwest of the City of White Salmon, in an unincorporated area of Skamania County, Washington (Figure 1). The project area is situated adjacent to, but entirely outside of, the Columbia Gorge National Scenic Area.

Study area boundaries are shown in Figure 2. The project study area for potential wetlands and waters included:

- 300-foot corridors centered on all proposed turbine strings and their associated access roads;
- 50-foot corridors on either side of all existing roads proposed for improvement in conjunction with the project; and
- an approximately 15-acre plot for proposed substation construction, and two 5-acre and five 2-acre areas identified as proposed construction staging areas.

No jurisdictional wetlands or waters of the State/U.S. were observed in the study area. Five sites were identified as potential "drainageways having short periods of spring or storm runoff" that would be subject to county buffer requirements. The five drainageways appear to meet criteria as Type V streams subject to a 25 foot buffer requirement.

This delineation represents the best professional judgment and conclusions of CH2M HILL. It is considered a preliminary jurisdictional determination; final authority for jurisdictional determinations for regulatory permitting rests with the U.S. Army Corps of Engineers and Skamania County Department of Planning and Community Development.

## Results

### Office Review

#### USGS Topographic Map

The USGS topographic map shows an intermittent pond identified as "Cedar Swamp" mapped within the general project area but outside of the study areas/proposed project facilities. Three unnamed perennial streams (Cedar Swamp tributaries) are mapped as crossing an existing road that is proposed to be widened to 20 feet. A proposed underground collector line will also follow the road. An unnamed perennial stream is mapped beginning at the western edge of the proposed 15 acre staging area (Figure 2).

#### National Wetland Inventory (NWI) Map

The National Wetland Inventory map shows one wetland in the general project area (Figure 3). The wetland is classified as a *palustrine unconsolidated bottom, semipermanently flooded, diked/impounded* (PUBFh) wetland and corresponds with the "Cedar Swamp" mapped on the USGS topographic map. It is outside the study areas.

#### Washington Department of Natural Resources (DNR) Forest Practices Stream Mapping

The Washington Department of Natural Resources Forest Practices Stream Mapping shows ten stream segments that are located within project study areas (Figure 3). These included the streams on the USGS map as well as additional streams. The streams at sites B-1, B-2 and B-3 are unnamed drainages that flow toward the Little White Salmon River. The other streams are unnamed tributaries of Little Buck Creek.

#### Skamania County Area Soil Survey

A review of the *Soil Survey of Skamania County Area, Washington* (Haagen, 1990) shows six soil series and 13 types or phases mapped within the project area (Figure 4). None are listed as hydric according the *Hydric Soils List for the Skamania County Area, Washington* (NRCS, 2001) and none are listed as containing inclusions of hydric soils.

## Field Investigation

### Wetlands

No wetlands were observed within the study areas. All of the potential stream crossing sites examined for the delineation were dominated by upland species. No wetland hydrology indicators were observed on the surface. Due to the lack of wetland vegetation or hydrology indicators on the surface no sample pits were dug.

### Waters of the State/U.S.

Ten sites with potential stream crossings of proposed project facilities were documented in the field delineation and determination of potential buffer widths (Table 1; Figure 3). Site photos are in the Appendix. None of the crossings appear to have waters of the U.S./State present. They did not contain channels or other characteristics of waters.



**TABLE 1**  
Site Summary

Site ID	Site Characteristics	Water of the State/U.S.	Skamania County Critical Area	Buffer Width (feet)
B-1	plateau; west edge is steep forested slope with broad swale; upland vegetation; no channel, scour or other indicators of a drainageway	NO	NO	0
B-2	gully in forest; upland vegetation; no channel, culvert, scour or other indicators of a drainageway	NO	NO	0
B-3	gully in forest and clearcut; upland vegetation; no channel, culvert, scour or other indicators of a drainageway	NO	NO	0
D-2	very subtle broad forested swale; upland vegetation; no channel, culvert, scour or other indicators of a drainageway	NO	NO	0
D-3	narrow forested gully; upland vegetation; 12" culvert under road; no channel; isolated areas of scour upstream of road; 12" wide scour path extends downstream of road approximately 100', then ends	NO	Class V stream	25
D-4	broad, shallow forested gully; upland vegetation; 12" culvert under road; no channel or scour	NO	Class V stream	25
D-5	very subtle broad forested swale; upland vegetation; no channel, culvert, scour or other indicators of a drainageway	NO	NO	0
D-6	broad, shallow forested gully; upland vegetation; 12" culvert under road; no channel or scour	NO	Class V stream	25
F-1	broad gully in recent clearcut; upland vegetation; 12" culvert under road; no channel; isolated areas of scour	NO	Class V stream	25
F-2	gentle slope in recent clearcut; upland vegetation; water from snow melt flowing across the ground; no culvert, channel or scour	NO	Class V stream	25





# LEGEND

- City
- Columbia River
- Freeway
- Highway
- County Boundary



0 10 20  
Miles

## Figure 1

### Vicinity Map

Wetland Delineation  
Saddleback Wind Project





**Figure 2**

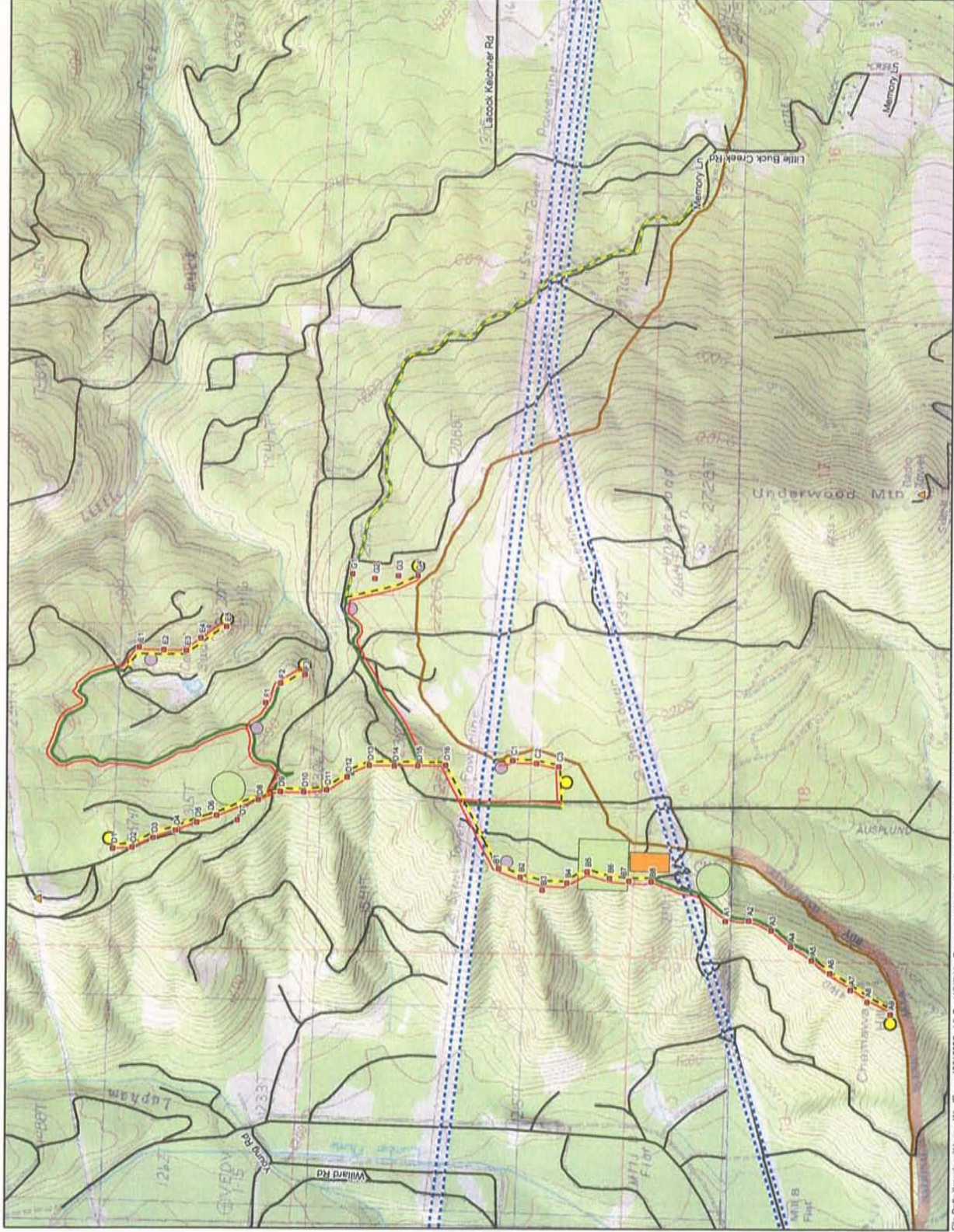
**Project Area**  
Wetland Delineation  
Saddleback Wind Project

**LEGEND**

- Proposed Permanent Facilities**
  - Proposed Turbine
  - Proposed Access Road - 20'
  - Existing Road - Widened to 15'
  - Existing Road - Widened to 20'
  - Proposed Underground 34.5kV Collector Line
  - Proposed Substation & O&M Facility
- Proposed Temporary Facilities**
  - Temporary Turnaround Area
  - Temporary Staging Area - 5 and 15 Acres
  - Temporary Staging Area - 2 Acres
- Existing Features**
  - Existing Microwave Tower
  - Existing Transmission Line
  - Existing Road
  - National Scenic Area Boundary



0 1,500 3,000  
Feet



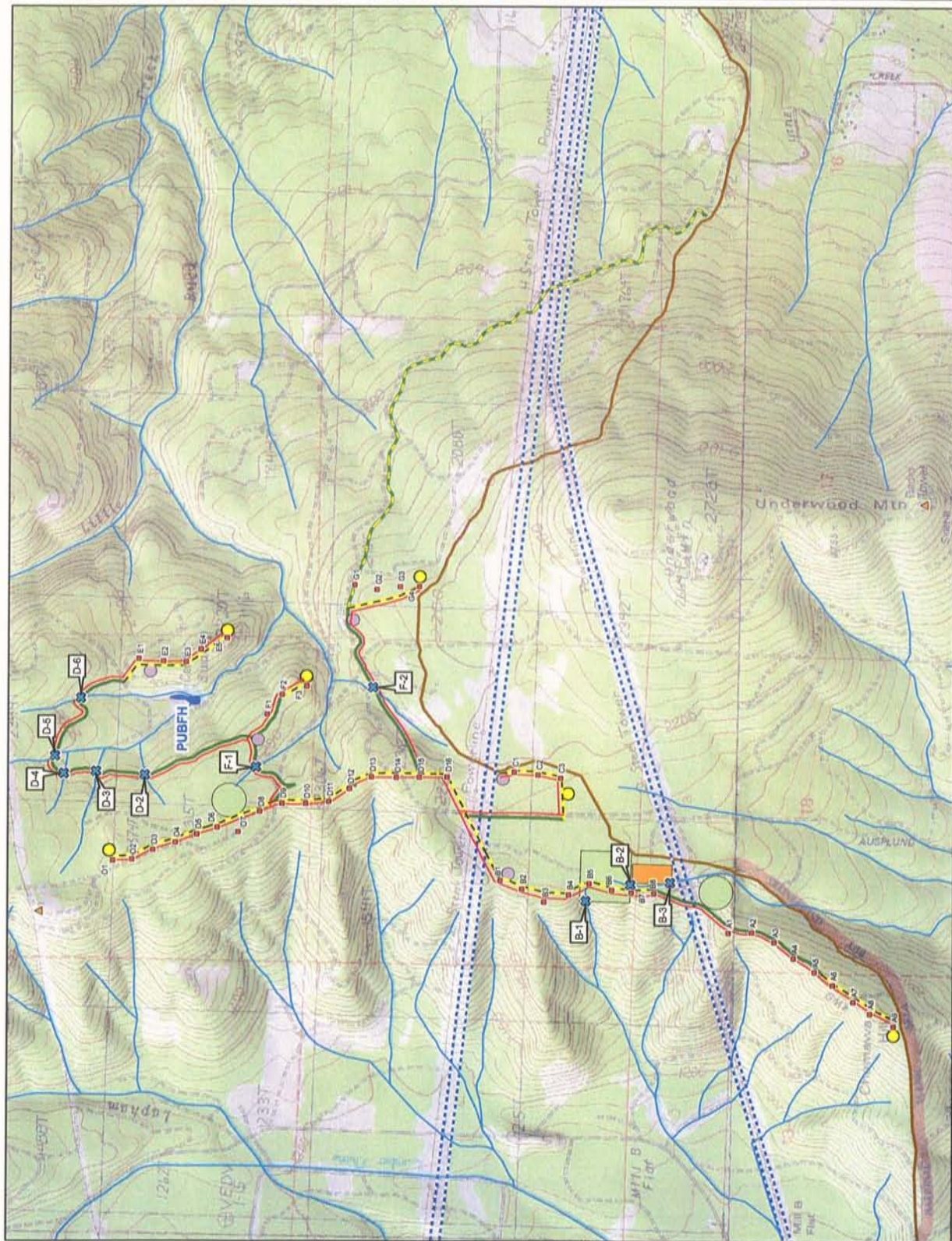
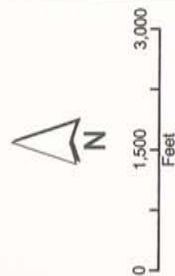


**Figure 3**

**DNR Streams**  
Wetland Delineation  
Saddleback Wind Project

**LEGEND**

- NWI Wetlands
- Stream Crossing
- Streams (from WA DNR)
- Proposed Permanent Facilities
  - Proposed Turbine
  - Proposed Access Road - 20'
  - Existing Road - Widened to 15'
  - Existing Road - Widened to 20'
  - Proposed Underground 34.5kV Collector Line
  - Proposed Substation & O&M Facility
- Proposed Temporary Facilities
  - Temporary Turnaround Area
  - Temporary Staging Area - 5 and 15 Acres
  - Temporary Staging Area - 2 Acres
- Existing Features
  - Existing Microwave Tower
  - Existing Transmission Line
  - National Scenic Area Boundary

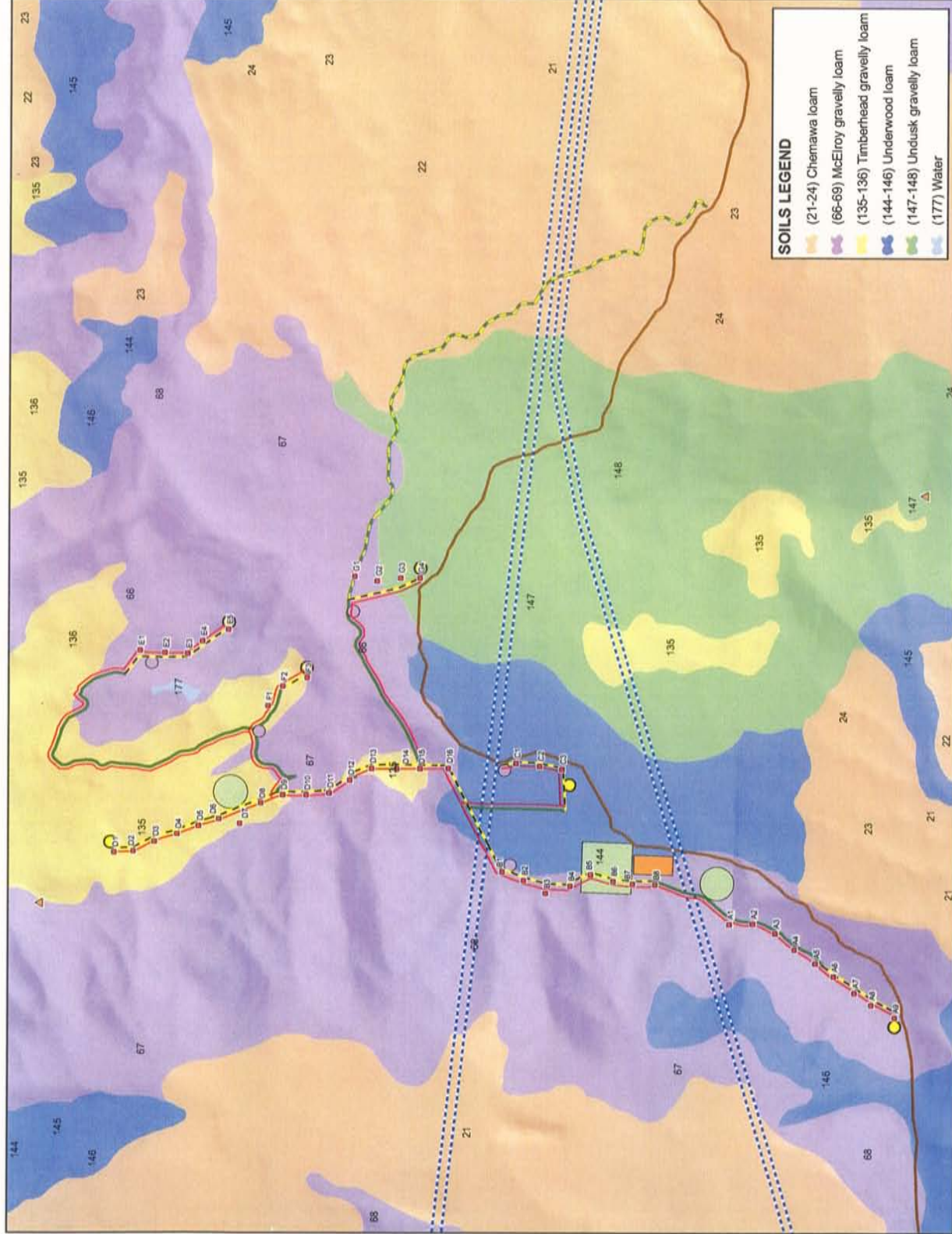
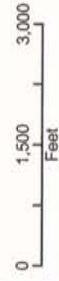




**Figure 4**  
Soils Mapping  
Wetland Delineation  
Saddleback Wind Project

**LEGEND**

- Proposed Permanent Facilities**
- Proposed Turbine
  - Proposed Access Road - 20'
  - Existing Road - Widened to 15'
  - Existing Road - Widened to 20'
  - Proposed Underground 34.5kV Collector Line
  - Proposed Substation & O&M Facility
- Proposed Temporary Facilities**
- Temporary Turnaround Area
  - Temporary Staging Area - 5 and 15 Acres
  - Temporary Staging Area - 2 Acres
- Existing Features**
- Existing Microwave Tower
  - Existing Transmission Line
  - National Scenic Area Boundary



- SOILS LEGEND**
- (21-24) Chemawa loam
  - (66-69) McElroy gravelly loam
  - (135-136) Timberhead gravelly loam
  - (144-146) Underwood loam
  - (147-148) Undusk gravelly loam
  - (177) Water

## **APPENDIX**

# **SITE PHOTOS**





Photo B1-01 . Looking west down slope from edge of plateau at location of upper end of USGS and DNR-mapped stream. 10/26/06.





Photo B1-02. Looking west downslope approximately 100 feet below plateau edge. 10/26/06.



Photo B1-03. Looking east at location of proposed temporary staging area on plateau. 10/26/06.



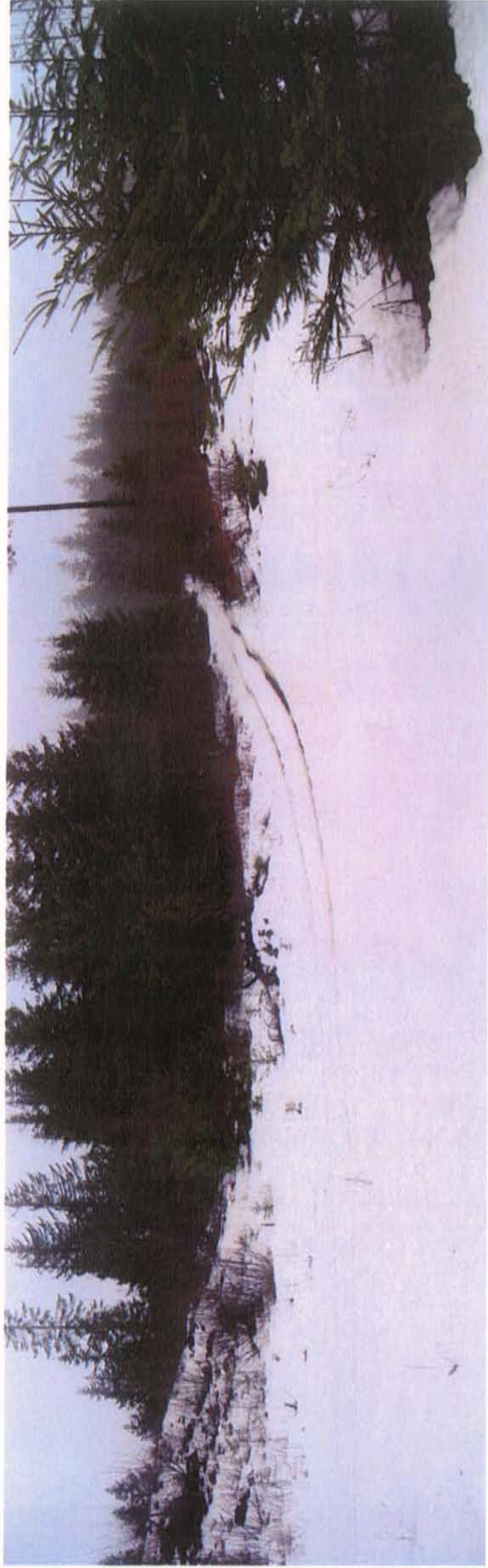


Photo B2-01. Looking north up slope at location of upper end of DNR mapped stream in proposed temporary staging area. No channel or other evidence of wetlands or waters was observed during this site visit or on an October 26, 2006 site visit. 01/08/07.



Photo B2-02. Looking south at subtle swale in location of DNR-mapped stream in proposed temporary staging area. Swale becomes a larger gully down slope. 01/08/07.





Photo B3-01. Looking west where transmission line access road crosses gully at location of DNR mapped stream. Proposed Substation & O&M Facility location is just north (right) of the road. 01/08/07.



Photo B3-02. Looking north upslope from road at gully. 01/08/07.







Photo B3-03. Looking south downslope from transmission line access road at gully.  
01/08/07.





Photo D2-01. Looking south at location of DNR-mapped stream. 10/26/06.



Photo D2-02. Looking west upslope from road. 10/26/06.





Photo D2-03. Looking west upslope from approximately 25 feet below road. 10/26/06.





Photo D3-01. Looking north at location of USGS and DNR-mapped stream. Drainageway is in front of vehicle. 10/26/06.



Photo D3-02. Looking west upslope approximately 200 feet below road. 10/26/06.



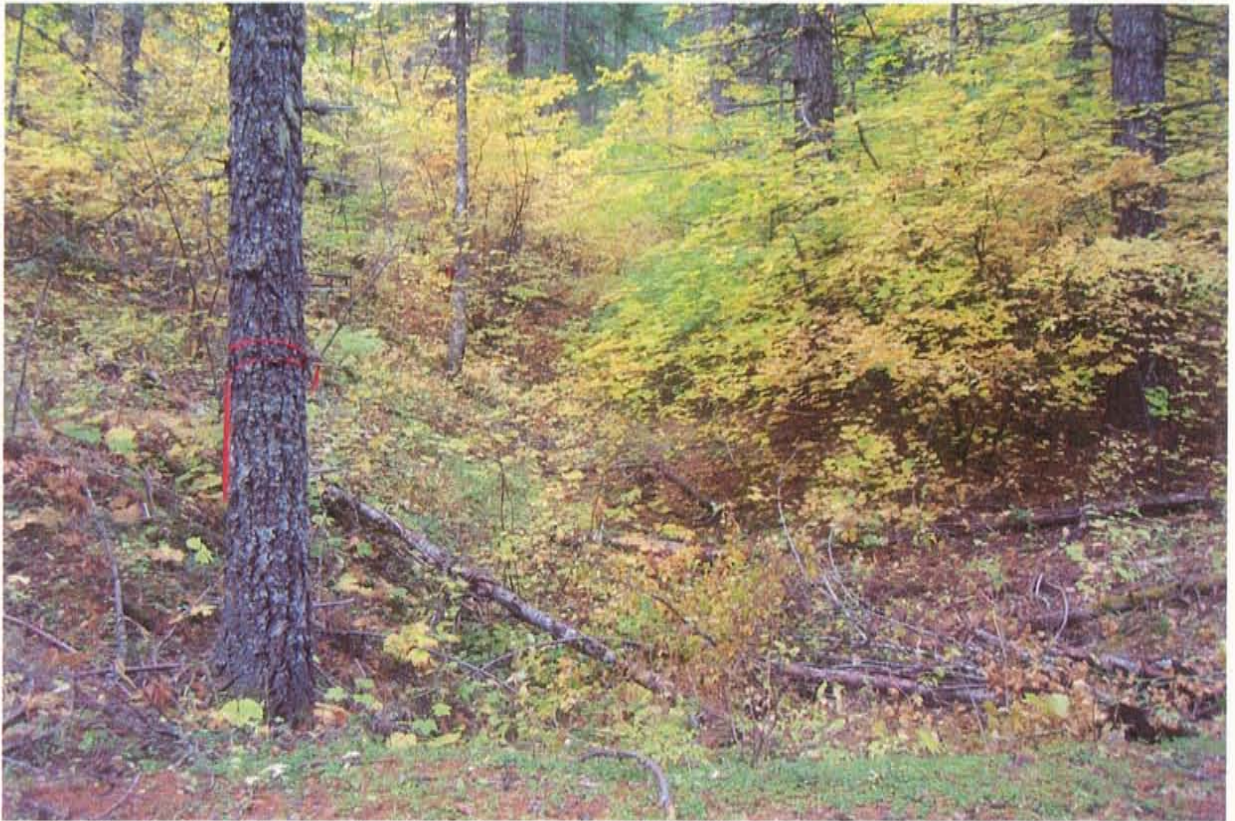


Photo D3-03. Looking west upslope from road. 10/26/06.

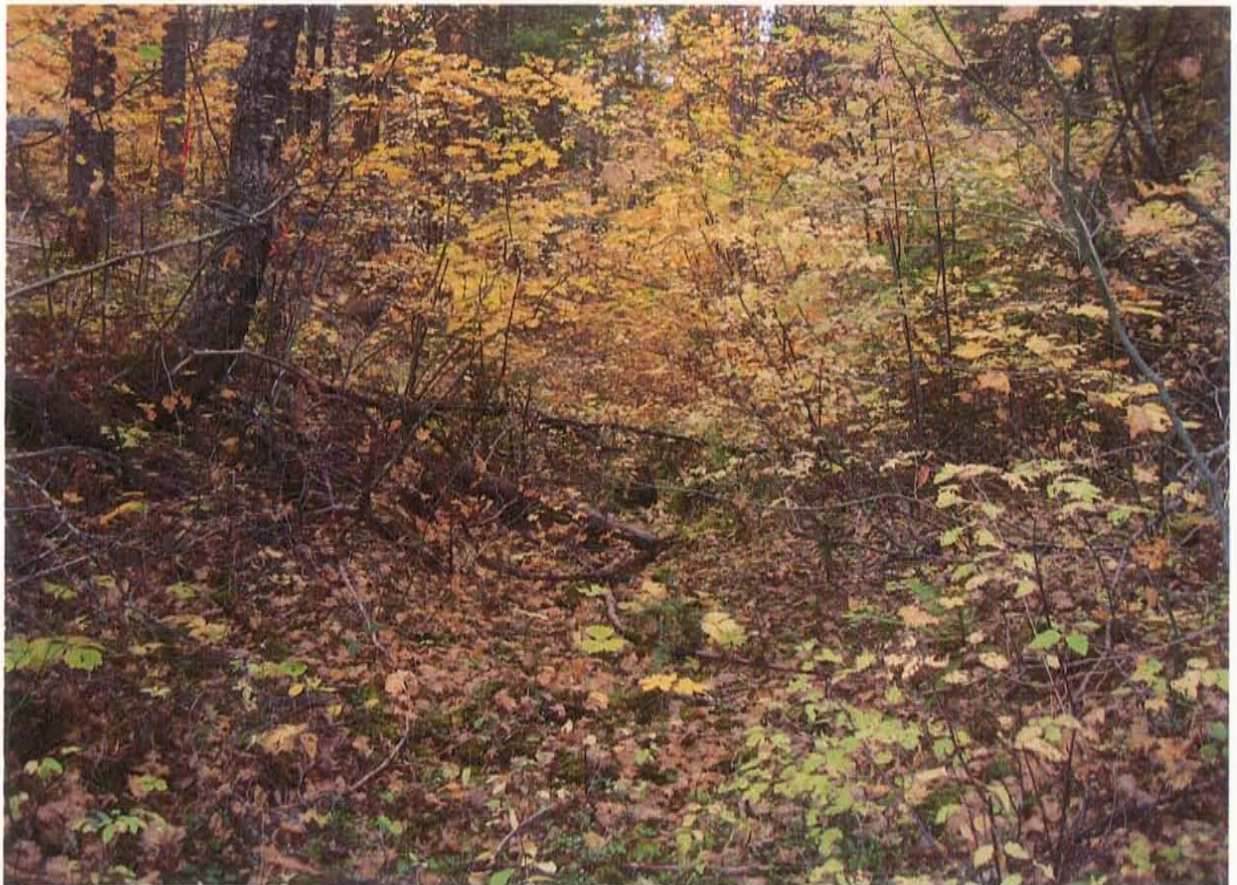


Photo D3-04. Looking west upslope approximately 100 feet above road. 10/26/06.



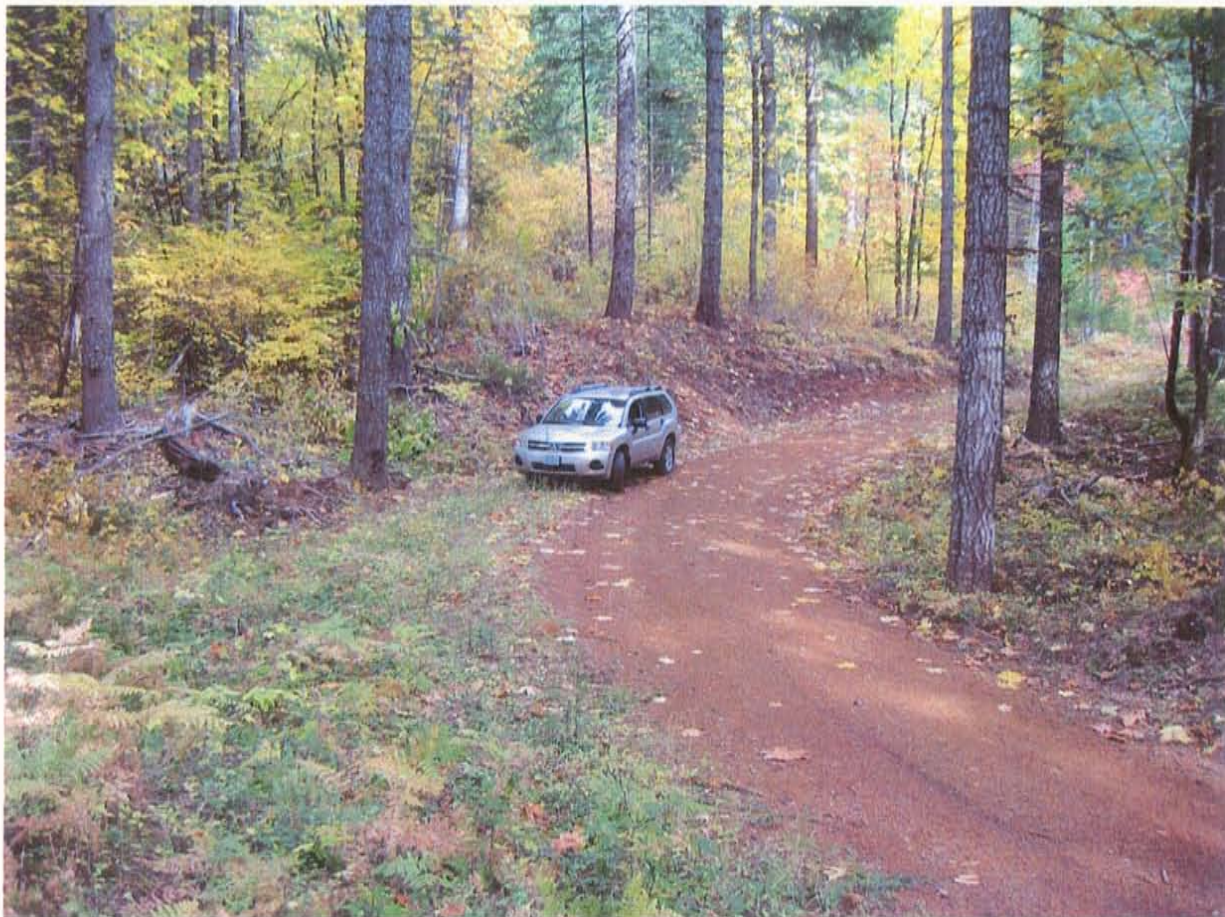


Photo D4-01. Looking northeast at location of DNR-mapped stream. Drainageway is in front of vehicle. 10/26/06.





Photo D4-02. Looking northwest upslope from road. 10/26/06.

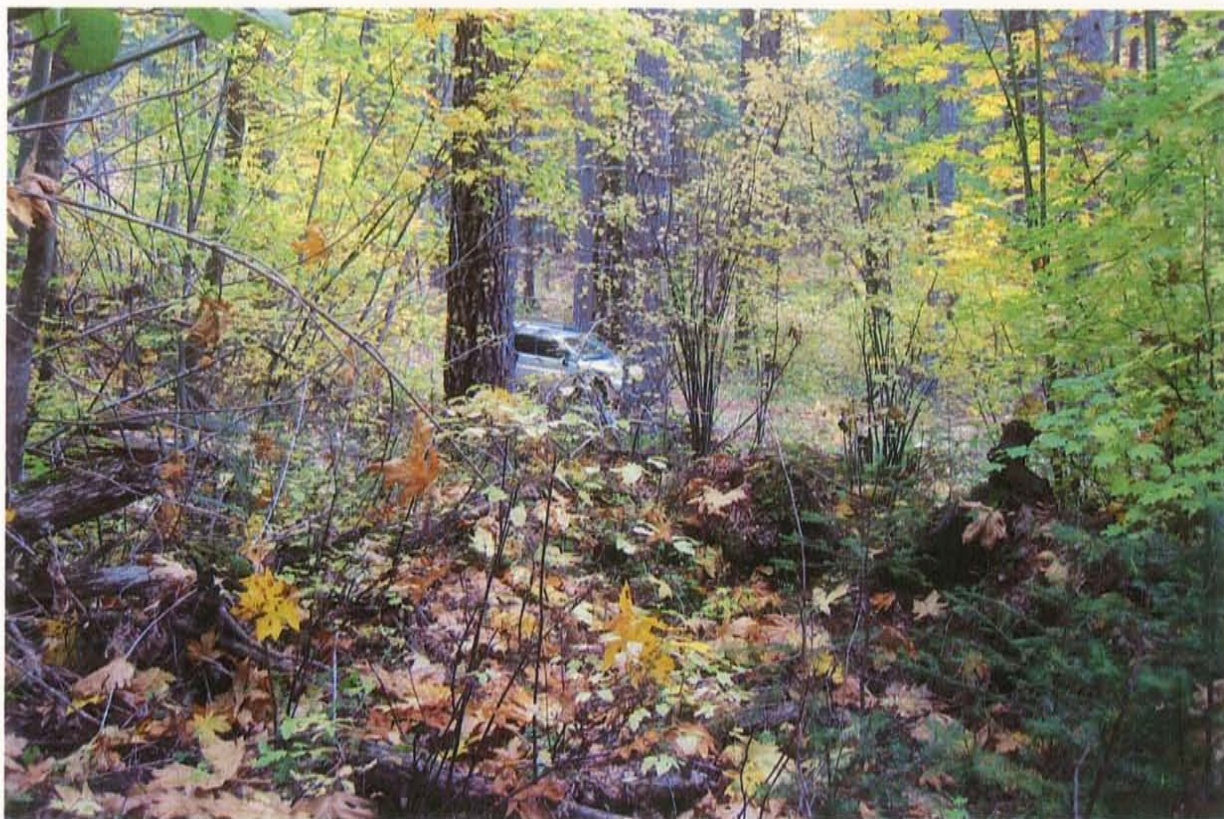


Photo D4-03. Looking southeast downslope approximately 100 feet above road. 10/26/06.



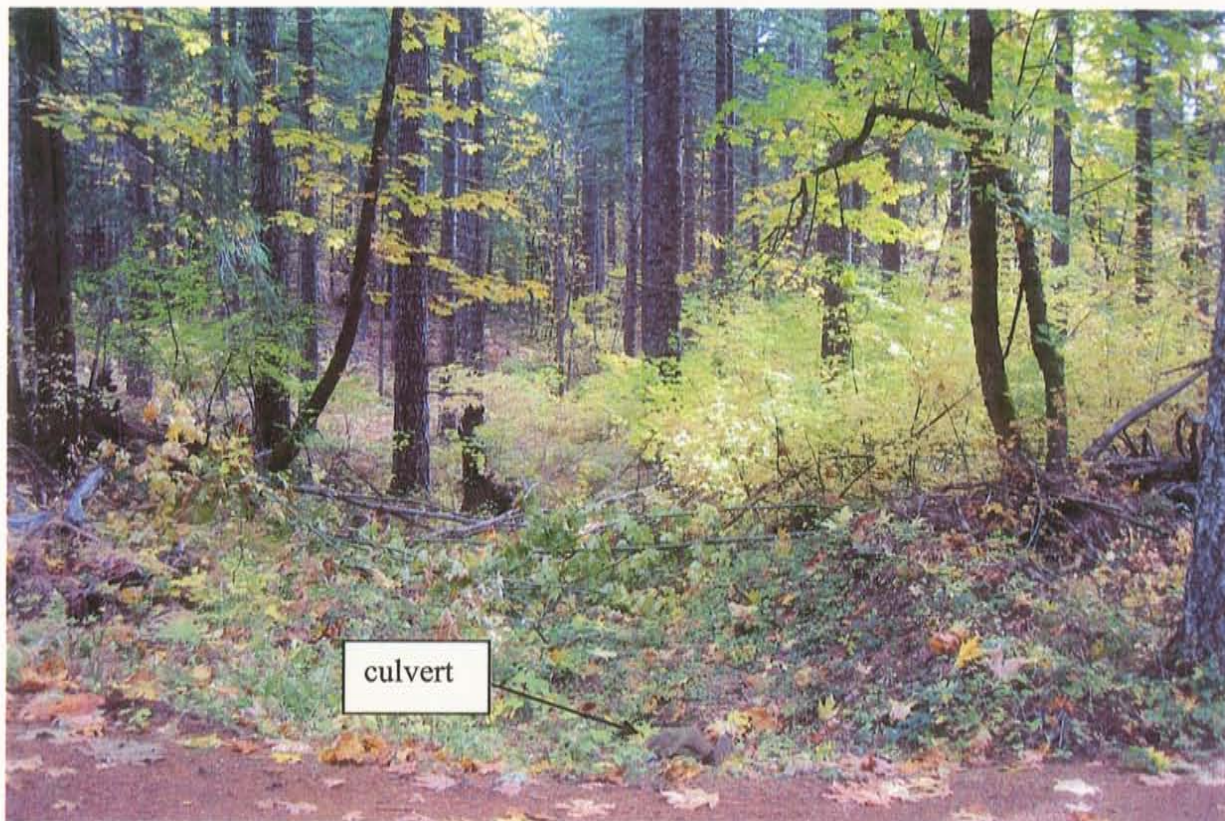


Photo D4-04. Looking southeast downslope from road. Note rock over culvert. 10/26/06.



Photo D4-05. Looking northwest upslope approximately 200 feet below road. 10/26/06.





Photo D5-01. Looking east at location of USGS and DNR-mapped stream. Vehicle is at lowest portion of site. 10/26/06.





Photo D5-02. Looking north upslope from road. 10/26/06.



Photo D5-03. Looking north upslope approximately 100 feet above road. 10/26/06.





Photo D5-04. Looking south downslope from road. 10/26/06.



D5-05. Looking north upslope approximately 200 feet below road (note vehicle on road in center of photo). 10/26/06.





Photo D6-01. Looking east at location of USGS and DNR-mapped stream. Drainageway is in front of vehicle. 10/26/06.



Photo D6-02. Looking south downslope approximately 100 feet above road. Culvert inlet is at pink flag. 10/26/06.



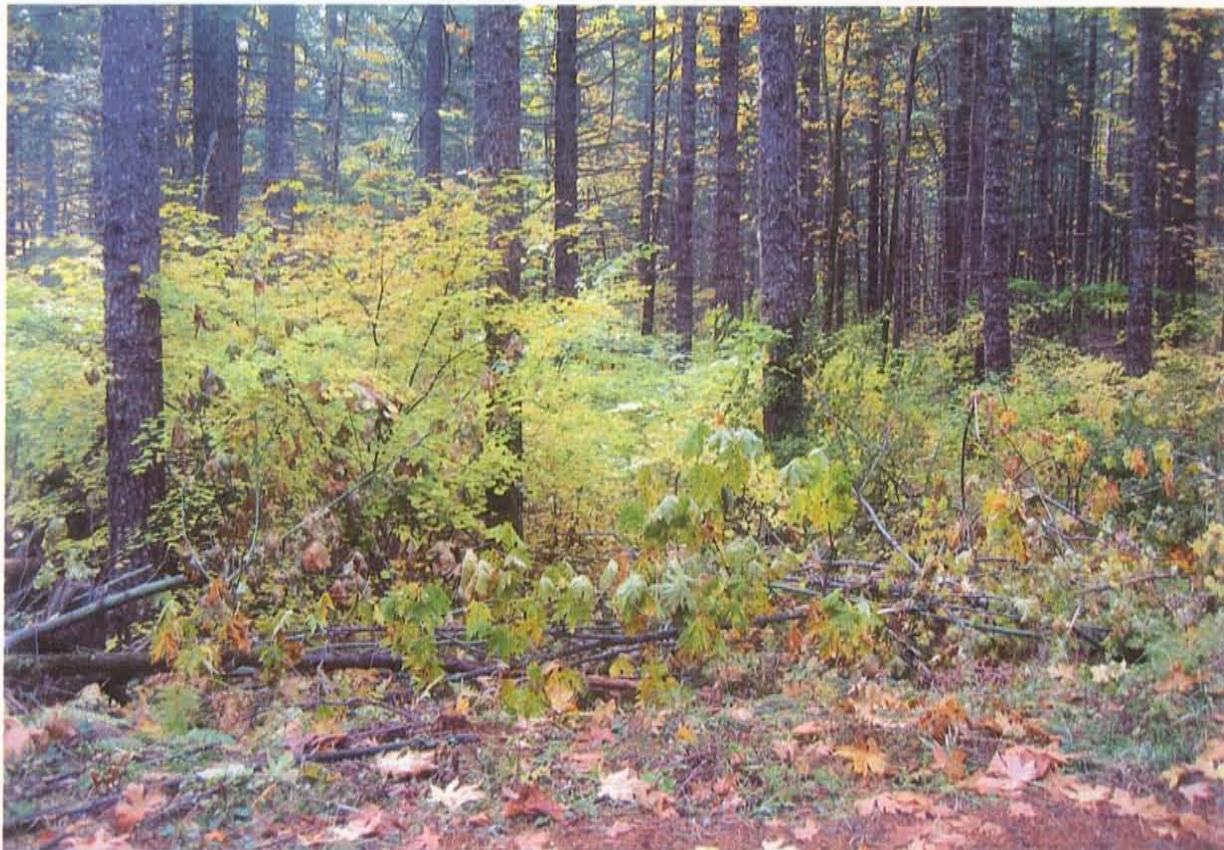


Photo D6-03. Looking south downslope from road. 10/26/06.



Photo D6-04. Looking north upslope approximately 250 feet below road. 10/26/06.





Photo F1-01. Looking west at location of DNR-mapped stream. Drainageway is behind vehicle. 10/26/06.





Photo F1-02. Looking southeast downslope from road. 10/26/06.



Photo F1-03. Looking northwest upslope approximately 200 feet below road. 10/26/06.





Photo F1-04. Looking northwest upslope from road. 10/26/06.



Photo F1-05. Looking upslope approximately 100 feet above road. 10/26/06.





Photo F2-01. Looking southwest at location of DNR-mapped stream. Dashed line is location of existing dirt road proposed for widening. 01/08/07.



Photo F2-02. Looking northwest along existing dirt road at location of DNR-mapped stream. 01/08/07.





Photo F2-03. Looking south upslope approximately 50 feet above existing dirt road.  
01/08/07.



Photo F4-04. Looking north downslope approximately 100 feet below existing dirt road.  
Surface flow sinks into ground and disappears approximately 100 feet below this point.  
01/08/07.

**C-3**

**Rare Plant Survey Report: Saddleback Wind Project,  
Skamania County, Washington. Prepared for PPM Energy.**

**CH2M HILL (Peggy O'Neill). 2003**

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# **Rare Plant Survey Report Saddleback Wind Project Skamania County, Washington**

Prepared for  
**PPM Energy**

October 2003

**CH2MHILL**  
Peggy O'Neill

# Contents

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# 1.0 Introduction

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CH2M HILL biologists conducted surveys for endangered, threatened, and sensitive plant species for the purpose of complying with state and federal permit requirements for the proposed Saddleback Wind project. BPA and Skamania County are the lead federal and state agencies that are responsible for identifying and evaluating the potential adverse environmental impacts of the proposed Project. The investigation was conducted in the vicinity of Underwood Mountain, approximately 7 miles northwest of the City of White Salmon, in an unincorporated area of Skamania County, Washington (Figure 1). The project area is situated adjacent to, but entirely outside of, the Columbia Gorge National Scenic Area.

## 1.1 Proposed Project Activities

PPM Energy, Inc. (PPM), proposes to build and operate a wind power facility at a site on private commercial forest land and a parcel owned by the Washington Department of Natural Resources (DNR). The planned facility will generate up to 86 megawatts (MW) of electricity and will consist of up to 48, 1.5 to 1.8-MW, wind turbines and associated support infrastructure, consisting of newly constructed and improved roads, transformers, underground 34.5-kilovolt (kV) collector lines, as well as a substation and operations and maintenance (O&M) facility. Collectively, the facility is known as the “proposed Project” or “Project.”

The total project will consist of up to 48 wind turbines. Each turbine will be up to approximately 390 feet tall (measured from the ground to the turbine blade tip), and will be mounted on a concrete pad. Spaced about 347 to 462 feet apart, the turbines will be grouped in strings of 3 to 16 turbines and connected by an underground electrical collector system. The applicant has determined the location and the end points of each turbine string; however, the number of turbines within each string, and the spacing between each turbine, may vary depending on which turbine supplier is selected by PPM Energy. All ultimate turbine siting, spacing, and clear areas will be in accordance with industry standards and safety measures discussed later in this document.

The turbines will operate at wind speeds ranging from 9 to 56 miles per hour (mph). The electrical output of each string of turbines will be connected to the Project substation by underground collector cables. The Project substation will be built directly adjacent to BPA's transmission lines, facilitating interconnection with the BPA grid. Access to the Project area will likely require use of about 5 miles of private logging roads and constructing about 3 miles of new gravel roads on private land.

## 1.2 Study Area

The project area is located in the Southern Washington Cascades Province (Franklin and Dyrness 1988). This area is characterized by generally accordant ridge crests separated by

steep, deeply dissected valleys. The project falls within the *Abies grandis* and *Pseudotsuga menziesii* major vegetation zones (Franklin and Dyrness 1988). Climate is wet and cool, receiving a significant portion of its precipitation in the form of snow which accumulates in winter snowpacks as deep as 1 to 3 meters.

The project area is located on the north and west flanks of Underwood Mountain, northwest of White Salmon, Washington. Major drainages in the area include the White Salmon and the Little White Salmon River basins to the east and west of the site respectively. Both basins drain to the Columbia River south of the site, which drains to the Pacific Ocean.

Historically, the project area was dominated by coniferous species – grand fir (*Abies grandis*), and Douglas-fir (*Pseudotsuga menziesii*). Historical species dominance was dependent on elevation, aspect, underlying soil, and previous disturbance history (Franklin and Dyrness 1988). Mixed conifer and deciduous forest stands usually followed disturbances, but occasionally deciduous-dominated stands developed, depending on the disturbance type and physical environment. Typical deciduous species were alder (*Alnus rubra*, *A. sinuata*), Pacific dogwood (*Cornus nutallii*), and big-leaf maple (*Acer macrophyllum*).

The predominant land use in the surrounding area between Underwood Mountain and the Little White Salmon River is commercial forest production. Land within the proposed project area is currently in commercial timber production and is owned by SDS Lumber Company, Broughton Lumber Company, and the Washington Department of Natural Resources.

Current vegetation conditions are heavily influenced by forest management activities over the last century. Land in the project area is privately owned, managed industrial forest. While forest management has not reduced tree species diversity, it has resulted in a shift in species dominance to the commercially valuable Douglas-fir and in changes to stand structure and complexity, patch size, and species distribution. Average stand age probably declined from relatively short stand rotation ages. Few large, old conifer trees occur in the project area and there are no known late-successional or “old-growth” stands within or adjacent to the project area, though small groups of big trees occur.

Common understory plants include sword fern (*Polystichum munitum*), vanilla leaf (*Achlys triphylla*), false Solomon’s seal (*Smilacena racemosa*), western starflower (*Trientalis latifolia*), Columbia windflower (*Anemone deltoidea*), snowberry (*Symphoricarpos albus*), vine maple (*Acer circinatum*), Oregongrape (*Berberis nervosa*), red-flowering currant (*Ribes sanguineum*), and red elderberry (*Sambucus racemosa*). A list of all plant species observed within the project area is found in Table 1, Appendix A.

The vegetation communities within the project area are common within the region and maintained through forest management, and to a lesser extent natural disturbance. Because of private ownership, rugged landscape, and the value of high-volume timber producing land, these vegetation communities are expected to persist within the region during the foreseeable future.





Insert Figure 1

## VICINITY MAP

## 2.0 Methods

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### 2.1 Pre-field Review

Prior to the field survey, a list of rare plant species potentially occurring within the project area was compiled. In identifying these species a plant was considered a special status species if it met one of the following criteria: federally or state listed or proposed as a rare, threatened, or endangered species (USFWS 1996 a&b); a federal candidate for listing (USFWS 1996 a&b); a Washington Natural Heritage Information System special plant (WNHIS 2003); or listed by the Washington Natural Heritage Program (WNHP) as a rare plant species known to occur in Skamania County (WNHP, March 2003). A species was determined to have some potential for occurring in the study area if it is known to occur in the vicinity or its known geographic range includes the study area, and if it is known to occur in habitats and elevations likely to occur in the study area. Twenty-nine special status species identified from these searches are shown in Table 2, Appendix B.

Further data was collected regarding the habitat requirements, phenology, associated species, and taxonomy of these species. Taxonomic keys, monographs, species guides, and plant lists were collected to provide additional information. Several references were used to gather habitat descriptions for particular species and are noted in the reference section of this report. This information was used to focus the level of survey intensity in areas where site conditions indicated species habitat requirements were present.

### 2.2 Field Investigation

The purpose of the rare plant surveys was to locate all populations of special status plants within the project area, to precisely record and map their locations using GPS technology, and to determine the size and phenology of each rare plant population, and its microhabitat characteristics. Surveys were floristic in nature and were conducted according to the rare plant survey guidelines provided by the U.S. Bureau of Land Management *Survey Protocols for Survey and Manage Strategy 2 Vascular Plants* (Whiteaker et al. 1998).

Surveys for potential rare plant species within project area were conducted on May 28, 29, 30 and July 28 and 29, 2003. This range of survey dates was selected to encompass all or a portion of the blooming times of all of the special status plants potentially occurring within the project area. The field surveys were performed by CH2M HILL botanists and ecologists familiar with rare plant species of the region. Potential habitats supporting rare species within the project study area were surveyed on foot at an intensity level sufficient to confirm the presence or absence of targeted rare plant species identifiable at the time of the surveys. The surveyors kept a list of all vascular plants encountered. Observations of plant associations, land use patterns, and unusual habitats were recorded.

Study area boundaries are shown in Figure 2. The project study area for potential habitats included:

- 300-foot corridors centered on all proposed turbine strings and their associated access roads,
- 50-foot corridors on either side of all existing roads proposed for improvement in conjunction with the project,
- an approximately 15-acre plot for proposed substation construction, and
- two 5-acre and five 2-acre areas identified as proposed construction staging areas.

Two survey methods were used. An *Intuitive Controlled Survey* was conducted throughout the project site with a *Complete Survey* conducted in areas of high potential habitat. Protocol for these methods is as follows:

### **Intuitive Controlled Survey**

For the entire project area an intuitive controlled survey was used. This method can also include a complete survey in habitats with the highest potential for rare plant species of concern.

The surveyor traversed through the project area to see a representative cross section of all the major habitats and topographic features, looking for the target species while en route between different areas. When the surveyor arrives at an area of high potential (that is defined in the pre-field review or encountered during the field visit), a complete survey for the target species is conducted.

### **Complete Survey**

For areas where the most suitable habitat was located a complete survey was conducted. These surveys are defined as a 100 percent visual exam of the project area.

All plant species encountered in the survey areas were identified to at least genus and to the level necessary to ensure that they were not special status plant species. Plant identification was aided using current taxonomic guides, including *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1996) and *Wetland Plants of Oregon and Washington* (Guard, 1995). A list of all plant taxa encountered was recorded in the field by turbine string, road, or staging/substation area. Collections were made for later determination of species that were not readily identifiable in the field. Final species determinations were made by keying specimens using standard references such as *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1996). A list of plants encountered within the project area during the rare plant survey is provided in Table 1, Appendix A.

**FIGURE 2: STUDY AREA**



## 3.0 Results

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### 3.1 Plant Communities

A total of five vegetation types occur within the areas included in project surveys: one wetland and four upland vegetation types. A description of these vegetation types follows.

#### 3.1.1 Wetland Vegetation

**Riparian Deciduous.** Natural and anthropogenic disturbances frequently result in domination by deciduous species in near-stream areas. Within the project area this type occurs in the area identified on the USGS topographic map as “Cedar Swamp.” Historically this area was dominated by very large, old cedar, which have been logged. The area is now dominated by willow and cottonwood (*Populus balsamifera*) with scattered occurrences of young cedar.

The Cedar Swamp area consists of approximately 24 acres is located adjacent to the proposed impact area for Turbine String F.

#### 3.1.2 Upland Vegetation.

**Grass-forb Stand.** Grass-forb Stands are found in the project vicinity in recently clearcut areas. Grass-forb is the stand condition in the USDA Forest Service classification system defined as areas where shrubs comprise less than 40 percent crown cover and are less than 5 feet tall (Brown, 1985). This stand type occurs when a disturbance such as timber harvest, fires, or wind has killed or removed most or all of the larger trees, or when brush fields are cleared for planting. These units may range from mainly devoid of vegetation to dominance by herbaceous species (grasses and forbs). Tree regeneration in these units is generally less than 5 feet tall and 40 percent crown cover.

In Grass-forb stands within the project vicinity vegetation is minimal and consists predominantly of weedy herbaceous species, including bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*). These areas generally consist of ubiquitous coarse woody material (CWM), occasional slash piles, and large areas of bare ground. Within the project’s proposed impact area there are approximately 22.3 acres of grass-forb vegetation community.

**Brushfield/Shrub Stand.** Brushfields are defined as the shrub stand condition in the USDA Forest Service classification system (Brown 1985). They develop on land following clearcut tree harvesting or other disturbances that remove vegetation. In keeping with Washington Forest Practices Rules, Chapter 222 WAC, all harvest units are planted within 3 years after harvest or a period of from 1 to 10 years as determined by the department in the case of a natural regeneration plan and must maintain minimum stocking levels of 150 vigorous, well-distributed undamaged seedlings per acre of commercial tree species.

Thus the majority of brushfields are actually young plantations (typically Douglas-fir, although many landowners are now planting mixed species) that have not yet reached the closed canopy stage or shaded out the shrub species. The type may have large amounts of bare soil, and often has slash and other logging debris on the ground. Vegetation (other than planted conifers) often consists of remnants from the forest understory and early successional annuals. There are vine maple, Sitka alder, beaked hazelnut (*Corylus cornuta*), serviceberry (*Amelanchier alnifolia*), Himalayan blackberry (*Rubus discolor*), bracken fern (*Pteridium aquilinum*), sword fern, oceanspray (*Holodiscus discolor*), fireweed (*Epilobium angustifolium*), woolly yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea*) and grasses as ground cover.

Vegetation control has occurred in conjunction with forest management and includes herbicide application, mechanical control, or both. These areas are visually and functionally different from areas where control has not occurred. Despite control efforts, or where they have not occurred, dense shrub thickets frequently occur, dominated by the native vine maple. Within the thickets are small alders and Douglas-fir that occasionally grow taller than the vine maple. These areas also may have patches of alder saplings, salmonberry (*Rubus spectabilis*), vine maple, red elderberry, oceanspray, lupine (*Lupinus* sp. ), Oregon oxalis, and grass. Small diameter coarse woody material (CWM) is common. Within the project's proposed impact area there are approximately 45.8 acres of brushfield/shrub vegetation community.

**Conifer-Hardwood Forest.** Conifer-Hardwood Forest is found in the project vicinity in the closed sapling-pole stand condition, under the USDA Forest Service vegetation classification system (Brown 1985). The forest canopy in these stands is dominated by a mix of bigleaf maple and Douglas-fir, with some red alder. Canopy height typically ranges from 40 to 60 feet. Canopy closure is between 60 and 80 percent. Maple forms about 30 percent of the canopy cover with Douglas-fir forming most of the rest of the canopy. Stands may have distinct tree canopy layers with deciduous overtopping emerging conifer or remnant conifer over the deciduous component. Stands with shrub layers that merge with the canopy layers are found in the project vicinity. The shrub layer varies from open to dense and contains vine maple, salmonberry, thimbleberry (*Rubus parviflora*), red elderberry, beaked hazelnut, and Pacific dogwood. The herbaceous layer contains sword fern, trailing blackberry, oxalis, grasses, and moss. Within the project's proposed impact area there are approximately 147.9 acres of conifer-hardwood vegetation community.

CWM is dependent on stand age, but is typically low to moderate. Deciduous snags outnumber conifer snags, although depending on stand origin, short well decayed conifer snags may be present.

**Conifer Forest.** Coniferous Forest is found in the project area in closed sapling-pole-sawtimber stands and large sawtimber stands. Within the project area and most of the region, Coniferous Forests are dominated by Grand fir and Douglas-fir. The closed sapling-pole-sawtimber is a continuum of tree diameter sizes with saplings being relatively small, poles being in the 8-12 inch range, and sawtimber ranging from 12 to 23 inches. Important to these stand types is the closed canopy and relative short live crowns found in the pole and sawtimber stages. The closed canopy results in the exclusion of most shrub species and many herbs.

CWM in this stage is typically low and consists of remnants from previous stands. Snags are typically rare, although small diameter snags become more frequent in the pole and sawtimber stages as shading and resource competition kills subdominants.

Large sawtimber is considered to be at least 21 inches in DBH. Within-stand differentiation has begun and dominants are beginning to overtop and out-compete other tree species. Competition for space results in more light reaching the forest floor and shrub and herbaceous communities typically become more diverse. CWM and snags are generally rare, although the number of snags and amount of CWM may be variable amount stands, dependent on past harvest practices, stand management, and actual stand age.

These forests are used for commercial forestry, and are generally regenerated after harvest, although some may be the result of natural disturbance combined with commercial planting. They are subject to timber management activities including harvest, replanting, and stand improvement activities. These forests are widespread in the project vicinity. Within the project's proposed impact area there are approximately 85.8 acres of conifer vegetation community.

## **3.2 Rare Plants**

No special status plant species were observed within the proposed project area in the course of the rare plant surveys.





## 4.0 References and Personal Communication

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# Appendix A

## Plant Species Observed

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**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Aceraceae</b>				
	<i>Acer circinatum</i>	vine maple	X	
	<i>Acer macrophyllum</i>	big leaf maple	X	
<b>Apiaceae</b>				
	<i>Daucus carota</i>	Queen Anne's lace		X
	<i>Oenanthe sarmentosa</i>	Pacific water -parsley	X	
	<i>Osmorhiza chilensis</i>	mountain sweet-cicely	X	
	<i>Sanicula crassicaulis</i>	Pacific sanicle	X	
<b>Apocynaceae</b>				
	<i>Apocynum androsaemifolium</i>	spreading dogbane	X	
<b>Araliaceae</b>				
	<i>Oplopanax horridus</i>	Devil's club	X	
<b>Aristolochiaceae</b>				
	<i>Asarum caudatum</i>	wild ginger		
<b>Asteraceae</b>				
	<i>Achillea millefolium</i>	wooly yarrow	X	
	<i>Adenocaulon bicolor</i>	pathfinder		
	<i>Anaphalis margaritacea</i>	pearly-everlasting	X	
	<i>Antennaria luzuloides</i>	woodrush pussytoes	X	
	<i>Centaurea cyanus</i>	bachelor's button		X
	<i>Centaurea diffusa</i>	diffuse knapweed		X
	<i>Chrysanthemum leucanthemum</i>	ox-eye daisy		X
	<i>Cichorium intybus</i>	chicory		X
	<i>Cirsium arvense</i>	Canada thistle		X
	<i>Cirsium vulgare</i>	bull thistle		X
	<i>Gnaphalium palustre</i>	marsh cudweed	X	
	<i>Hieracium albiflorum</i>	white-flowered hawkweed	X	
	<i>Hieracium scouleri</i>	wooly-weed	X	
	<i>Lactuca serriola</i>	prickly lettuce		X
	<i>Taraxacum officinale</i>	dandelion		X
	<i>Tragopogon dubius</i>	yellow salsify		X
<b>Berberidaceae</b>				
	<i>Achlys triphylla</i>	vanilla leaf	X	
	<i>Berberis nervosa</i>	Cascade Oregon grape	X	
	<i>Vancouveria hexandra</i>	white insideout flower	X	
<b>Betulaceae</b>				
	<i>Alnus sinuata</i>	Sitka alder	X	
	<i>Corylus cornuta</i>	beaked hazelnut	X	
<b>Boraginaceae</b>				
	<i>Cryptantha flaccida</i>	common cryptantha	X	
<b>Brassicaceae</b>				
	<i>Erysimum occidentale</i>	pale wallflower	X	
<b>Campanulaceae</b>				
	<i>Campanula scouleri</i>	Scouler's bluebell	X	



**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Caprifoliaceae</b>				
	<i>Linnaea borealis</i>	twin flower	X	
	<i>Lonicera hispidula</i>	hairy honeysuckle	X	
	<i>Lonicera sp.</i>	honesuckle	X	
	<i>Sambucus racemosa</i>	red elderberry	X	
	<i>Symphoricarpos albus</i>	snowberry	X	
<b>Caryophyllaceae</b>				
	<i>Stellaria jamesiana</i>	sticky chickweed		
<b>Cornaceae</b>				
	<i>Cornus nutallii</i>	Pacific dogwood	X	
<b>Cupressaceae</b>				
	<i>Thuja plicata</i>	western red cedar	X	
<b>Cyperaceae</b>				
	<i>Eleocharis palustris</i>	creeping spikerush	X	
<b>Dryopteridaceae</b>				
	<i>Athyrium filix-femina</i>	lady fern	X	
<b>Equisitaceae</b>				
	<i>Equisetum arvense</i>	field horsetail	X	
<b>Ericaceae</b>				
	<i>Arctostaphylos patula</i>	green-leaf manzanita	X	
	<i>Chimaphylla menziesii</i>	little pipsissewa	X	
	<i>Chimaphylla umbellata</i>	common pipsissewa	X	
	<i>Pyrola picta</i>	white vein pyrola	X	
	<i>Vaccinium sp.</i>	huckleberry	X	
<b>Fabaceae</b>				
	<i>Cytisus scoparius</i>	Scotch broom		X
	<i>Lathyrus latifolius</i>	everlasting peavine		X
	<i>Lathyrus polyphyllus</i>	leafy peavine	X	
	<i>Lotus purshiana</i>	spanish-clover	X	
	<i>Lupinus caudatus</i>	Kellog spurred lupine	X	
	<i>Lupinus polyphyllus</i>	large-leaf lupine	X	
	<i>Lupinus sp.</i>	lupine	X	
	<i>Trifolium dubium</i>	least hop clover		X
	<i>Trifolium sp.</i>	clover		
	<i>Vicia sp.</i>	vetch		
<b>Grossulariaceae</b>				
	<i>Ribes sanguineum</i>	red-flowering currant	X	
<b>Hydrophyllaceae</b>				
	<i>Nemophila parviflora</i>	small-flowered nemophila	X	
	<i>Phacelia hastata</i>	silver-leaf phacelia	X	
<b>Hypericaceae</b>				
	<i>Hypericum perforatum</i>	common St. John's-wort		X
<b>Juncaceae</b>				
	<i>Juncus effusus</i>	common rush	X	
	<i>Luzula parviflora</i>	small-flowered wood rush	X	

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Lamiaceae</b>				
	<i>Stachys cooleyae</i>	Cooley's hedge-nettle	X	
<b>Liliaceae</b>				
	<i>Clintonia uniflora</i>	bead lily	X	
	<i>Disporum hookeri</i>	Hooker's fairy-bell	X	
	<i>Lilium columbianum</i>	Columbia lily	X	
	<i>Smilacina racemosa</i>	western false Solomon's seal	X	
	<i>Smilacina stellata</i>	star-flowered false Solomon's	X	
	<i>Trillium ovatum</i>	western trillium	X	
<b>Onagraceae</b>				
	<i>Epilobium angustifolium</i>	fireweed		X
	<i>Epilobium sp.</i>	epilobium		
	<i>Oenothera strigosa</i>	common evening-primrose	X	
<b>Orchidaceae</b>				
	<i>Calypso bulbosa</i>	fairy-slipper	X	
	<i>Corallorhiza maculata</i>	spotted coral-root	X	
	<i>Corallorhiza mertensiana</i>	Merten's coral-root	X	
	<i>Corallorhiza striata</i>	striped coral-root	X	
<b>Pinaceae</b>				
	<i>Abies grandis</i>	grand fir	X	
	<i>Pseudotsuga menziesii</i>	Douglas-fir	X	
	<i>Tsuga heterophylla</i>	western hemlock	X	
<b>Plantaginaceae</b>				
	<i>Plantago lanceolata</i>	English plantain	X	
	<i>Plantago major</i>	common plantain	X	
<b>Poaceae</b>				
	<i>Bromus tectorum</i>	cheat grass		X
<b>Polemoniaceae</b>				
	<i>Microsteris gracilis</i>	midget phlox	X	
<b>Polygonaceae</b>				
	<i>Rumex acetosella</i>	sheep sorrel		X
	<i>Rumex occidentalis</i>	western dock	X	
<b>Polypodiaceae</b>				
	<i>Adiantum pedatum</i>	maidenhair fern	X	
	<i>Polystichum munitum</i>	sword fern	X	
	<i>Pteridium aquilinum</i>	bracken fern	X	
<b>Portulacaceae</b>				
	<i>Claytonia perfoliata</i>	miner's lettuce	X	
	<i>Claytonia siberica</i>	Siberian spring beauty	X	
<b>Primulaceae</b>				
	<i>Trientalis latifolia</i>	western starflower	X	
<b>Ranunculaceae</b>				
	<i>Actaea rubra</i>	baneberry	X	
	<i>Anemone deltoidea</i>	Columbia wind flower	X	

**TABLE 1 Plant Species Observed May 28-30 and July 28-29, 2003**  
**Saddleback Wind Project**

FAMILY	SCIENTIFIC NAME	COMMON NAME	NATIVE	NON-NATIVE
<b>Rhamnaceae</b>				
	<i>Ceanothus integerrimus</i>	deerbrush	X	
	<i>Ceanothus sanguineus</i>	redstem ceanothus	X	
	<i>Ceanothus velutinus</i>	tobacco-brush	X	
<b>Rosaceae</b>				
	<i>Aruncus sylvestris</i>	goatsbeard	X	
	<i>Fragaria virginiana</i>	wild strawberry	X	
	<i>Holodiscus discolor</i>	oceanspray	X	
	<i>Prunus emarginata</i>	bitter cherry	X	
	<i>Prunus virginiana</i>	common chokecherry	X	
	<i>Rosa gymnocarpa</i>	baldhip rose	X	
	<i>Rosa woodsii</i>	Wood's rose	X	
	<i>Rubus leucodermis</i>	blackcap	X	
	<i>Rubus parviflora</i>	thimbleberry	X	
	<i>Rubus ursinus</i>	blackberry	X	
<b>Rubiaceae</b>				
	<i>Galium aparine</i>	cleavers	X	
<b>Salicaceae</b>				
	<i>Populus balsamifera</i>	black cottonwood	X	
	<i>Salix lasiandra</i>	Pacific willow	X	
	<i>Salix scouleriana</i>	Scouler's willow	X	
	<i>Salix sitchensis</i>	Sitka willow	X	
<b>Saxifragaceae</b>				
	<i>Mitella diversifolia</i>	varied-leaved mitrewort	X	
	<i>Tellima grandiflora</i>	fringecup	X	
	<i>Tiarella trifoliata</i>	foamflower	X	
<b>Scrophulariaceae</b>				
	<i>Linaria dalmatica</i>	dalmatian toadflax		X
	<i>Penstemon sp.</i>	penstemon	X	
	<i>Penstemon subserratus</i>	fine-toothed penstemon	X	
	<i>Verbascum thapsus</i>	wooly mullein	X	
	<i>Veronica scutellata</i>	marsh speedwell	X	
<b>Valerianaceae</b>				
	<i>Plectritis macrocera</i>	white plectritis	X	
<b>Violaceae</b>				
	<i>Viola glabella</i>	stream violet	X	



# **Appendix B**

## **Potential Special Status Plant Species**

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**TABLE 2 Status, Distribution and Habitat Data for Special Status Plant Species Identified as Occurring or Potentially Occurring in the Vicinity of the Saddleback Wind Project.**

Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Asteraceae</b>								
	<i>Balsamorhiza deltoidea</i>	Puget balsamroot	mid March to mid June	Open places, usually avoiding the thinner soils; in the Puget trough, from south		Review		WNHP (2001); NPSO (1998)
				Vancouver Island to southern California.				
	<i>Erigeron howellii</i>	Howell's daisy	May to early July	In Washington, <i>Erigeron howellii</i> occurs primarily on steep north-facing slopes at elevations ranging from 1600 to 3400 feet. The taxon generally occurs within microsites that have very little soil development and limited development of competing vegetation. The sites are essentially in a stable, herb-dominated condition.		Threatened	SC	WNHP (2002)
	<i>Erigeron oregonus</i>	Gorge daisy	June	Moist shady cliffs and ledges; Columbia River Gorge, mostly frequently collected on the Oregon side.		Threatened	SC	WNHP (2002); Jolley (1988)
	<i>Microseris borealis</i>	northern microseris	July - August	Marshes at mid to high elevations west of Bonneville Dam. Blooms in the morning.		Sensitive		WNHP (2002); Jolley (1988)
<b>Boraginaceae</b>								
	<i>Hackelia diffusa</i> var. <i>diffusa</i>	diffuse stickseed	May through June	Shaded area, cliffs, talus, wooded flats and slopes.	Symphoricarpos albus, Philadelphus lewisii, Osmorhiza occidentalis, Acer glabrum, Fritillaria pudica, Erysimum occidentale	Sensitive		WNHP (2001)

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(E) Listed Endangered  
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(CH) Critical Habitat  
(PE) Proposed Endangered  
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(PCH) Proposed Critical Habitat

**STATE STATUS DESIGNATIONS:**

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(PE) Proposed Endangered  
(PT) Proposed Threatened  
(SC or C) Sensitive-critical  
(SV or V) Sensitive-vulnerable  
(SoC) Species of Concern  
(SP or P) Sensitive peripheral or naturally rare  
(SU or U) Sensitive-undetermined

**TABLE 2 Status, Distribution and Habitat Data for Special Status Plant Species Identified as Occurring or Potentially Occurring in the Vicinity of the Saddleback Wind Project.**

Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Brassicaceae</b>								
	<i>Rorippa columbiae</i>	persistentsepal yellowcress	April to October (depending on water regime)	Has been observed near all types of bodies of water, including the Columbia River, intermittent snow-fed streams, permanent lakes, snow-fed lakes, internally-drained lakes, which may be dry for extended periods of time, wet meadows, irrigation ditches, and roadside ditches. The species apparently requires wet soil throughout the growing season. It is known from a wide variety of soil types, including clay, sand, gravel, sandy silt, cobblestones, and rocks. Individuals are usually found in open habitats that have low vegetative cover. A common feature of all of the known sites is inundation for at least part of the year. <i>R. columbiae</i> typically occurs in the lowest vegetated riparian zone in a band spanning approximately 1-1.5 meters in elevation.	NA	Threatened	SC	WNHP (2001)
<b>Campanulaceae</b>								
	<i>Githopsis specuarioides</i>	common blue-cup	Mid-April to mid-June	Open places at lower elevations; typically open habitats within forested landscapes.	Vary, but often include <i>Pseudotsuga menziesii</i> , <i>Pinus ponderosa</i> , <i>Quercus garryana</i> . Other associated species: <i>Agropyron spicatum</i> , <i>Festuca idahoensis</i> , <i>Bromus mollis</i> , <i>Lomatium</i> sp., <i>Collinsia parviflora</i> .			WNHP (2001); Jolley (1988)
<b>Caryophyllaceae</b>								
	<i>Silene douglasii</i> var. <i>monantha</i>	Douglas' silene	May - June or later, depending on elevation.	Rocky, well-drained soils, wet areas. Sagebrush plains to montane slopes.		Review		WNHP (2001); John Gammon, Washington DNR (2002) Florence Caplow Washington DNR (2002)
<b>Cyperaceae</b>								
	<i>Carex macrochaeta</i>	large-awn sedge	June - August	Moist or wet, open places, often near the beach. Northwest coast of Asia, east through the Aleutian Islands to the Alaska peninsula, and south near the coast to southern B.C.; reputedly also in the Columbia River Forge at Multnomah Falls, Oregon. An old (1836) collection by Garry is supposed to have come from Ft. Vancouver, WA.		Sensitive		WNHP (2002)

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**TABLE 2 Status, Distribution and Habitat Data for Special Status Plant Species Identified as Occurring or Potentially Occurring in the Vicinity of the Saddleback Wind Project.**

Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Fagaceae</b>	<i>Chrysolepsis chrysophylla</i>	golden chinquapin	May through July	Dry, open sites to fairly thick woodland, from sea level up to 5500 feet elevation.		Sensitive		WNHP (2002); Florence Caplow, Washington DNR (2003)
<b>Fumariaceae</b>	<i>Corydalis aquae-gelidae</i>	Clackamas corydalis	June to September	Occurs primarily in the western hemlock (Tusga heterophylla) and Pacific silver fir (Abies amabilis) zone. (Franklin and Dyrness, 1973), at elevations ranging from 2500 to 3800 feet. It is found growing in or near cold flowing water, including seeps and small streams, often occurring within the stream channel itself. Current information suggests that C. aquae-gelidae prefers intermediate levels of overstory canopy closure which provide enough light for flowering and reproduction, yet not so much light that a dense cover of shrubs develops.		Threatened	SC	WNHP (2002)
<b>Iridaceae</b>	<i>Sisyrinchium sarmentosum</i>	pale blue-eyed grass	mid-June to early August	Occurs in meadows and small openings from 1600 to 4200 feet. The meadows, which fill with snow and/or water I winter and spring, area variously dominated by grasses and sedges. Conifers such as lodgepole pine (Pinus contorta), and Engelmann spruce (Picea engelmannii), and shrubs such as hardhack (Spiraea douglasii), border the meadows and are occasional invaders. The sites are relatively flat, often being slightly concave. Most sites are within either the Little White Salmon River or the White Salmon River drainages. The underlying bedrock is basalt from various flows.	Pinus contorta, Picea engelmannii, Spiraea douglasii	Threatened	SC	WNHP (2001)

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Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Juncaceae</b>								
	<i>Juncus howellii</i>	Howell's rush	July - August	Moist ground in the mountains; chiefly Californian, from Siskiyou to Trinity and Butte cos., but possibly northeast to northeast Oregon and west central Idaho.		Review		WNHP (2002)
<b>Lentibulariaceae</b>								
	<i>Utricularia intermedia</i>	flat-leaved bladderwort	July through August	Shallow ponds, slow-moving streams, and wet sedge or rush meadows. Generally occurs only in significant wetlands where standing water is present year around,. bog-like areas.	Scirpus acutus, Ranunculus flammula, Juncus supiniformis, Juncus balticus, Equisetum fluviatile, Carex sitchensis	Sensitive		WNHP (2001)  John Gammon, Washington DNR (2002) Florence Caplow Washington DNR (2002)
<b>Lycopodiaceae</b>								
	<i>Lycopodiella inundata</i>	bog clubmoss		Mostly in sphagnum bogs, seldom in other very wet places.		Sensitive		WNHP (2002)
<b>Ophioglossaceae</b>								
	<i>Botrychium lunaria</i>	moonwort	May through July	Moist or wet, more or less open places at middle to high elevation in the mountains, e.g., about mountain springs; generally neither in meadows nor in deep forest, at least in our range.		Sensitive		WNHP (2002); Florence Caplow, Washington DNR (2003)
	<i>Botrychium minganense</i>	Mingan grape-fern	May through July	Exhibits wide ecological amplitude, occurring in a wide range of habitats, particularly east of the Cascades, where it occurs in open shrubland and barren slopes. However, it typically occurs in older forest stands. The colonies are associated with riparian zones and old growth western redcedar ( <i>Thuja plicata</i> ) in dense shade, sparse understory, on alluvium substrate and often a duff layer of <i>Thuja</i> branchlets. Generally occur on soils saturated in the Spring, but tend to dry out later in the growing season. Plants do not occur in soils wet enough to support skunk cabbage, but grow adjacent to these areas.		Review		WNHP (2001); Florence Caplow, Washington DNR (2003)
	<i>Botrychium pinnatum</i>	St. John's moonwort	May through July	Moist or wet, more or less open places in the mountains, but not at highest altitudes.		Sensitive		WNHP (2002); Florence Caplow, Washington DNR (2003)

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**TABLE 2 Status, Distribution and Habitat Data for Special Status Plant Species Identified as Occurring or Potentially Occurring in the Vicinity of the Saddleback Wind Project.**

Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Orchidaceae</b>								
	<i>Cypripedium fasciculatum</i>	clustered lady's slipper	May through mid-June	Mid-to late-seral Douglas-fir ( <i>Psuedotsuga menziesii</i> ) or Ponderosa pine ( <i>Pinus ponderosa</i> ) overstory with a closed herbaceous layer and variable shrub layer, mostly on northerly aspects. It can also be found in grand fir ( <i>Abies grandis</i> ) forest with Swauk sandstone, thick duff or sandy loam soils.	<i>Psuedotsuga menziesii</i> , <i>Pinus ponderosa</i> , <i>Pachistima myrsinites</i> , <i>Holodiscus discolor</i> , <i>Spiraea betulifolia</i> , <i>Berberis nervosa</i> , <i>Calamagrostis rubescens</i> , <i>Arnica cordifolia</i> , <i>Carex geyeri</i> , <i>Abies grandis</i>	Threatened	SC	WNHP (2001)
	<i>Plantathera sparsifolia</i>	canyon bog-orchid	Late May-August	Open, wet areas, seeps and bogs.	<i>Plantathere stricta</i> , <i>P. dilatata</i> , <i>Polygonum bistirtoides</i> , <i>Drosera rotundifolia</i> , <i>Gentiana rotundifolia</i> .	Sensitive		WNHP (2002)
	<i>Spiranthes porrifolia</i>	western ladies-tresses	May through August	Wet meadows, along stream, in bogs, and on seepage slopes.	<i>Pinus ponderosa</i> , <i>Psuedotsuga menziesii</i> , <i>Quercus garryana</i> , <i>Purshia tridentata</i> , <i>Allium amplexans</i> , <i>Delphinium burkei</i> , <i>Brodiaea coronaria</i> , <i>Oenothera villosa</i> , <i>Lotus corniculatus</i> , <i>Verbascum blattaria</i> , <i>Chicorium intybus</i> ., <i>Melilotus alba</i> , <i>Trifolium arvense</i> , <i>Lathyrus latifolius</i>	Sensitive		WNHP (2001)
<b>Polemoniaceae</b>								
	<i>Polemonium carneum</i>	great polemonium	mid to late June	Thickets, woodland, and forest opening, from near sea level to moderate elevation in the mountains.		Threatened		WNHP (2002); Jolley (1988)
<b>Portulacaceae</b>								
	<i>Montia diffusa</i>	branching montia	late April to mid June	Mostly in moist woods on the west side of the Cascades.		Sensitive		WNHP (2001); NPSO (1998)
<b>Ranunculaceae</b>								
	<i>Cimicifuga elata</i>	Tall bugbane	late May -Aug	Occurs in and along margins of moist forest at low to middle elevations. From B.C., Olympic Peninsula, along western WA Cascades and Puget Trough, south to NW Oregon. In Washington, <i>C. elata</i> generally grows in or along the margins of mixed, mature or o old growth stands of mesic	<i>Pseudotsuga menziesii</i> , <i>Thuja plicata</i> , <i>Acer macrophyllum</i> , <i>Alnus rubra</i> , <i>Acer circinatum</i> , <i>Holodiscus discolor</i> , <i>Corylus cornuta</i> , <i>Polystichum munitum</i> , <i>Symphoricarpos albus</i> .	T		ONHP (2001); Pojar & MacKinnon (1994); WNHP (2001)

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**TABLE 2 Status, Distribution and Habitat Data for Special Status Plant Species Identified as Occurring or Potentially Occurring in the Vicinity of the Saddleback Wind Project.**

coniferous forest, or mixed coniferous-deciduous forest.								
Family	Scientific Name	Common Name	Phenology	Habitat	Associated Species	WA State	Federal Status	Sources
<b>Saxifragaceae</b>								
	<i>Bolandra oregana</i>	bolandra	early May to early July	Moist, mossy rocks, usually near waterfalls, on both sides of the lower Columbia River.		Sensitive		WNHP (2001); NPSO (1998)
	<i>Parnassia fimbriata</i> var. <i>hoodiana</i>	fringed grass-of-parnassus	July - September	Gorge, and along the Snake Rive and its tributaries in southeast Washington, northeast Oregon, and adjacent Idaho. Bogs, wet meadows, and stream banks, lower montane to arctic-alpine.		Sensitive		WNHP (2002); Jolley (1988)
	<i>Sullivantia oregana</i>	Oregon sullivantia	May through August	Occurs on moist cliffs, especially near waterfalls. Probably grows in shallow pockets of basalt-derived soils. Occurs in microsites that remain wet to moist much of the year.	Dodecatheum dentatum, Tolmiea menziesii, Oxalis trillifolia.	Threatened	SC	WNHP (2002); Jolley (1988)
<b>Scrophulariaceae</b>								
	<i>Collinsia sparsiflora</i> var. <i>bruceae</i>	few-flowered collinsia	mid-March through April	In Washington, the taxon occurs in thin soils over basalt on a variety of slopes, from almost flat to rather steep, generally south-facing. The microsites are generally quite open, but may be adjacent to or found within open stands of ponderosa pine and Oregon white oak. These habitats are moist in spring, but become dry by summer.	There is generally a dense herbaceous layer, commonly with Balsamorhiza sagittata, Lomatium macrocarpum, Sisyrinchium douglasii, Lupinus bicolor, Fritillaria pudica, Lithophragma sp.. Weedy annual species such as Poa bulbosa, and Erodium cicutarium.			WNHP (2002)
	<i>Penstemon barrettiae</i>	Barrett's beardtongue	late April to early June	In Washington, P. Barrettiae generally grows in crevices along basalt cliff faces, on ledges of rock outcrops, on open talus and occasionally along well drained roadsides. It occurs mostly at lower elevations, but its range is up to 3200 feet. It generally occurs on rocky substrates of basaltic origin, with little soil development. Soils area composed of wind blown material and organic matter and provide good drainage.	Psuedotsuga menziesii, Pinus ponderosa	Threatened	SC	WNHP (2001)

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# **Appendix C**

## **Species Descriptions for Potentially Occurring Rare Plants**

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**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Asteraceae</b>			
	<i>Balsamorhiza</i>	Puget balsamroot	Perennial with a deep-seated, woody taproot and multicapital caudex; basal leaves long-petiolate, the blade mostly triangular-hastate, or with more cordate base, up to 30 cm. Long and 20 mm wide, green, inconspicuously hirsute and often glandular, thinner and less veiny than in <i>B. careyana</i> , often crenate; stem 2-10 dm tall, scapiform, but usually with several strongly reduced narrow leaves; central head large, the disk rarely less than 2.5 cm wide; lateral heads, when present, obviously smaller; involucre only slightly or scarcely wooly, the outer bracts tending to be enlarged and foliaceous, surpassing the disk' rays commonly about 13 or about 21 (fewer on the reduced lateral heads), 2-5 cm long, soon deciduous, not becoming papery; achenes glabrous.
	<i>Erigeron howellii</i>	Howell's daisy	Perennial from a rhizome, 8 to 20 inches tall, scantily short-villous under the heads. Leaves thin, glabrous, the lowermost ones with elliptical or suborbicular blade 1 to 3 inches long and 1/2 to 2 inches wide, abruptly contracted to the 3/4 to 5 inch petiole. Middle cauline leaves ample, ovate to cordate, strongly clasping at the base; upper leaves similar but smaller. Heads solitary, the disk 1/2 to 3/4 inch wide. Involucral bracts loose, equal, glandular, somewhat herbaceous. Rays 30-50 1/2 to 1 inch long, 1/16 to 1/8 inch wide, white. Disk corollas 1/8 to 1/4 inch long, more flaring than in <i>E. peregrinus</i> . Achenes mostly asymmetrically 5-nerved. Pappus of 20-30 capillary bristles.
	<i>Erigeron oreganus</i>	Gorge daisy	Perennial with a stout mostly simple caudex and stout root; herbage glandular and loosely viscid-villous; stem lax, 5-15 cm long; basal leaves tufted, spatulate to obovate, coarsely toothed or incised, up to 9 cm long and 2.5 cm wide; cauline leaves well developed, broadly lanceolate to elliptic or ovate, up to 4 cm long and 1 cm wide; heads 1-several in a leafy inflorescence, the disk 9-13 mm wide; involucre 5-7 mm high, glandular and viscid-villous, the bracts loose, equal, thin, green; rays mostly 30-60, bluish to more often pink or white, 5-8 mm long; disk corollas usually 3.4-4.7 mm long; pappus simple, of about 15-20 bristles which are characteristically curled and twisted for at least the upper half.
	<i>Microseris borealis</i>	northern microseris	Perennial (with stout taproot). Stems leafless with solitary flower head. Leaves with minute teeth on margins.
<b>Boraginaceae</b>			
	<i>Hackelia diffusa</i> var.	diffuse stickseed	Perennial 1 2/3 to 2 1/2 inches tall. Stems few, erect or ascending, internodes long near the base, short near midstem, the plant therefore appearing leafy near the middle. Pubescence strongly spreading, hirsute, becoming antrorsely appressed in the inflorescence. Radial leaves few to many, 5 to 9 inches long, 1/2 to 1 inch wide, elliptic, petiolate for 1/3 their length, hirsute, all but the lowermost cauline leaves sessile, the lower ones 3 2/3 to 6 inches long, 1/2 to 2/3 inch wide, elliptic, becoming lanceolate or linear-lanceolate above, at mid-stem 2 1/2 to 4 inches long and 1/4 to 1/3 inch wide. Pedicel 1/4 to 1/3 inch long in fruit. Calyx 1/8 inch long, lanceolate or linear-lanceolate. Corolla limb blue or cream, with a yellowish throat, 1/4 to 1/2 inch wide. Fornices with appendages papillate-puberulent to short pilose, not always evidently emarginate. Anthers 1/16 inch long. Nutlets 1/8 inch long, ovate, dorsal surface rough, verrucose-hispidulous, the intramarginal prickles distinct, 10. Prominent marginal prickles distinct to their bases, 1/16 to 1/8 inch long, these alternating with 1-3 short barbs.



**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Brassicaceae</b>			
	<i>Rorippa columbiae</i>	persistentsepal yellowcress	Low-growing perennial with stems that usually are 4-12 inches long. The stems generally grow flat on the ground but are sometimes erect and much-branched. The stems arise from underground stems and rhizomes and can at times form large clusters of stems. The leaves are divided almost to their center into several pairs of opposite leaflets, and sometimes have small teeth on the edge. Flowers are borne both on the ends of the stems and in the axis of leaves. The flowers are approximately 1/3 inch wide and have four bright yellow petals, which are about 1/10 inch long. The sepals are flat and ovate to oblong and tend to persist through fruiting. The fruits are almost oblong and are 1/4 inch long and are usually
<b>Campanulaceae</b>			
	<i>Githopsis specularioides</i>	common blue-cup	Annual herb with branched or unbranched stems up to 12 inches tall. In Washington it has usually been observed to be less than 6 inches tall. The plants are leafy stemmed, and the narrow, toothed, alternate leaves are sessile, up to 2/3 inch long and 1/16 inch wide. Flowers occur single, and are irregularly scattered on the upper stems, or are strictly terminal on small, unbranched plants. Flowers are deep blue, with a whitish throat, 3/8 inch long or less. Flowers have five lobes, and the lobes are about as long the flower tube. The sepals, 1/4 to 1/2 inch long, tend to obscure the flowers from view.
<b>Caryophyllac</b>			
	<i>Silene douglasii</i> var. <i>monantha</i>	Douglas' silene	Caespitose perennial with a stout taproot, branched caudex, and numerous decumbent simple stems 1-4 (7) dm tall, finely and densely pubescent throughout with crisped and usually retrorse hairs, very rarely slightly glandular above; leaves mostly matted at the base of the stems and on the new shoots, narrowly to broadly oblanceolate to linear-lanceolate, mostly 2-5 (8) cm long, 2-7 (12) mm broad, acute, long-petiolate; cauline leaves 1-8 pairs, becoming smaller and sessile above; flowers usually 1-7, linear-bracteate, cymose, the lower ones sometimes remote from the terminal; calyx tubular, (10) 12-15 mm long, becoming inflated, papery, and tubular-campanulate in fruit, 10-nerved, usually thickly puberulent, less commonly nearly glabrous, very rarely somewhat glandular; corolla creamy-white or greenish, pink, or purplish-tinged; claw of the petals 8-12 mm long, sometimes auriculate, the blade oblong, 4-6 (8) mm long, bilobed 1/5 to 1/3 of the length but otherwise usually entire (very rarely with a small lateral tooth on each margin below the sinus); appendages 2, linear or oblong, 1 (3) mm long; carpophore 3-4 mm long, finely puberulent; styles 3 (4 or 5); capsule 1-celled; seeds about 1.3 mm long, rugose-tessellate, the margins more prominently rounded-papillate.
<b>Cyperaceae</b>			
	<i>Carex macrochaeta</i>	large-awn sedge	Stems loosely clustered on a system of short, branching rhizomes, 1-7 dm tall, aphyllopodic; roots pubescent, covered with a yellowish-brown felt; leaves rather few, flat, mostly 2-5 mm wide, glabrous, evidently to obscurely white-papillate on the lower surface; staminate spike solitary (seldom 2 or 3), terminal, 1-3 cm long, with black or dark brown, awn-tipped scales; pistillate spikes (1) 2-4, not crowded, the lowest one loose or nodding on a slender, flexuous, often elongate peduncle and subtended by a leafy bract which may or may not surpass the inflorescence and which is sheathless or has a short sheath up to about 5 mm long; upper pistillate spikes shorter-pedunculate or even sub-sessile, with shorter and less-foliaceous subtending bracts; pistillate scales black or sometimes merely dark purple or brown, often with a paler mid-vein, the body shorter or sometimes long than the perigynium, usually narrower distally than the perigynium, distinctly awn-tipped, the awn sometimes as much as 1 cm long, always at least some of the awns in the spike 2 mm long or more; perygynia glabrous, narrow, commonly lance-elliptic, light green or sometimes partly or wholly dark purplish, 10- to 15-nerved, 3.3-4.8 mm long, beakless or with a very short beak seldom over 0.2 mm long; stigmas 3; achene trigonous, 1.7-2.3 mm long, loosely enclosed in the lower half or three-fifths of the perigynium.

**TABLE 3 Special Status Plant Descriptions  
Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Fagaceae</b>			
	<i>Chrysolepsis chrysophylla</i>	golden chinquapin	Large shrub or small tree (3) 5-30 m tall, the bark thick and heavily furrowed; leaves with petioles scarcely 1 cm long, the blades lanceolate to oblong-lanceolate or -elliptic, (3) 5-10 cm long, entire, thick and coriaceous, dark green and glabrous or sparsely scurfy-tomentose above, yellow-green to golden and densely scurfy-tomentose beneath, the vase acute, gradually to abruptly acuminate; involucre a 4-valved, spiny bur 1.5-2 cm broad, containing 1 (2) hard-shelled nuts about
<b>Fumiariaceae</b>			
	<i>Corydalis aquae-gelidae</i>	Clackamas corydalis	Perennial from deep-seated, fleshy roots, the stems succulent and strongly fistulose, 12 to 44 inches tall, simple to branched; leaves several, yellowish-green, glaucous on the lower surface, the lower cauline ones up to 24 inches long often equaling the racemes, from 4 to 6 times pinnate, the ultimate segments very numerous, more or less elliptic, 3/16 to 1/2 inch long and 1/16 to 3/16 inches broad; racemes simple to compounded, conspicuously bracteate, rather compactly 30 to 60 flowered, ultimately elongate and up to 9 inches long; corolla 1/2 to 3/4 inch long, pale to deep pinkish with a slight trace of purple, the inner petals more deeply colored at the tip; spurred petal conspicuously crested, usually without free margins or the margins very slightly upturned; spur 3/8 inch long; capsule ellipsoid, 3/8 to 1/2 inch long, about 1/3 as thick, the style 1/4 to 1/2 as long; seeds about 1/16 inch long.
<b>Iridaceae</b>			
	<i>Sisyrinchium sarmentosum</i>	pale blue-eyed grass	Perennial herb up to 12 inches tall, although generally it is only 6 to 8 inches in height. The leaves are narrow and area generally, but not always, shorter than the stem. Both the stems and leaves are a pale green or blue-green color. Each stem has 2-7 flowers on slender pedicels. The perianth is pale blue with a yellow spot in the center. The tepals are about 1/2 inch in length and pale blue in color. The anthers are yellow. A technical description needs to be consulted for positive
<b>Juncaceae</b>			
	<i>Juncus howellii</i>	Howell's rush	Rhizomatous perennial 2-6 dm tall, the stems slightly compressed, exceeding the leaves; sheaths with membranous margins freed above and forming erect auricles 1-3 mm long; blades 2-4 mm broad dorsiventrally flattened, grasslike, nonseptate; heads (2) 3-9, in a terminal inflorescence 2-9 cm long, each head 3- to 8 (15)-flowered, 7-17 mm broad (pressed); involucre bract rarely as much as 15 mm long; perianth segments lanceolate-acuminate, 5-6.5 mm long, subequal, medium- to chestnut-brown with a broad greenish midstripe, usually minutely papillose toward the tip (under 20X magnification); stamens 6, the anthers 1.8-2.6 mm long, much longer than the filaments; capsule ovoid, 0.5-0.7 mm long, covered with a strongly reticulate membrane that forms a conspicuous appendage at each end.
<b>Lentibulariac</b>			
	<i>Utricularia intermedia</i>	flat-leaved bladderwort	Submersed plants with very slender stems, commonly creeping along the bottom; leaves numerous, alternate, mostly 1/4 to 3/4 inch long, commonly 3-parted at the base and then 1-3 time dichotomous, the segments often unequal, slender, flat, not much narrower in successive dichotomies, the ultimate ones rather blunt; blades borne on specialized branches distinct from the leaves, 1/16 to 3/16 inch wide; winter buds ovoid or ellipsoid, 3/16 to 1/8 inch long, flowers mostly 2-4 in lax racemes at the end of an emergent peduncle 2 1/2 to 8 inches long;; corolla yellow, the proper tube very short, the lower lip commonly 1/3 to 1/2 inch long, with a well-developed palate; upper li not much more than half as long as the lower; spur nearly as long as the broad, slightly lobed lower lip; fruiting pedicels suberect.

**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Lycopodiaceae</b>			
	<i>Lycopodiella inundata</i>	bog clubmoss	Main stem annual, more or less elongate, prostrate or arching, irregularly rooting, leafy, giving rise to scattered, erect, leafy branches, each of which is up to about 1 dm tall and terminates in a cone 1.5-4 cm long; plant perennating by a winter bud; leaves crowded, in 8-10 ranks, thick, narrow, mostly entire, 4-8 mm long and less than 1mm wide, broadest near the base, tapering gradually to the softly acicular tip, the ones on the lower side of the main stem twisted into a more or less erect position, those of the erect stems loosely ascending; sporophylls numerous, crowded, expanded at the base, otherwise resembling the vegetative leaves, the long, slender, green tips loosely ascending; sporangia ellipsoid-globose, about 1 mm wide; spores 43 microns or more in diameter, rounded-triangular or nearly circular in outline, the outer face irregularly ridged-reticulate, the commissural faces papillate, the commissures in furrows; gametophyte cylindrical, erect, with distal filamentous lobes, distally emergent and photosynthetic.
<b>Ophioglossac</b>			
	<i>Botrychium lunaria</i>	moonwort	Plants (3) 6-18 (22) cm tall, glabrous throughout; sterile blade sessile or on a short stalk up to about 5 mm long, about equaling or more often somewhat shorter than the common stalk, which is (1.5) 4-10 cm long, the blade itself mostly 1.5 to 7 cm long and 0.7 to 3 (3.5) cm wide, distinctly pinnate, with (2) 3-6 (7) pairs of pinnae, these sessile, dichotomously veined, without a midrib, broadly flabellate, broader than long, crowded and often somewhat overlapping, the lowest pair not notable different from the next pair; fertile stalk and fruiting spike each 0.5 to 7 cm long, subequal or either one longer than the other; both the sterile blade and the fertile spike erect or nearly so in bud; bud glabrous, completely hidden by the sheathing base of the common stalk.
	<i>Botrychium minganense</i>	Mingan grape-fern	A small, herbaceous perennial fern. The sterile blade (trophophore) is dull green in color, narrowly oblong to linear in overall outline, about 10 cm long by 2.5 cm wide. The sterile blade is once-pinnate, with up to 10 pairs of pinnae. In general the segments are well-developed, cuneate to flabellate in shape, and spaced separately from each other along the rachis. The margins of the pinnae are entire to shallowly crenate. The lowest pinnae are narrowly fan-shaped. The above-ground or visible parts of this species consist of a single upright stem arising from the ground and terminating in a cluster of tiny ball-like structures that resemble a bunch of grapes. Branching off from the main stem is the sterile, fern like leaf blade (the trophophore). At the base of the common stalk, but just below the ground, are several layers of leaf primordia that are the preformed buds of plants that will emerge in future years.
	<i>Botrychium pinnatum</i>	St. John's moonwort	Plants mostly 1-2 dm tall, glabrous from the first, commonly yellow-green; sterile blade attached near or more commonly above the middle of the plant (the common stalk mostly 4-13 cm long) sessile or nearly so, mostly ovate or ovate-oblong in outline, mostly 2-5 cm long and 1.5-4 cm wide, somewhat fleshy, evidently veiny, bipinnate or subbipinnate (at least toward the base), the pinnae mostly 3-6 pairs, the ultimate segments rounded, not much if at all longer than wide, somewhat crowded; fertile stalk mostly 1-4 cm long, the fertile spike 1.5-6 cm long, erect even in bud; sterile blade erect in bud except for the inclined but not clasping tip; bud glabrous, wholly concealed by the base of the common stalk.



**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Orchidaceae</b>			
	<i>Cypripedium fasciculatum</i>	clustered lady's slipper	Perennial herbaceous plant with a single erect stem 2-8 inches tall and a single pair of broad, parallel-veined, pleated leaves at or above the middle of the stem, which is covered with wooly hairs. Flowers droop in a tight cluster of 2-4 at the tip of the stem and consist of greenish-brown or greenish-purple petals and sepals, usually purple-lined or mottled, and a greenish-yellow pouch with brownish-purple margins, often with a purplish tinge. The stem above the leaves becomes erect and elongates as the capsules develop.
	<i>Plantathera sparsifolia</i>	canyon bog-orchid	Plant glabrous, 12 to 32 inches tall, the stems leafy mostly on the lower half. Leaves narrowly oblong-lanceolate, up to 10 inches long and mostly 1/2 to 1 1/4 inches broad. Raceme much elongate and usually very lax flowered, 6 to 16 inches long, the first several flowers rarely overlapping. Bracts usually shorter than the flowers but the lowermost sometimes considerably longer. Flowers greenish. Upper sepal broadly ovate to suborbicular, blunt, concave and converging with the upper petals to form a distinct hood, 1/4 to 1/3 inch long, 3-nerved. Lateral sepals spreading, falcately oblong-lanceolate, 1/4 to 1/2 inch long, 3-nerved. Lip pendent, thickish, linear to linear-lanceolate, 1/4 to 1/2 inch long. Spur cylindric to slightly clavate and mostly abruptly narrowed at the tip, from slightly shorter to somewhat longer than the lip, mostly somewhat curved. Column rather large, well over half as long as the upper sepal, the pollen sacs 1/16 inch long, well-separated by the connective.
	<i>Spiranthes porrifolia</i>	western ladies-tresses	Terrestrial, glabrous 8-20 inches tall; leaves 3 to 5, elliptic-lanceolate, basal or on lower portion of stem, sometimes absent at flowering time; stems with a few bracts above the leaves; inflorescence a dense spiral of up to forty small yellowish flowers in several vertical ranks; floral bracts lanceolate, 1/2 inch long; dorsal sepal lanceolate, lateral sepals similar but oblique; petals linear-lanceolate; lip ovate, not expanded at apex, base with prominent protuberances; column 1/16 inch long with dorsal anther; ovary sessile, stout, 1/16 inch long.
<b>Polemoniaceae</b>			
	<i>Polemonium carneum</i>	great polemonium	Perennial with loosely clustered (sometime solitary) stems from a woody rhizome or caudex, loosely erect, 3-10 dm tall, viscid-villous in the inflorescence, otherwise glabrous or nearly so except for the villous-ciliate margins of the petioles or the lower portion thereof, or sometimes the stem viscid-villous throughout; leaflets mostly 11-19, lanceolate to ovate or elliptic, generally acute, thin, mostly 1.5-4.5 cm long and 6-23 mm wide, the 3 terminal ones sometimes partly confluent; basal leaves long-petiolate, cauline progressively less so, long-pedicellate, in an open terminal, generally leafy inflorescence; calyx 7.5-14 mm long at anthesis, the lobes shorter or longer than the tube; corolla campanulate, (15) 18-28 mm long, the lobes longer than the tube, variable in color, often flesh-colored, salmon, or yellow, sometimes lavender to
<b>Portulacaceae</b>			
	<i>Montia diffusa</i>	branching montia	Low, spreading, diffusely (more or less dichotomously) branched annual, up to 3-4 dm broad and as much as 1.5-2 dm tall; basal leaves few, the blade lanceolate or rhombic-lanceolate to suborbicular, mostly 1-2.5 cm long, often nearly as broad, abruptly narrowed to a petiole 2-4 times as long; cauline leaves alternate, not greatly reduced even in the inflorescence, usually more or less lanceolate-rhombic, the lower ones with blades sometimes as much as 5 cm long; racemes often ancillary to ordinarily foliage leaves, clustered and paniculate toward the branch ends, the lower 1 or 2 of the several flowers often from the axil of a leafy bract; sepals 2-3 mm long, unequal; petals white or pale pink, 3-4 mm long; stamens 5; capsule equaling or slightly exceeding the sepals, obovoid-pointed, 3-valved; seeds usually (1) 2-3, black, finely and regularly papillate with low, oval protuberances, 1.2-1.5 mm long, with a short conical strophiole nearly 0.5 mm long.

**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Ranunculaceae</b>			
	<i>Cimicifuga elata</i>	Tall bugbane	<p>Tall woodland perennial with large expansive, bi- and triternate-toothed leaves. The leaves are downy-hairy above, smooth below and usually arranged in clusters of three, with 9-17 leaflets. The leaflets have 5-7 lobes, coarsely toothed margins and are similar in shape to maple leaves. Stem leaves gradually become smaller as the height of their attachment increases. Plants usually have a single, sometimes branched flowering stem, 3-6 feet tall, from a horizontal rhizome that is up to 4 inches long and 1 inch in diameter. The long, open racemes consist of many 1/4 inch white flowers whose sepals drop at once, giving the appearance of a "bottle brush" of long white stamens and pistils. As its fruits mature, the terminal raceme often becomes declined at a 45-90 degree angle from the axis of the main stem. The fruit is a dry flat capsule containing approximately 10 red to purple-brown seeds. Each flower usually produces 1 capsule; occasionally 2 or 3 capsules are produced.</p> <p>Somewhat similar to false bugbane (<i>Trautvetteria caroliniensis</i>) with tall (1-2 m), branched stems, large compound leaves (somewhat like those of <i>Actea rubra</i>), numerous small, white-stamened flowers in a narrow, terminal, branched inflorescence, and several-seeded follicles.</p>
<b>Saxifragaceae</b>			
	<i>Bolandra oregana</i>	bolandra	Weakly glandular-pubescent, herbaceous perennial with numerous bulblets along the very short, horizontal rootstocks, the stems mostly single, (1.5) 2-4 (6) dm tall; basal and lower cauline leaves with slender petioles up to 15 cm long, the blades reniform (2) 3-7 cm broad, shallowly lobed and with 9013 acutely dentate or usually somewhat serrate-dentate segments; petioles much shortened on the upper leaves and the stipules much more conspicuous and leaflike; bracts of the inflorescence somewhat clasping, 1-3 cm long, deeply crenate-dentate' panicle branches (1) 2-7, remote, spreading, 1-7 flowered; calyx accrescent and eventually 14-18 mm long, the linear-lanceolate, usually purplish lobes equaling or slightly exceeding the campanulate-tubular portion; petals purplish, linear, about equal to the calyx lobes, the stamens about 1/3 as long, the filament reddish-purple; capsule about 1 cm long, the carpels fused only 1/5 to 1/4 their length.
	<i>Parnassia fimbriata</i> var. <i>hoodiana</i>	fringed grass-of-parnassus	Rootstock short, rather stout, from slightly ascending to nearly erect; flowering stems 1-several, mostly 1.5-3 (5) dm tall. The bract cordate and more or less clasping, mostly 5-15 (20) mm long, borne from slightly below to considerably above midlength of the scape; petioles (1) 3-10 (15) cm long; leaf blades (1.5) 2-4 (5) cm broad, mostly reniform or somewhat reniform-auriculate and broader than long, but not uncommonly more nearly cordate or truncate at base, and sometimes slightly cuneate and somewhat longer than broad; calyx fused with the ovary for only about 1 mm, the segments oblong-ovate to elliptic-oval, 4-7 mm long, usually 5 (7) -veined, entire or more commonly crenulate-fimbriate, at least toward the rounded tip; petals white, 5- to 7-veined, 8-12 mm long (about twice as long as the calyx lobes, more or less cuneate-obovate in general appearance but claw-like at the base and with numerous long, filiform-linear, plainly cellular-verrucose fimbriae, becoming more or less erose to entire on the upper half; staminodia thickened and scalelike, flared above the middle and usually with a central, subterminal, larger lobe and 7-9 marginal, short, thick, rounded lobes, but sometimes with 5-many elongate, slender, capitate-tipped segments; filaments stout, about equaling the calyx segments, anthers 2-2.5 mm long; capsule ovoid, about 1 cm long. Variety hoodiana: Staminodia ending in longer, more slender, filamentlike, usually capitate segments. Segments of the staminodia mostly less than 10, slender, strongly capitate, all marginal, equaling (or longer than) the rather narrow basal scale.
	<i>Sullivantia oregana</i>	Oregon sullivantia	Delicate, yellowish-green perennial spreading by long slender stolons, nearly or quite glabrous except for some glandular pubescence on the upper portion of the flowering stems and on the inflorescence, the hairs mostly purplish-tipped. The basal leaves are long-petiolate, the blade reniform, 1/2 to 4 inches broad, incisely lobed to 1/2 their length into 7 to 9 cuneate segments and again once or twice sharply toothed. Flowering stems 2 to 8 inches tall with 1 to 3 leaves that are greatly reduced upward. Flowers erect, but becoming sharply reflexed in fruit. Calyx glabrous, pale green, 1/10 to 1/8 inch long, more or less campanulate. Petals slightly long than the calyx lobes, the blade oval to obovate-oblongate, narrowed to a very short, broad claw. Stamens shorter than the sepals, the cordate anthers about equaling the slender filaments. Capsule about 1/8 inch long, seeds brown 1/16 inch long.

**TABLE 3 Special Status Plant Descriptions**  
**Saddleback Wind Project**

Family	Scientific Name	Common	Description
<b>Scrophularia</b>			
	<i>Collinsia sparsiflora</i> var. <i>bruceae</i>	few-flowered collinsia	<p>Plants annual, 2 to 8 inches tall, simple or often branched, erect, glabrous or minutely spreading-hirtellous. Leaves opposite throughout, the lower petiolate, with broadly elliptic or ovate to subround, often few-toothed blade about 1/2 inch long or less, often deciduous, the others narrow and becoming sessile, commonly linear to linear-oblong or linear-lanceolate, mostly entire, up to about 1 1/4 inches long and 1/4 inch wide. Flowers long-pedicellate, 1-3 at each of the upper nodes, their subtending leaves more or less reduced. Calyx 1/4 to 1/2 inch long, the lanceolate to narrowly lance-triangular, acute to acutish lobes prominent, firm-foliaceous, much longer than the tube, commonly concealing much of the corolla tube. Corolla blue-lavender or often white, 1/3 to 1/2 inch long, the tube abruptly bent near the base, forming an oblique angle with the calyx and strongly enlarged on the upper side at the bend. Keel generally somewhat hairy externally near the tip. Upper pair of filaments shortly spreading-hairy over most of their length. Capsule subglobose, 1/8 to 1/4 inch wide. Sees flattened, irregularly wing-margined, evidently cellular-reticulate, 1/8 inch long.</p> <p>Can be distinguished from other species of <i>Collinsia</i> by the following characters: upper filaments pubescent rather than glabrous; calyx nearly as long or as long as corolla; capsule subglobose rather than ellipsoid; seed flattened with a narrow wing margin, rather than turgid with a thickened margin, or flattened with a wide margin.</p>
	<i>Penstemon barrettiae</i>	Barrett's beardtongue	<p>Medium-sized perennial herb with stems 8-16 inches tall, much branched and somewhat shrubby at the base. The leaves are evergreen, thick, leathery or succulent, bluish- to grayish-green, and toothed along the margins. The rose-purple flowers are 1 to 1 1/2 inches long, tubular, and strongly two-lipped at the end. The flowers are approximately 1/2 inch wide at the mouth, and hairy on the inside of the lower lip.</p>





Figures 1 and 2 are missing from Appendix C-3 as the full report was not provided to  
URS

**C-4**

**Baseline Avian Use Surveys of the Project in Fall 2004,  
Summer 2006, and Winter-Spring 2008-2009**

**West, Inc. 2009**

# **FINAL REPORT**

## **Wildlife Baseline Studies for the Whistling Ridge Wind Resource Area Skamania County, Washington**

**Final Report  
September 11 – November 4, 2004,  
May 21 – July 14, 2006, and  
December 4, 2008 – May 29, 2009**

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August 7, 2009



## EXECUTIVE SUMMARY

SDS Lumber has proposed a wind-energy facility in Skamania County, Washington, near the town of White Salmon. SDS Lumber contracted Western EcoSystems Technology, Inc. to conduct surveys and monitor wildlife resources in the Whistling Ridge Wind Resource Area to estimate the impacts of project construction and operations on wildlife. The following document contains results for fixed-point bird use surveys and incidental wildlife observations.

The proposed wind-energy facility contains minimal habitat diversity. Approximately 82.0% of the 1,151-acre (1.8 square mile; 4.7 square kilometer) area is composed of evergreen forest. The next most common habitat is developed open space, which comprises 8.5% of the Whistling Ridge Wind Resource Area. Shrub-scrub habitat comprises 7.1% and grassland areas comprise 1.8% of the study area. All other habitats collectively comprise less than 1% of the Whistling Ridge Wind Resource Area.

The principal objectives of the study were to: 1) provide site specific bird resource and use data that would be useful in evaluating potential impacts from the proposed wind-energy facility; 2) provide information that could be used in project planning and design of the facility to minimize impacts to birds; and 3) recommend further studies or potential mitigation measures, if warranted.

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors. Fixed-point surveys were conducted from September 11, 2004 through November 4, 2004, May 21, 2006 through July 14, 2006, and again in December 4, 2008 through May 29, 2009. A total of 261 20-minute fixed-point surveys were completed and 86 bird species were identified.

Waterfowl use only occurred during spring (0.07 birds/plot/20-min survey), and consisted of a single group of Canada geese. Raptor use was highest during the fall (0.63 birds/plot/20-min survey) and lowest during the spring (0.16). The most common raptors observed in the study area were red-tailed hawk, Cooper's hawk, and sharp-shinned hawk. Vultures had the highest use in summer (0.31 birds/plot/20-min survey) and much lower use during all other seasons. Upland gamebirds had much lower use than other bird types recorded, with highest use recorded during spring (0.11 birds/plot/20-min survey). Passerines had the highest use among all bird types across all seasons, with use ranging from 14.13 birds/plot/20-minute survey in the summer to 1.65 in winter.

Levels of bird use varied within the study area by point. For all bird species combined, use was highest at points D, C, and B (13.7, 12.8, and 11.8 birds/20-minute survey, respectively). Bird use at other points ranged from 5.31 to 11.0 birds/20-minute survey. The higher mean use at points D, C, and B was due mostly to relatively high use by passerines at these points (11.1, 11.5, and 11.0 birds/20-minute survey, respectively). Passerine use at other points ranged from 4.15 to 8.94 birds/20-minute survey. Waterfowl use only occurred at point J, with 0.62 birds/20-minute survey. Raptor use was highest at point A (0.56 birds/20-minute survey), and ranged from zero to 0.35 birds/20-minute survey at other points. Vultures were observed at approximately half of the

points (A, B, C, D, E, and H); use ranged from 0.04 birds/20-minute survey at point A to 0.36 at point D.

Survey points were located within evergreen forest habitat in the Whistling Ridge Wind Resource Area. No obvious flyways or concentration areas were observed. No strong association with topographic features within the study area was noted for raptors or other large birds. Although some differences in bird use were detected among survey points, the differences are not large enough to suggest that any portions of the Whistling Ridge Wind Resource Area should be avoided when siting turbines due to very high bird use.

During the study, 523 single or groups of birds totaling 1,449 individuals were observed flying during fixed-point bird use surveys. For all bird species combined, 65.7% of birds were observed flying below the likely zone of risk, 31.3% were within the zone of risk, and 3.0% were observed flying above the zone of risk for typical turbines that could be used in the Whistling Ridge Wind Resource Area. Bird types most often observed flying within the turbine zone of risk were doves/pigeons (58.8%), raptors (58.6%) and vultures (53.6%). Waterfowl were always observed flying above the zone of risk. Upland gamebirds, passerines, and other birds were typically observed flying below the zone of risk.

For all bird species with at least 10 separate groups of flying birds, only six species were observed flying within the zone of risk during more than 50% of observations: red crossbill (90.2%), common raven (55.1%), western bluebird (62.3%), band-tailed pigeon (59.4%), red-tailed hawk (70.0%), and turkey vulture (53.6%). Based on the use (measure of abundance) of the study area by each species and the flight characteristics observed for those species, the red crossbill and common raven had the highest probability of turbine exposure, with exposure indices of 0.29 and 0.23, respectively. The raptor species with the highest exposure index was the red-tailed hawk, which was ranked eleventh of all species, although its exposure index was only 0.05.

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. Incidental observations included six bird species and five mammal species. The most abundant bird species recorded incidentally was pine siskin.

Based on fixed-point bird use data collected for the Whistling Ridge Wind Resource Area, mean annual raptor use was 0.28 raptors/plot/20-minute survey. The annual rate was low relative to raptor use at 36 other wind-energy facilities that implemented similar protocols to the present study and had data for three or four different seasons. Mean raptor use in the study area was low compared to these other wind resource areas, ranking twenty-ninth.

A regression analysis of raptor use and raptor collision mortality for 13 new-generation wind-energy facilities where similar methods were used to obtain raptor use estimates showed a significant ( $R^2 = 69.9\%$ ) correlation between raptor use and raptor collision mortality. Due to the low raptor use in comparison to most wind resource areas, using this regression to predict raptor collision mortality the Whistling Ridge Wind Resource Area yielded an estimated fatality rate of zero. However, A 90% prediction interval around this estimate is zero to 0.25 fatalities per megawatt per year.

Based on species composition of the most common raptor fatalities at other western wind-energy facilities and species composition of raptors observed at the Whistling Ridge Wind Resource Area during the surveys, the majority of the fatalities of diurnal raptors will likely consist of red-tailed hawk. Based on the seasonal use estimates, it is expected that risk to raptors would be unequal across seasons, with the lowest risk in spring and winter, and highest risk during the fall.

The data collected during this study suggests that the Whistling Ridge Wind Resource Area does not receive substantial use by waterfowl, and does not appear to be within a major migratory pathway for raptors. In addition, the study area does not appear to provide important stopover habitat for migrant songbirds based on fixed-point bird use surveys. Construction and operation of the wind-energy facility may displace some types of birds.

Some species considered to be sensitive or of conservation concern were observed within the Whistling Ridge Wind Resource Area. During all surveys and incidental observations, five sensitive bird species were observed including 30 Vaux's swifts, 15 pileated woodpeckers, five northern goshawks, three bald eagles, and two golden eagles. This is a tally that in some cases may represent repeated observations of the same individual.

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## INTRODUCTION

SDS Lumber has proposed a wind-energy facility in Skamania County, Washington, near the town of White Salmon (Figures 1 and 2). SDS Lumber contracted Western EcoSystems Technology, Inc. (WEST) to conduct surveys and monitor wildlife resources in the Whistling Ridge Wind Resource Area (WRWRA) to estimate the impacts of wind-energy facility construction and operations on wildlife.

The principal objectives of the study were to: 1) provide site specific bird resource and use data that would be useful in evaluating potential impacts from the proposed wind-energy facility; 2) provide information that could be used in project planning and design of the facility to minimize impacts to birds; and 3) recommend further studies or potential mitigation measures, if warranted. The protocols for the baseline studies are similar to those used at other wind-energy facilities across the nation, and follow the guidance of the National Wind Coordinating Collaborative (Anderson et al. 1999). The protocols have been developed based on WEST's experience studying wildlife at proposed wind-energy facilities throughout the US, and were designed to help predict potential impacts to birds (particularly raptors).

Baseline surveys were conducted from September 11 through November 4, 2004, May 15 through July 14, 2006, and December 4, 2008 through May 29, 2009 at the WRWRA. Surveys were conducted across all four seasons and included fixed-point bird use surveys and incidental wildlife observations. Other baseline data have previously been collected at this site, including bat acoustical surveys, habitat mapping, rare plant surveys, and targeted surveys for species of concern including spotted owl (*Strix occidentalis*), northern goshawk (*Accipiter gentilis*), and western gray squirrel (*Sciurus griseus*). The results of those studies are included in other reports.

In addition to site-specific data, this report presents existing information and results of studies conducted at other wind-energy facilities. The ability to estimate potential bird mortality at the proposed WRWRA is greatly enhanced by operational monitoring data collected at existing wind-energy facilities. For several wind-energy facilities, standardized data on fixed-point surveys were collected in association with standardized post-construction (operational) monitoring, allowing comparisons of bird use with bird mortality. Where possible, comparisons with regional and local studies were made.

## STUDY AREA

The proposed wind resource area is in southeast Skamania County, approximately four miles (6.4 kilometers [km]) northwest of White Salmon, Washington (Figure 1). The specific study area is just north of Underwood Mountain and includes Sections 5, 6, 7, & 8, Township 3N, Range 10E. The WRWRA consists of hilltops dominated by coniferous forests with some clearcuts and linear clearings associated with powerline rights-of-way (Figure 2). Elevation of the study area ranges from approximately 1,700 – 2,400 feet (ft; 518 – 732 meters [m]).

Approximately 82.0% of the 1,151-acre (1.8 square mile [mi<sup>2</sup>]; 4.7 km<sup>2</sup>) area is composed of evergreen forest (Table 1; Figure 3). Forests in the project area are managed by SDS Lumber for

commercial timber production. The next most common habitat is developed, open space, which comprises 8.5% of the WRWRA. Shrub-scrub habitat comprises 7.1% and grassland areas comprise 1.8% of the WRWRA. All other habitats collectively comprise less than one percent of the WRWRA (Table 1).

## **METHODS**

### **Fixed-Point Bird Use Surveys**

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors, defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). The points were selected to survey representative habitats and topography of the study area, while also providing relatively even coverage. All birds seen during each 20-minute (min) fixed-point survey were recorded.

#### *Bird Use Survey Plots*

Ten points were selected to achieve relatively even coverage of the study area and survey representative habitats and topography within the study area. Six of the points were used for the 2004 and 2006 surveys seasons, with four additional points being added for the 2008/2009 study season (Figure 4). Each survey plot was an 800-m (2,625-ft) radius circle centered on the point.

#### *Bird Survey Methods*

All species of birds observed during fixed-point surveys were recorded. Observations of large birds beyond the 800 m radius were recorded, but were not included in the statistical analyses; for small birds observations beyond the 100 m (328 ft) radius were excluded. A unique observation number was assigned to each observation.

The date, start and end time of the survey period, and weather information such as temperature, wind speed, wind direction, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each observation. The behavior of each bird observed, and the vegetation type in which or over which the bird occurred, were recorded based on the point of first observation. Approximate flight height and flight direction at first observation were recorded to the nearest 5-m (16-ft) interval.

Locations of raptors, other large birds, and species of concern seen during fixed-point bird use surveys were recorded on field maps by observation number. Flight paths and perched locations were digitized using ArcGIS 9.3. Any comments were recorded in the comments section of the data sheet. Any unusual wildlife observations were recorded on the incidental datasheets.

#### *Observation Schedule*

Sampling intensity was designed to document bird use and behavior by habitat and season within the study area. Fixed-point surveys were conducted from September 11 through November 4,



2004 (fall migration period), from May 21 through July 14, 2006 (summer breeding season), from December 4, 2008 through March 15, 2009 (winter), and from March 16 through May 29, 2009 (spring migration period). Surveys were conducted approximately weekly during the spring, summer and fall, and every other week during the winter. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season. To the extent practical, each point was surveyed about the same number of times. A total of 261 20-min fixed-point surveys were conducted at the WRWRA.

## **Incidental Wildlife Observations**

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. All raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species), habitat, and, in the case of sensitive species, the location was recorded by Universal Transverse Mercator (UTM) or Global Positioning System (GPS) coordinates.

## **Statistical Analysis**

### *Quality Assurance and Quality Control*

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database was compared to the raw data forms and any errors detected were corrected. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

### *Data Compilation and Storage*

A Microsoft® ACCESS database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks, and electronic data files were retained for reference.

### *Fixed-Point Bird Use Surveys*

#### Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists, with the number of observations and the number of groups, were generated by season, including all observations of birds detected regardless of their distance from the observer. Species richness was calculated as the mean number of species observed per plot per survey (i.e., number of species/plot/20-min survey). Species diversity and richness were compared between seasons for fixed-point bird use surveys.

### Bird Use, Composition, and Frequency of Occurrence

For the standardized fixed-point bird use estimates, only observations of large birds detected within the 800-m radius plot were used; small birds observations were limited to 100 m. Estimates of mean bird use (i.e., number of birds/plot/20-min survey) were used to compare differences between bird types, seasons, and other wind-energy facilities.

The frequency of occurrence was calculated as the percent of surveys in which a particular species or bird type was observed. Percent composition was calculated as the proportion of the overall mean use for a particular species or bird type. Frequency of occurrence and percent composition provide relative estimates of species exposure to the proposed wind-energy facility. For example, a species may have high use estimates for the area based on just a few observations of large groups; however, the frequency of occurrence will indicate that the species occurs during very few of the surveys and therefore, the species may be less likely affected by the wind resource area.

### Bird Flight Height and Behavior

To calculate potential risk to bird species, the first flight height recorded was used to estimate the percentages of birds flying within the likely “zone of risk” (ZOR) for collision with turbine blades of 35 to 130 m (114 to 427 ft) above ground level (AGL), which is the blade height of typical turbines that could be used at the WRWRA.

### Bird Exposure Index

A relative index of collision exposure (R) was calculated for bird species observed during the fixed-point bird use surveys using the following formula:

$$R = A * P_f * P_t$$

Where A equals mean relative use for species *i* (large bird observations within 800 m of the observer or 100 m for small birds) averaged across all surveys,  $P_f$  equals the proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and  $P_t$  equals the proportion of all initial flight height observations of species *i* within the likely ZOR.

### Spatial Use

Data were analyzed by comparing use among plots. Mapped flight paths were qualitatively compared to study area features such as topographic features. The objective of mapping observed bird locations and flight paths was to look for areas of concentrated use by raptors and other large birds and/or consistent flight patterns within the study area. This information can be useful in turbine layout design or adjustments of individual turbines for micro-siting.

## RESULTS

Surveys were completed at the WRWRA from September 11 through November 4, 2004, May 21 through July 14, 2006 and December 4, 2008 – May 29, 2009. Eighty-eight bird species and five mammal species were identified during surveys completed at the WRWRA. Results of the fixed-point surveys and incidental wildlife observations, and the specific numbers of unique species for each survey type, are discussed in the sections below.

### Fixed-Point Bird Use Surveys

#### *Bird Diversity and Species Richness*

Eighty-six unique species were observed over the course of all fixed-point bird use surveys, with a mean number 4.51 species/survey (Table 2). More unique species were observed during the spring (67 species), followed by summer (55), fall (39), and winter (16; Table 2). The mean number of species per survey was higher in the summer (10.84 species/survey), compared to spring (4.54), fall (4.02) and winter (1.16; Table 2). A total of 2,663 individual bird observations within 1,407 separate groups were recorded during the fixed-point surveys (Table 3). Cumulatively, six species (7.0% of all species) composed approximately 43.7% of the observations: dark-eyed junco (*Junco hyemalis*), American robin (*Turdus migratorius*), white-crowned sparrow (*Zonotrichia leucophrys*), yellow-rumped warbler (*Dendroica coronata*), common raven (*Corvus corax*), and Steller's jay (*Cyanocitta stelleri*). All other species comprised less than 5% of the observations. A total of 76 individual raptors were recorded within the WRWRA, representing 11 species (Table 3).

#### *Bird Use, Composition, and Frequency of Occurrence by Season*

Mean bird use, percent composition, and frequency of occurrence for all species and bird types by season were calculated (Table 4). The highest overall bird use occurred in the summer (15.98 birds/plot/20-min survey), followed by fall (14.34), spring (9.13), and winter (1.99). Passerines were the most abundant bird type observed across all seasons.

#### Waterfowl

Waterfowl were only observed during spring (0.07 birds/plot/20-minute survey; Table 4). The only waterfowl species recorded was Canada goose (*Branta canadensis*), which consisted of one group of eight individuals observed. Waterfowl comprised 0.8% of overall bird use in spring and were observed during 0.9% of spring surveys.

#### Raptors

Raptor use was much higher during fall (0.63 birds/plot/20-min survey; Table 4), compared to summer (0.22), winter (0.17) and spring (0.16; Table 4). High raptor use in fall consisted mostly of sharp-shinned hawk (*Accipiter striatus*; 0.13 birds/plot/20-min survey), unidentified buteo (0.13), and Cooper's hawk (*Accipiter cooperii*; 0.12). Cooper's hawk had the highest use of any one raptor species in spring (0.06 birds/plot/20-min survey), red-tailed hawk (*Buteo jamaicensis*) had the highest use in summer (0.13), and bald eagle (*Haliaeetus leucocephalus*) had the highest use in winter (0.08), although this was due to observations of only two individual bald eagles. Raptors comprised 8.4% of the overall bird use in winter and 4.4% in fall, compared to 1.8% overall bird use in spring and 1.4% in summer. Raptors were observed during 34.8% of surveys

in the fall and 22.2% in the summer, compared to 13.3% of the surveys in the winter and 12.9% in the spring.

### Vultures

Vulture use was much higher in summer (0.31 birds/plot/20-minute survey; Table 4), than in spring (0.08), fall (0.08), and winter (zero). The only vulture species observed was turkey vulture (*Cathartes aura*). Vultures comprised 1.9% of overall bird use during summer surveys, 0.9% during spring surveys, and 0.5% during fall surveys. Vultures were observed during 11.1% of summer surveys, compared to 6.7% of spring surveys and 5.9% of fall surveys.

### Upland Gamebirds

Upland gamebirds had relatively low use in spring, summer, and fall (0.11 birds/plot/20-min survey, 0.02, and 0.02, respectively; Table 4). Only three upland gamebird species were observed within the WRWRA, including wild turkey (*Meleagris gallopavo*), sooty grouse (*Dendragapus fuliginosus*), and ruffed grouse (*Bonasa umbellus*). Upland gamebirds comprised 1.2% of overall bird use during spring surveys and only 0.1% during both summer and fall surveys. Upland gamebirds were observed during 10.1% of surveys in the spring compared to 2.2% of summer surveys and 1.9% of fall surveys.

### Passerines

Passerines had the highest use of any bird type during all four seasons (Table 4). Passerine use was highest in summer (14.13 birds/plot/20-min survey) and fall (12.53), and lower during spring (7.88) and winter (1.69). Passerine use varied by season. Passerines with the highest use by season were American robin in spring (1.31 birds/plot/20-min survey), white-crowned sparrow in summer (2.07), dark-eyed junco in fall (2.19), and common raven in winter (0.69). Passerines comprised greater than 80% of overall bird use during all seasons. Passerines were observed during 90% or more of the surveys during spring, summer, and fall surveys, and 58.3% of surveys in winter.

### *Bird Flight Height and Behavior*

Flight height characteristics were estimated for both bird types and bird species (Tables 5 and 6). During the study, 523 single birds or groups totaling 1,449 individuals were observed flying during fixed-point bird use surveys (Table 5). Overall, 31.3% of birds observed flying were recorded within the ZOR for collision with turbine blades of 35 to 130 m (114 to 427 ft) AGL, 65.7% were below the ZOR, and 3.0% were flying above the ZOR (Table 5). More than half (58.6%) of flying raptors were observed flying within the ZOR, 15.5% were below the ZOR, and only 25.9% were above the ZOR. Raptor subtypes that were observed within the ZOR most often were falcons (100%), accipiters (65.2%), and eagles (60.0%). Doves/pigeons had the highest percentage of flying birds within the ZOR (58.8%) followed by raptors (58.6%) and vultures (53.6%). Upland gamebirds, passerines, and other birds were typically observed flying below the ZOR (Table 5).

Six species had at least 10 groups observed flying and were observed flying within the ZOR during at least 50% of observations, including red crossbill (*Loxia curvirostra*; 90.2%), common raven (*Corvus corax*; 55.1%), western bluebird (*Sialia mexicana*; 62.3%), band-tailed pigeon (*Columba fasciata*; 59.4%), red-tailed hawk (70.0%) and turkey vulture (53.6%; Table 6). Ten



species were always seen flying within the likely ZOR; however, these were based on fewer than five observations.

#### *Bird Exposure Index*

A relative exposure index was calculated for each species (Table 6). This index is only based on initial flight height observations and relative abundance (defined as the use estimate) and does not account for other possible collision risk factors such as foraging or courtship behavior. Red crossbill (0.29) and common raven (0.23) had exposure indices higher than any other species. Red-tailed hawk had the highest exposure index of any raptor species (0.05); all other raptor species had an exposure index of 0.02 or less (Table 6).

#### *Spatial Use*

For all bird species combined, use was highest at points D, C, and B (13.7, 12.8 and 11.8 birds/20-min survey, respectively). Bird use at other points ranged from 5.31 to 11.0 birds/20-min survey (Figure 5). The higher mean use estimates for points D, C, and B were largely due to higher passerine use at these points (11.1, 11.5, and 11.0 birds/20-min survey, respectively). Passerine use at the other points ranged from 4.15 to 8.94 birds/20-min survey. Waterfowl use only occurred at point J with 0.62 birds/20-min survey. Raptor use was highest at point A (0.56 birds/20-min survey), and ranged from zero to 0.35 birds/20-min survey at other points. Vultures were observed at approximately half of the points (A, B, C, D, E, and H); use ranged from 0.04 birds/20-min survey at point A to 0.36 at point D. Upland gamebird use was highest at point G (0.17 birds/20-min survey), and ranged from zero to 0.09 birds/20-min survey at other points.

Flight paths for waterbirds, waterfowl, shorebirds, raptors, and vultures were digitized and mapped (Figures 6a-d). No obvious flyways or concentration areas were observed for any species. The available data do not indicate that any portions of the study area warrant being excluded from development due to very high bird use.

### **Incidental Wildlife Observations**

There were six bird species observed incidentally, totaling 23 birds within eight separate groups during the study (Table 7). Five mammal species were also observed incidentally at the WRWRA.

#### *Bird Observations*

The most abundant bird species recorded as an incidental wildlife observation was pine siskin (*Carduelis pinus*; nine individuals). Two species, osprey (*Pandion haliaetus*) and common poorwill (*Phalaenoptilus nuttallii*), were only seen incidentally at the WRWRA. Canada goose, red-tailed hawk, and ruffed grouse (*Bonasa umbellus*) were also observed incidentally.

#### *Mammal Observations*

A total of five mammal species including 43 mule deer (*Odocoileus hemionus*), nine black-tailed deer (*Odocoileus hemionus columbianus*), three elk (*Cervus elephus*), one Douglas squirrel (*Tamiasciurus douglasii*), and one gray squirrel (*Sciurus* sp.) were observed incidentally during the fixed-point surveys at the WRWRA (Table 8). The gray squirrel was only observed for a

brief period and therefore it could not be positively identified as being either a state threatened western gray squirrel or an eastern gray squirrel (*Sciurus carolinensis*).

## DISCUSSION AND IMPACT ASSESSMENT

### Bird Impacts

#### *Direct Effects*

The most probable direct impact to birds from wind-energy facilities is direct mortality or injury due to collisions with turbines or guy wires of meteorological (met) towers. Collisions may occur with resident birds foraging and flying within the study area or with migrant birds seasonally moving through the study area. Project construction could affect birds through loss of habitat, or potential fatalities from construction equipment. Impacts from the decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low. Equipment used in wind-energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The risk of direct mortality to birds from construction is most likely potential destruction of a nest during initial site clearing if conducted during the nesting season.

Substantial data on bird mortality at wind-energy facilities are available from studies in California and throughout the West and Midwest. Of 841 bird fatalities reported from California studies (more than 70% from the Altamont Pass facility in California), about 39% were diurnal raptors, about 19% were passerines (excluding house sparrows [*Passer domesticus*] and European starlings [*Sturnus vulgaris*]), and about 12% were owls. Non-protected birds including house sparrows, European starlings, and rock pigeons (*Columba livia*) comprised about 15% of the fatalities. Other bird types generally made up less than 10% of the fatalities (Erickson et al. 2002b). During 12 fatality monitoring studies conducted outside of California, diurnal raptor fatalities comprised about 2% of the wind-energy facility-related fatalities and raptor mortality averaged 0.03/turbine/year. Passerines (excluding house sparrows and European starlings) were the most common collision victims, comprising about 82% of the 225 fatalities documented. For all bird species combined, estimates of the number of bird fatalities per turbine per year from individual studies ranged from zero at the Searsburg wind-energy facility in Vermont (Kerlinger 1997) and the Algona facility in Iowa (Demastes and Trainer 2000), to 7.7 at the Buffalo Mountain facility in Tennessee (Nicholson 2003). Using mortality data from a 10-year period from wind-energy facilities throughout the entire United States, the average number of bird collision fatalities is 3.1 per megawatt (MW) per year, or 2.3 per turbine per year (NWCC 2004).

#### Raptor Use and Exposure Risk

The annual mean raptor use at the WRWRA (0.28 raptors/plot/20-min survey) was compared with other wind-energy facilities that implemented similar protocols and had data for three or four seasons. Similar studies were conducted at 36 other wind-energy facilities. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-min survey (Figure 7). Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 –

1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Under this ranking, mean raptor use (number of raptors divided by the number of 800 m plots and the total number of surveys) at the WRWRA is considered to be low. Compared to the other wind-energy facilities, the WRWRA ranked twenty-ninth (Figure 7).

Although high numbers of raptor fatalities have been documented at some wind-energy facilities (e.g. Altamont Pass), a review of studies at wind-energy facilities across the United States reported that only 3.2% of casualties were raptors (Erickson et al. 2001a). Indeed, although raptors occur in most areas with the potential for wind-energy development, individual species appear to differ from one another in their susceptibility to collision (NRC 2007). Results from Altamont Pass in California suggest that mortality for some species is not necessarily related to abundance (Orloff and Flannery 1992). American kestrels (*Falco sparverius*), red-tailed hawks, and golden eagles (*Aquila chrysaetos*) were killed more often than predicted based on abundance. Thus far, only three northern harrier (*Circus cyaneus*) fatalities at existing wind energy facilities have been reported in publicly available documents, despite the fact they are commonly observed during point counts at these facilities (Erickson et al. 2001a; Whitfield and Madders 2006). Because northern harriers often forage close to the ground, risk of collision with turbine blades is considered low for this species. Relative use by American kestrels at the High Winds facility was almost six times the use of American kestrels at the Altamont Pass facility (Kerlinger 2005). It is likely that many factors, in addition to abundance, are important in predicting raptor mortality.

An exposure index analysis may also provide insight into what species has a higher likelihood of turbine casualties. The index considers relative probability of exposure based on abundance, proportion of daily activity spent flying, and proportion of flight height of each species within the ZOR for turbines likely to be used at the wind-energy facility. For the WRWRA, the raptor species with the highest exposure index was the red-tailed hawk, which was ranked eleventh of all species (Table 6). The exposure index analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior (e.g., during foraging or courtship) or abundance of nocturnal migrants. It also does not take into consideration habitat selection, the ability to detect and avoid turbines, and other factors that may vary among species and influence likelihood for turbine collision. For these reasons, the actual risk for some species may be lower or higher than indicated by this index

A regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality ( $R^2 = 69.9\%$ ; Figure 8). Using this regression to predict raptor collision mortality at the WRWRA, based on an adjusted mean raptor use of 0.28 raptors/20-min survey, yields an estimated fatality rate of zero due to the low raptor use observed. A 90% prediction interval around this estimate is zero to 0.25 fatalities/MW/year. Based on the relative abundance of red-tailed hawks, Cooper's hawks, and sharp-shinned hawks, there is higher potential for fatalities of these three species compared to other species.

#### Non-Raptor Use and Exposure Risk

Mean overall bird use at the WRWRA was 9.3 birds/800-m radius plot/20-minute survey. Mean overall bird use for 24 other WRAs in the Pacific Northwest has ranged from 5-23.6. The

WRWRA ranks 19th compared to these 24 other WRA (Figure 9). To date, no relationships have been observed between overall use by bird types other than raptors, and fatality rates of those bird types at wind-energy facilities. However, the overall avian use at the WRWRA is low compared to most other WRAs in the Pacific Northwest and therefore high levels of avian mortality would not be expected.

Most bird species in the US are protected by the Migratory Bird Treaty Act (MBTA 1918). Passerines (primarily perching birds) have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001a, 2002b), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines made up a large proportion of the birds observed during the baseline study, passerines would be expected to make up the largest proportion of fatalities at the WRWRA. Exposure indices based on observations within 100 m indicate that red crossbill is the most likely passerine to be exposed to collision from wind turbines at the WRWRA. Other passerine species likely most at risk based on abundance and flight behavior would include common raven, American robin, western bluebird, tree swallow (*Tachycineta bicolor*), evening grosbeak (*Coccothraustes vespertinus*), Vaux's swift (*Chaetura vauxi*), and American goldfinch (*Carduelis tristis*; Table 6b). Other non-raptor species with high exposure indices include turkey vulture and band-tailed pigeon. Most non-raptors had relatively low exposure indices due to the majority of individuals flying below the likely zone of risk. Due to the low exposure risks at WRWRA, it is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

The only waterfowl species observed in the WRWRA was a single group of eight Canada goose recorded during spring fixed-point bird use surveys, and another group of six individuals were observed incidentally. Wind-energy facilities with year-round use by water dependent species have shown the highest mortality, although the levels of waterfowl/waterbird/shorebird mortality appear insignificant compared to the use of the facilities by these groups. Of 1,033 bird carcasses collected at US wind-energy facilities, waterbirds comprised about 2%, waterfowl comprised about 3%, and shorebirds comprised less than 1% (Erickson et al. 2002b). At the Klondike, Oregon wind-energy facility, only two Canada goose fatalities were documented (Johnson et al. 2003) even though 43 groups totaling 4845 individual Canada geese were observed during pre-construction surveys (Johnson et al. 2002a). The recently constructed Top of Iowa wind-energy facility is located in cropland between three Wildlife Management Areas (WMAs) with historically high bird use, including migrant and resident waterfowl. During a recent study, approximately one million goose-use days and 120,000 duck-use days were recorded in the WMAs during the fall and early winter, and no waterfowl fatalities were documented during concurrent and standardized wind-energy facility fatality studies (Jain 2005). Similar findings were observed at the Buffalo Ridge wind-energy facility in southwestern Minnesota, which is located in an area with relatively high waterfowl/waterbird use and some shorebird use. Snow geese (*Chen caerulescens*), Canada geese, and mallards (*Anas platyrhynchos*) were the most common waterfowl observed. Three of the 55 fatalities observed during the fatality monitoring studies were waterfowl, including two mallards and one blue-winged teal (*Anas discors*). Two American coots (*Fulica americana*), one grebe, and one shorebird fatality were also found (Johnson et al. 2002b). Based on available evidence, waterfowl do not seem especially vulnerable to turbine collisions and significant impacts are not likely.



### Sensitive Species Use and Exposure Risk

All sensitive species observed at the WRWRA are summarized in Table 8. No federal-listed species were observed during the study (Table 3). One gray squirrel was observed as an incidental observation. However, the gray squirrel was only observed for a brief period and therefore it could not be positively identified as being either a state threatened western gray squirrel or an eastern gray squirrel. One state sensitive species, bald eagle, was observed during fixed-point surveys at the WRWRA (two observations; Table 2). Four state candidate species, Vaux's swift, pileated woodpecker (*Dryocopus pileatus*), northern goshawk, and golden eagle, were observed during fixed point surveys (Table 8). The bald eagle and golden eagle are also legally protected under the Bald and Golden Eagle Protection Act (BGEPA 1940), while the others are protected under the Migratory Bird Treaty Act (MBTA 1918).

Use of the WRWRA by bald eagle, northern goshawk, and golden eagle was very low, and significant impacts are not expected. Vaux's swifts were fairly common and were commonly observed flying at turbine rotor-swept heights; therefore, some turbine mortality may occur for these species over the life of the facility. These collisions would likely be rare occurrences and it is unlikely the WRWRA would have any negative impacts on population levels in and near the study area. Based on seasonality of the observations, the Vaux's swifts appear to be migrants through the WRWRA rather than local breeding residents

### Indirect Effects

The presence of wind turbines may alter the landscape so that wildlife use patterns are affected, displacing wildlife away from the project facilities and suitable habitat. Some studies from wind-energy facilities in Europe consider displacement effects to have a greater impact on birds than collision mortality (Gill et al. 1996). The greatest concern with displacement impacts for wind-energy facilities in the US has been where these facilities have been constructed in grassland or other native habitats (Leddy et al. 1999; Mabey and Paul 2007). Although Crockford (1992) suggests that disturbance appears to impact feeding, resting, and migrating birds, rather than breeding birds, results from studies at the Stateline wind-energy facility in Washington and Oregon (Erickson et al. 2004) and the Buffalo Ridge wind-energy facility in Minnesota (Johnson et al. 2000a) suggest that breeding birds are also affected by wind-facility operations.

### Raptor Displacement

In addition to possible direct effects on raptors within the study area (discussed above), indirect effects caused by disturbance-type impacts, such as construction activity near an active nest or primary foraging area, also have a potential impact on raptor species. Birds displaced from wind-energy facilities might move to areas with fewer disturbances, but with lower quality habitat, with an overall effect of reducing breeding success. Most studies on raptor displacement at wind-energy facilities, however, indicate effects to be negligible (Howell and Noone 1992; Johnson et al. 2000a, 2003; Madders and Whitfield 2006). Notable exceptions to this include a study in Scotland that described territorial golden eagles avoiding the entire wind-energy facility area, except when intercepting non-territorial birds (Walker et al. 2005). A study at the Buffalo Ridge wind-energy facility in Minnesota found evidence of northern harriers avoiding turbines on both a small scale (< 100 m from turbines) and a larger scale in the year following construction (Johnson et al. 2000a). Two years following construction, however, no large-scale displacement of northern harriers was detected.

The only published report of avoidance of wind turbines by nesting raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density on 101 mi<sup>2</sup> (262 km<sup>2</sup>) of land surrounding a wind-energy facility was 5.94 nests/39 mi<sup>2</sup> (5.94 nests/101 km<sup>2</sup>), yet no nests were present in the 12 mi<sup>2</sup> (31 km<sup>2</sup>) facility itself, even though habitat was similar (Usgaard et al. 1997). However, this analysis assumes that raptor nests are uniformly distributed across the landscape, an unlikely event, and even though no nests were found, only two nests would be expected for an area 12 mi<sup>2</sup> in size if the nests were distributed uniformly. At a wind-energy facility in eastern Washington, based on extensive monitoring using helicopter flights and ground observations, raptors still nested in the study area at approximately the same levels after construction, and several nests were located within 0.5 miles (0.8 km) of turbines (Erickson et al. 2004). At the Foote Creek Rim Wind-Energy Facility in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles (0.5 km) of the turbine strings, and seven red-tailed hawk nests, one great horned owl (*Bubo virginianus*) nest, and one golden eagle nest located within one mile (1.6 km) of the wind-energy facility successfully fledged young (Johnson et al. 2000b). The golden eagle pair successfully nested 0.5 mile from the facility for three different years after it became operational. A Swainson's hawk (*Buteo swainsoni*) also nested within 0.25 mile (0.4 km) of a turbine string at the Klondike I wind-energy facility in Oregon after the facility was operational (Johnson et al. 2003). These observations suggest that there will be limited nesting displacement of raptors at the WRWRA.

#### Displacement of Non-Raptor Bird Species

Studies concerning displacement of non-raptor species have concentrated on grassland passerines and waterfowl/waterbirds (Winkelman 1990; Larsen and Madsen 2000; Mabey and Paul 2007). Wind-energy facility construction appears to cause small-scale local displacement of grassland passerines and is likely due to the birds avoiding turbine noise and maintenance activities. Construction also reduces habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson et al. 2000a). Leddy et al. (1999) surveyed bird densities in Conservation Reserve Program (CRP) grasslands at the Buffalo Ridge wind-energy facility in Minnesota, and found mean densities of 10 grassland bird species were four times higher at areas located 180 m (591 ft) from turbines than they were at grasslands nearer turbines. Johnson et al. (2000a) found reduced use of habitat by seven of 22 grassland-breeding birds following construction of the Buffalo Ridge wind energy facility in Minnesota. Results from the Stateline wind-energy facility in Oregon and Washington (Erickson et al. 2004), and the Combine Hills wind-energy facility in Oregon (Young et al. 2005), suggest a relatively small impact of the wind-energy facilities on grassland nesting passerines. Transect surveys conducted prior to and after construction of the wind-energy facilities found that grassland passerine use was significantly reduced within approximately 50 m (164 ft) of turbine strings, but areas further away from turbine strings did not have reduced bird use.

Displacement effects of wind-energy facilities on waterfowl and shorebirds appear to be mixed. Studies from the Netherlands and Denmark suggest that densities of these types of species near turbines were lower compared to densities in similar habitats away from turbines (Winkelman 1990; Pedersen and Poulsen 1991). However, a study from a facility in England, found no effect of wind turbines on populations of cormorant (*Phalacrocorax xarbo*), purple sandpipers (*Calidris maritima*), eiders (*Somateria mollissima*), or gulls, although the cormorants were temporarily displaced during construction (Lawrence et al. 2007). At the Buffalo Ridge wind-energy facility

in Minnesota, the abundance of several bird types, including shorebirds and waterfowl, were found to be significantly lower at survey plots with turbines than at reference plots without turbines (Johnson et al. 2000a). The report concluded that the area of reduced use was limited primarily to those areas within 100 m of the turbines. Disturbance tends to be greatest for migrating birds while feeding and resting (Crockford 1992; NRC 2007). The only waterfowl/waterbirds use at the WRWRA included one group of eight Canada goose observed during spring fixed-point bird use surveys and one group of six individuals during incidental observations. Based on the minimal presence of waterfowl/waterbird species, impacts should be negligible.

A study conducted in England to assess displacement of wintering farmland birds by wind turbines located in an agricultural landscape found that only common (ring-necked) pheasants (*Phasianus colchicus*) apparently avoided turbines. The other species/bird groups examined, including granivores, red-legged partridge (*Alectoris rufa*), Eurasian skylark (*Alauda arvensis*) and corvids, showed no displacement from wind turbines. In fact, Eurasian skylarks and corvids showed increased use of areas close to turbines, possibly due to increased food resources associated with disturbed areas (Devereux et al. 2008).

No studies have been conducted to assess displacement effects of birds in western coniferous forest. It is likely that some displacement may occur similar to that observed in other habitat types.

## CONCLUSIONS AND RECOMMENDATIONS

Based on data collected during this study, raptor and all bird use of the WRWRA is generally lower than most wind resource areas evaluated throughout the western and Midwestern U.S. using similar methods. Based on the results of the studies to date, bird mortality at the WRWRA would likely be similar or lower than that documented at other wind-energy facilities located in the western and Midwestern United States where bird collision mortality has been relatively low.

Based on research conducted at wind-energy facilities throughout the US, raptor use at the WRWRA is generally lower than use levels recorded at other wind-energy facilities. Raptor fatality rates are expected to be within the range of fatality rates observed at other facilities where raptor use levels are lower. To date, no relationships have been observed between overall use by other bird types, and fatality rates of those bird types at wind-energy facilities. However, the flight characteristics and foraging habits of some species may result in increased exposure for these species at the WRWRA. The surveys conducted for this proposed wind resource area also do not address the impacts of the proposed facility to nocturnal migrants, such as passerines. To date, overall fatality rates for birds (including nocturnal migrants) at wind-energy facilities have been relatively low and consistent in the West. As more research is conducted at facilities in the West, more information regarding the potential direct impacts of wind-energy facilities to bird species will be obtained.

The proposed wind-energy facility contains minimal habitat diversity; approximately 82% of the WRWRA contains forested habitat, while the remaining areas are comprised of developed open

space, scrub-shrub, and grasslands (Table 1, Figure 3). Some species considered to be sensitive or of conservation concern were observed within the WRWRA. Some potential exists for wind turbines to displace birds within forested habitats. Research concerning displacement impacts to songbirds, waterfowl and waterbirds and wind-energy facilities is limited, but some studies show the potential for small scale (180 m or less) displacement, while impacts to densities of birds at larger scales has not been shown.



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**Table 1. The land cover types, coverage, and composition within the Whistling Ridge Wind Resource Area.**

<b>Habitat</b>	<b>Acres</b>	<b>% Composition</b>
Developed, Open Space	97.55	8.5
Developed, Low Intensity	4.91	0.4
Deciduous Forest	2.32	0.2
Evergreen Forest	944.07	82.0
Mixed Forest	0.53	<0.1
Scrub-Shrub	81.32	7.1
Grassland	20.80	1.8
<b>Total</b>	<b>1,151.49</b>	<b>100</b>

Data from the National Landcover Database (USGS NLCD 2001).

**Table 2. Summary of bird use (number of birds/plot/20-min survey), species richness (species/20-min survey), and sample size by season and overall during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Season</b>	<b>Number of Visits</b>	<b>Mean Use</b>	<b>Species Richness</b>	<b># Species</b>	<b># Surveys Conducted</b>
Fall 2004	9	14.34	4.02	39	53
Summer 2006	9	15.98	10.84	55	45
Winter 2008/2009	6	1.99	1.16	16	47
Spring 2009	12	9.13	4.54	67	116
<b>Overall</b>	36	9.32	4.51	86	261

**Table 3. Total number of individuals and groups for each bird type and species, by season and overall, during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Scientific Name	Fall 2004		Summer 2006		Winter 2008/09		Spring 2009		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
<b>Waterfowl</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>1</b>	<b>8</b>
Canada goose	<i>Branta canadensis</i>	0	0	0	0	0	0	1	8	1	8
<b>Raptors</b>		<b>29</b>	<b>33</b>	<b>10</b>	<b>10</b>	<b>6</b>	<b>7</b>	<b>25</b>	<b>26</b>	<b>70</b>	<b>76</b>
<u>Accipiters</u>		<i>16</i>	<i>16</i>	<i>4</i>	<i>4</i>	<i>1</i>	<i>1</i>	<i>10</i>	<i>10</i>	<i>31</i>	<i>31</i>
Cooper's hawk	<i>Accipiter cooperii</i>	6	6	0	0	1	1	8	8	15	15
northern goshawk	<i>Accipiter gentilis</i>	2	2	3	3	0	0	0	0	5	5
sharp-shinned hawk	<i>Accipiter striatus</i>	7	7	1	1	0	0	2	2	10	10
unidentified accipiter		1	1	0	0	0	0	0	0	1	1
<u>Buteos</u>		<i>9</i>	<i>13</i>	<i>6</i>	<i>6</i>	<i>3</i>	<i>3</i>	<i>11</i>	<i>12</i>	<i>29</i>	<i>34</i>
red-tailed hawk	<i>Buteo jamaicensis</i>	6	6	6	6	3	3	11	12	26	27
unidentified buteo		3	7	0	0	0	0	0	0	3	7
<u>Northern Harrier</u>		<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>2</i>
northern harrier	<i>Circus cyaneus</i>	1	1	0	0	0	0	1	1	2	2
<u>Eagles</u>		<i>2</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>5</i>
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	0	2	3	0	0	2	3
golden eagle	<i>Aquila chrysaetos</i>	2	2	0	0	0	0	0	0	2	2
<u>Falcons</u>		<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>2</i>
American kestrel	<i>Falco sparverius</i>	0	0	0	0	0	0	1	1	1	1
prairie falcon	<i>Falco mexicanus</i>	1	1	0	0	0	0	0	0	1	1
<u>Owls</u>		<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>
northern saw-whet owl	<i>Aegolius acadicus</i>	0	0	0	0	0	0	1	1	1	1
snowy owl	<i>Bubo scandiacus</i>	0	0	0	0	0	0	1	1	1	1
<b>Vultures</b>		<b>4</b>	<b>4</b>	<b>6</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>12</b>	<b>20</b>	<b>30</b>
turkey vulture	<i>Cathartes aura</i>	4	4	6	14	0	0	10	12	20	30
<b>Upland Gamebirds</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>
ruffed grouse	<i>Bonasa umbellus</i>	1	1	1	1	0	0	0	0	2	2
sooty grouse	<i>Dendragapus fuliginosus</i>	0	0	0	0	0	0	2	2	2	2
wild turkey	<i>Meleagris gallopavo</i>	0	0	0	0	0	0	10	11	10	11

**Table 3. Total number of individuals and groups for each bird type and species, by season and overall, during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Scientific Name	Fall 2004		Summer 2006		Winter 2008/09		Spring 2009		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
<b>Doves/Pigeons</b>		<b>5</b>	<b>29</b>	<b>9</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>17</b>	<b>56</b>
band-tailed pigeon	<i>Columba fasciata</i>	3	27	9	23	0	0	3	4	15	54
mourning dove	<i>Zenaida macroura</i>	2	2	0	0	0	0	0	0	2	2
<b>Passerines</b>		<b>184</b>	<b>667</b>	<b>482</b>	<b>636</b>	<b>59</b>	<b>85</b>	<b>440</b>	<b>926</b>	<b>1,165</b>	<b>2,314</b>
American crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	3	9	3	9
American goldfinch	<i>Carduelis tristis</i>	10	89	5	8	1	1	4	17	20	115
American robin	<i>Turdus migratorius</i>	9	44	22	27	9	12	48	149	88	232
barn swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	1	1	1	1
Bewick's wren	<i>Thryomanes bewickii</i>	0	0	1	1	0	0	0	0	1	1
black-capped chickadee	<i>Poecile atricapillus</i>	6	8	1	1	1	2	2	2	10	13
black-headed grosbeak	<i>Pheucticus melanocephalus</i>	0	0	23	25	0	0	11	15	34	40
black-throated gray warbler	<i>Dendroica nigrescens</i>	0	0	21	22	0	0	0	0	21	22
brown creeper	<i>Certhia americana</i>	0	0	0	0	1	1	3	3	4	4
brown-headed cowbird	<i>Molothrus ater</i>	0	0	5	6	0	0	2	3	7	9
Bullock's oriole	<i>Icterus bullockii</i>	0	0	0	0	0	0	1	1	1	1
Cassin's finch	<i>Carpodacus purpureus</i>	0	0	0	0	0	0	1	1	1	1
Cassin's vireo	<i>Vireo cassinii</i>	0	0	2	2	0	0	0	0	2	2
cedar waxwing	<i>Bombycilla cedrorum</i>	0	0	4	10	0	0	0	0	4	10
chestnut-backed chickadee	<i>Poecile rufescens</i>	1	1	12	21	2	2	7	16	22	40
chipping sparrow	<i>Spizella passerina</i>	0	0	7	8	0	0	2	2	9	10
Clark's nutcracker	<i>Nucifraga columbiana</i>	1	1	0	0	0	0	0	0	1	1
common raven	<i>Corvus corax</i>	34	59	5	5	31	37	36	43	106	144
dark-eyed junco	<i>Junco hyemalis</i>	23	116	23	30	0	0	45	123	91	269
evening grosbeak	<i>Coccothraustes vespertinus</i>	0	0	2	9	0	0	1	14	3	23
golden-crowned kinglet	<i>Regulus satrapa</i>	10	13	1	1	2	3	4	14	17	31
golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	2	20	0	0	0	0	0	0	2	20



**Table 3. Total number of individuals and groups for each bird type and species, by season and overall, during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Scientific Name	Fall 2004		Summer 2006		Winter 2008/09		Spring 2009		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
gray jay	<i>Perisoreus canadensis</i>	0	0	0	0	0	0	2	6	2	6
Hammond's flycatcher	<i>Empidonax hammondii</i>	0	0	5	5	0	0	1	1	6	6
hermit thrush	<i>Catharus guttatus</i>	0	0	2	2	0	0	5	6	7	8
hermit warbler	<i>Dendroica occidentalis</i>	0	0	0	0	0	0	9	12	9	12
house wren	<i>Troglodytes aedon</i>	0	0	3	5	0	0	1	1	4	6
lazuli bunting	<i>Passerina amoena</i>	0	0	7	7	0	0	4	13	11	20
Lincoln's sparrow	<i>Melospiza lincolnii</i>	1	1	0	0	0	0	0	0	1	1
Macgillivray's warbler	<i>Oporornis tolmiei</i>	0	0	27	33	0	0	6	8	33	41
mountain chickadee	<i>Poecile gambeli</i>	1	2	0	0	0	0	1	1	2	3
Nashville warbler	<i>Vermivora ruficapilla</i>	0	0	2	2	0	0	7	10	9	12
northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	0	0	2	2	0	0	0	0	2	2
olive-sided flycatcher	<i>Contopus cooperi</i>	0	0	21	21	0	0	5	6	26	27
orange-crowned warbler	<i>Vermivora celata</i>	0	0	5	6	0	0	7	8	12	14
pacific-slope flycatcher	<i>Empidonax difficilis</i>	0	0	0	0	0	0	2	4	2	4
pine siskin	<i>Carduelis pinus</i>	0	0	3	11	0	0	5	13	8	24
purple finch	<i>Carpodacus purpureus</i>	1	2	14	20	0	0	1	6	16	28
red crossbill	<i>Loxia curvirostra</i>	4	30	9	48	0	0	1	8	14	86
red-breasted nuthatch	<i>Sitta canadensis</i>	11	12	11	12	6	6	18	24	46	54
red-winged blackbird	<i>Agelaius phoeniceus</i>	0	0	0	0	0	0	4	7	4	7
ruby-crowned kinglet	<i>Regulus calendula</i>	3	3	2	2	0	0	2	3	7	8
Say's phoebe	<i>Sayornis saya</i>	0	0	0	0	0	0	1	1	1	1
song sparrow	<i>Melospiza melodia</i>	1	1	0	0	1	1	1	2	3	4
spotted towhee	<i>Pipilo maculatus</i>	5	5	34	35	0	0	16	20	55	60
Steller's jay	<i>Cyanocitta stelleri</i>	31	76	12	16	4	5	27	41	74	138
Swainson's thrush	<i>Catharus ustulatus</i>	0	0	11	12	0	0	0	0	11	12
Townsend's solitaire	<i>Myadestes townsendi</i>	0	0	2	2	0	0	8	9	10	11
Townsend's warbler	<i>Dendroica townsendi</i>	0	0	13	14	0	0	0	0	13	14

**Table 3. Total number of individuals and groups for each bird type and species, by season and overall, during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Scientific Name	Fall 2004		Summer 2006		Winter 2008/09		Spring 2009		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
tree swallow	<i>Tachycineta bicolor</i>	3	15	0	0	0	0	4	8	7	23
unidentified empidonax		0	0	1	1	0	0	0	0	1	1
unidentified finch		0	0	0	0	1	15	0	0	1	15
unidentified passerine		5	28	2	2	0	0	0	0	7	30
unidentified warbler		0	0	1	1	0	0	0	0	1	1
varied thrush	<i>Ixoreus naevius</i>	5	14	0	0	0	0	8	14	13	28
violet-green swallow	<i>Tachycineta thalassina</i>	0	0	3	4	0	0	13	38	16	42
warbling vireo	<i>Vireo gilvus</i>	0	0	10	10	0	0	1	1	11	11
western bluebird	<i>Sialia mexicana</i>	4	27	1	1	0	0	11	26	16	54
western tanager	<i>Piranga ludoviciana</i>	1	1	38	41	0	0	18	24	57	66
western wood-pewee	<i>Contopus virens</i>	0	0	11	12	0	0	3	3	14	15
white-breasted nuthatch	<i>Sitta carolinensis</i>	0	0	0	0	0	0	10	13	10	13
white-crowned sparrow	<i>Zonotrichia leucophrys</i>	3	58	57	93	0	0	38	80	98	231
willow flycatcher	<i>Empidonax traillii</i>	0	0	8	9	0	0	0	0	8	9
Wilson's warbler	<i>Wilsonia pusilla</i>	0	0	16	16	0	0	2	2	18	18
yellow warbler	<i>Dendroica petechia</i>	0	0	1	1	0	0	0	0	1	1
yellow-rumped warbler	<i>Dendroica coronata</i>	9	41	14	14	0	0	27	94	50	149
<b>Other Birds</b>		<b>15</b>	<b>29</b>	<b>28</b>	<b>35</b>	<b>5</b>	<b>5</b>	<b>70</b>	<b>93</b>	<b>118</b>	<b>162</b>
downy woodpecker	<i>Picoides pubescens</i>	0	0	1	1	1	1	1	1	3	3
hairy woodpecker	<i>Picoides villosus</i>	2	2	6	8	0	0	10	11	18	21
northern flicker	<i>Colaptes auratus</i>	4	6	12	15	2	2	22	25	40	48
pileated woodpecker	<i>Dryocopus pileatus</i>	6	6	0	0	2	2	7	7	15	15
red-breasted sapsucker	<i>Sphyrapicus ruber</i>	0	0	0	0	0	0	22	29	22	29
rufous hummingbird	<i>Selasphorus rufus</i>	0	0	7	7	0	0	5	8	12	15
unidentified hummingbird		0	0	0	0	0	0	1	1	1	1
Vaux's swift	<i>Chaetura vauxi</i>	3	15	2	4	0	0	2	11	7	30
<b>Unidentified Birds</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

**Table 3. Total number of individuals and groups for each bird type and species, by season and overall, during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Scientific Name	Fall 2004		Summer 2006		Winter 2008/09		Spring 2009		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
unidentified bird		0	0	0	0	2	2	0	0	2	2
<b>Overall</b>		<b>238</b>	<b>763</b>	<b>536</b>	<b>719</b>	<b>72</b>	<b>99</b>	<b>561</b>	<b>1,082</b>	<b>1,407</b>	<b>2,663</b>

**Table 4. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each bird type and species by season during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Use				% Composition				% Frequency			
	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009
<b>Waterfowl</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.07</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.9</b>
Canada goose	0	0	0	0.07	0	0	0	0.8	0	0	0	0.9
<b>Raptors</b>	<b>0.63</b>	<b>0.22</b>	<b>0.17</b>	<b>0.16</b>	<b>4.4</b>	<b>1.4</b>	<b>8.4</b>	<b>1.8</b>	<b>34.8</b>	<b>22.2</b>	<b>13.3</b>	<b>12.9</b>
<u>Accipiters</u>	<i>0.31</i>	<i>0.09</i>	<i>0.03</i>	<i>0.08</i>	<i>2.1</i>	<i>0.6</i>	<i>1.7</i>	<i>0.8</i>	<i>25.2</i>	<i>8.9</i>	<i>3.3</i>	<i>7.7</i>
Cooper's hawk	0.12	0	0.03	0.06	0.8	0	1.7	0.7	11.9	0	3.3	6.0
northern goshawk	0.04	0.07	0	0	0.3	0.4	0	0	4.1	6.7	0	0
sharp-shinned hawk	0.13	0.02	0	0.02	0.9	0.1	0	0.2	7.4	2.2	0	1.7
unidentified accipiter	0.02	0	0	0	0.1	0	0	0	1.9	0	0	0
<u>Buteos</u>	<i>0.24</i>	<i>0.13</i>	<i>0.05</i>	<i>0.05</i>	<i>1.7</i>	<i>0.8</i>	<i>2.5</i>	<i>0.6</i>	<i>15.2</i>	<i>13.3</i>	<i>5.0</i>	<i>3.4</i>
red-tailed hawk	0.11	0.13	0.05	0.05	0.8	0.8	2.5	0.6	11.5	13.3	5.0	3.4
unidentified buteo	0.13	0	0	0	0.9	0	0	0	5.6	0	0	0
<u>Northern Harrier</u>	<i>0.02</i>	<i>0</i>	<i>0</i>	<i>0.01</i>	<i>0.1</i>	<i>0</i>	<i>0</i>	<i>0.1</i>	<i>1.9</i>	<i>0</i>	<i>0</i>	<i>0.8</i>
northern harrier	0.02	0	0	0.01	0.1	0	0	0.1	1.9	0	0	0.8
<u>Eagles</u>	<i>0.04</i>	<i>0</i>	<i>0.08</i>	<i>0</i>	<i>0.3</i>	<i>0</i>	<i>4.2</i>	<i>0</i>	<i>4.1</i>	<i>0</i>	<i>5.0</i>	<i>0</i>
bald eagle	0	0	0.08	0	0	0	4.2	0	0	0	5.0	0
golden eagle	0.04	0	0	0	0.3	0	0	0	4.1	0	0	0
<u>Falcons</u>	<i>0.02</i>	<i>0</i>	<i>0</i>	<i>0.01</i>	<i>0.1</i>	<i>0</i>	<i>0</i>	<i>0.1</i>	<i>1.9</i>	<i>0</i>	<i>0</i>	<i>0.8</i>
American kestrel	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
prairie falcon	0.02	0	0	0	0.1	0	0	0	1.9	0	0	0
<u>Owls</u>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0.02</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0.2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1.8</i>
northern saw-whet owl	0	0	0	0.01	0	0	0	0.1	0	0	0	0.9
snowy owl	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
<b>Vultures</b>	<b>0.08</b>	<b>0.31</b>	<b>0</b>	<b>0.08</b>	<b>0.5</b>	<b>1.9</b>	<b>0</b>	<b>0.9</b>	<b>5.9</b>	<b>11.1</b>	<b>0</b>	<b>6.7</b>
turkey vulture	0.08	0.31	0	0.08	0.5	1.9	0	0.9	5.9	11.1	0	6.7
<b>Upland Gamebirds</b>	<b>0.02</b>	<b>0.02</b>	<b>0</b>	<b>0.11</b>	<b>0.1</b>	<b>0.1</b>	<b>0</b>	<b>1.2</b>	<b>1.9</b>	<b>2.2</b>	<b>0</b>	<b>10.1</b>
ruffed grouse	0.02	0.02	0	0	0.1	0.1	0	0	1.9	2.2	0	0
sooty grouse	0	0	0	0.02	0	0	0	0.2	0	0	0	1.7



**Table 4. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each bird type and species by season during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Use				% Composition				% Frequency			
	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009
wild turkey	0	0	0	0.09	0	0	0	1.0	0	0	0	8.4
<b>Doves/Pigeons</b>	<b>0.54</b>	<b>0.51</b>	<b>0</b>	<b>0.03</b>	<b>3.7</b>	<b>3.2</b>	<b>0</b>	<b>0.4</b>	<b>9.3</b>	<b>17.8</b>	<b>0</b>	<b>2.6</b>
band-tailed pigeon	0.50	0.51	0	0.03	3.5	3.2	0	0.4	5.6	17.8	0	2.6
mourning dove	0.04	0	0	0	0.3	0	0	0	3.7	0	0	0
<b>Passerines</b>	<b>12.53</b>	<b>14.13</b>	<b>1.69</b>	<b>7.88</b>	<b>87.4</b>	<b>88.5</b>	<b>84.6</b>	<b>86.4</b>	<b>94.4</b>	<b>100.0</b>	<b>58.3</b>	<b>91.9</b>
American crow	0	0	0	0.08	0	0	0	0.9	0	0	0	2.7
American goldfinch	1.71	0.18	0.02	0.14	12.0	1.1	0.8	1.6	17.4	11.1	1.7	3.3
American robin	0.81	0.60	0.23	1.31	5.7	3.8	11.7	14.4	14.8	46.7	16.7	41.4
barn swallow	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
Bewick's wren	0	0.02	0	0	0	0.1	0	0	0	2.2	0	0
black-capped chickadee	0.15	0.02	0.03	0.02	1.0	0.1	1.7	0.2	11.1	2.2	1.7	1.8
black-headed grosbeak	0	0.56	0	0.13	0	3.5	0	1.4	0	44.4	0	9.2
black-throated gray warbler	0	0.49	0	0	0	3.1	0	0	0	46.7	0	0
brown-headed cowbird	0	0.13	0	0.03	0	0.8	0	0.3	0	11.1	0	1.7
brown creeper	0	0	0.02	0.03	0	0	0.8	0.3	0	0	1.7	2.5
Bullock's oriole	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
Cassin's finch	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
Cassin's vireo	0	0.04	0	0	0	0.3	0	0	0	4.4	0	0
cedar waxwing	0	0.22	0	0	0	1.4	0	0	0	8.9	0	0
chestnut-backed chickadee	0.02	0.47	0.05	0.14	0.1	2.9	2.5	1.6	1.9	26.7	5.0	6.0
chipping sparrow	0	0.18	0	0.02	0	1.1	0	0.2	0	15.6	0	1.7
Clark's nutcracker	0.02	0	0	0	0.1	0	0	0	1.9	0	0	0
common raven	1.12	0.11	0.69	0.34	7.8	0.7	34.8	3.7	48.9	11.1	36.0	22.9
dark-eyed junco	2.19	0.67	0	1.09	15.2	4.2	0	12.0	41.5	48.9	0	36.2
evening grosbeak	0	0.20	0	0.12	0	1.3	0	1.3	0	4.4	0	0.8
golden-crowned kinglet	0.25	0.02	0.07	0.12	1.7	0.1	3.6	1.3	19.3	2.2	4.8	3.3
golden-crowned sparrow	0.37	0	0	0	2.6	0	0	0	3.7	0	0	0

**Table 4. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each bird type and species by season during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Use				% Composition				% Frequency			
	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009
gray jay	0	0	0	0.05	0	0	0	0.5	0	0	0	1.7
Hammond's flycatcher	0	0.11	0	0.01	0	0.7	0	0.1	0	11.1	0	0.8
hermit thrush	0	0.04	0	0.05	0	0.3	0	0.5	0	4.4	0	4.2
hermit warbler	0	0	0	0.10	0	0	0	1.1	0	0	0	7.5
house wren	0	0.11	0	0.01	0	0.7	0	0.1	0	6.7	0	0.8
lazuli bunting	0	0.16	0	0.11	0	1.0	0	1.2	0	15.6	0	3.3
Lincoln's sparrow	0.02	0	0	0	0.1	0	0	0	1.9	0	0	0
Macgillivray's warbler	0	0.73	0	0.07	0	4.6	0	0.7	0	48.9	0	5.0
mountain chickadee	0.04	0	0	0.01	0.3	0	0	0.1	1.9	0	0	0.8
Nashville warbler	0	0.04	0	0.08	0	0.3	0	0.9	0	4.4	0	5.8
northern rough-winged swallow	0	0.04	0	0	0	0.3	0	0	0	4.4	0	0
olive-sided flycatcher	0	0.47	0	0.05	0	2.9	0	0.5	0	40.0	0	4.2
orange-crowned warbler	0	0.13	0	0.07	0	0.8	0	0.7	0	11.1	0	5.8
pacific-slope flycatcher	0	0	0	0.03	0	0	0	0.4	0	0	0	1.7
pine siskin	0	0.24	0	0.11	0	1.5	0	1.2	0	6.7	0	4.2
purple finch	0.04	0.44	0	0.05	0.3	2.8	0	0.5	1.9	31.1	0	0.8
red-breasted nuthatch	0.22	0.27	0.10	0.20	1.5	1.7	5.0	2.2	20.4	24.4	10.0	15.4
red-winged blackbird	0	0	0	0.06	0	0	0	0.6	0	0	0	3.3
red crossbill	0.56	1.07	0	0.07	3.9	6.7	0	0.7	7.4	20.0	0	0.8
ruby-crowned kinglet	0.06	0.04	0	0.03	0.4	0.3	0	0.3	5.6	4.4	0	1.7
Say's phoebe	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
song sparrow	0.02	0	0.02	0.02	0.1	0	0.8	0.2	1.9	0	1.7	0.8
spotted towhee	0.10	0.78	0	0.17	0.7	4.9	0	1.8	10.0	64.4	0	13.3
Steller's jay	1.42	0.36	0.10	0.35	9.9	2.2	4.9	3.9	47.0	26.7	7.4	22.2
Swainson's thrush	0	0.27	0	0	0	1.7	0	0	0	24.4	0	0
Townsend's solitaire	0	0.04	0	0.08	0	0.3	0	0.8	0	4.4	0	6.7
Townsend's warbler	0	0.31	0	0	0	1.9	0	0	0	24.4	0	0

**Table 4. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each bird type and species by season during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Use				% Composition				% Frequency			
	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009
tree swallow	0.30	0	0	0.07	2.1	0	0	0.7	4.1	0	0	3.3
unidentified empidonax	0	0.02	0	0	0	0.1	0	0	0	2.2	0	0
unidentified finch	0	0	0.36	0	0	0	17.9	0	0	0	2.4	0
unidentified passerine	0.52	0.04	0	0	3.6	0.3	0	0	9.3	4.4	0	0
unidentified warbler	0	0.02	0	0	0	0.1	0	0	0	2.2	0	0
varied thrush	0.26	0	0	0.12	1.8	0	0	1.3	9.3	0	0	6.9
violet-green swallow	0	0.09	0	0.32	0	0.6	0	3.5	0	6.7	0	11.1
warbling vireo	0	0.22	0	0.01	0	1.4	0	0.1	0	22.2	0	0.8
western bluebird	0.50	0.02	0	0.23	3.5	0.1	0	2.5	5.6	2.2	0	9.5
western tanager	0.02	0.91	0	0.20	0.1	5.7	0	2.2	1.9	75.6	0	15.0
western wood-pewee	0	0.27	0	0.03	0	1.7	0	0.3	0	24.4	0	2.5
white-breasted nuthatch	0	0	0	0.11	0	0	0	1.2	0	0	0	8.3
white-crowned sparrow	1.07	2.07	0	0.67	7.5	12.9	0	7.3	5.6	77.8	0	30.8
willow flycatcher	0	0.20	0	0	0	1.3	0	0	0	17.8	0	0
Wilson's warbler	0	0.36	0	0.02	0	2.2	0	0.2	0	35.6	0	1.7
yellow-rumped warbler	0.76	0.31	0	0.78	5.3	1.9	0	8.6	14.8	31.1	0	22.5
yellow warbler	0	0.02	0	0	0	0.1	0	0	0	2.2	0	0
<b>Other Birds</b>	<b>0.54</b>	<b>0.78</b>	<b>0.10</b>	<b>0.78</b>	<b>3.8</b>	<b>4.9</b>	<b>5.0</b>	<b>8.6</b>	<b>26.7</b>	<b>44.4</b>	<b>10.0</b>	<b>47.2</b>
downy woodpecker	0	0.02	0.02	0.01	0	0.1	0.8	0.1	0	2.2	1.7	0.9
hairy woodpecker	0.04	0.18	0	0.09	0.3	1.1	0	1.0	3.7	13.3	0	8.6
northern flicker	0.11	0.33	0.05	0.21	0.8	2.1	2.5	2.3	7.4	26.7	5.0	18.4
pileated woodpecker	0.11	0	0.03	0.06	0.8	0	1.7	0.6	11.5	0	3.3	5.9
red-breasted sapsucker	0	0	0	0.24	0	0	0	2.6	0	0	0	18.3
rufous hummingbird	0	0.16	0	0.07	0	1.0	0	0.7	0	15.6	0	4.2
unidentified hummingbird	0	0	0	0.01	0	0	0	0.1	0	0	0	0.8
Vaux's swift	0.28	0.09	0	0.09	2.0	0.6	0	1.0	4.1	4.4	0	1.7
<b>Unidentified Birds</b>	<b>0</b>	<b>0</b>	<b>0.04</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4.0</b>	<b>0</b>

**Table 4. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each bird type and species by season during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

Species/Type	Use				% Composition				% Frequency			
	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009	Fall 2004	Summer 2006	Winter 2008/09	Spring 2009
unidentified bird	0	0	0.04	0	0	0	2.0	0	0	0	4.0	0
<b>Overall</b>	<b>14.34</b>	<b>15.98</b>	<b>1.99</b>	<b>9.13</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>				



**Table 5. Flight height characteristics by bird type during fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Bird Type</b>	<b># Groups Flying</b>	<b># Obs Flying</b>	<b>Mean Flight Height (m)</b>	<b>% Obs Flying</b>	<b>% within Flight Height Categories</b>		
					<b>0-35 m</b>	<b>35-130 m</b>	<b>&gt; 130 m</b>
Waterfowl	1	8	180.00	100	0	0	100
Raptors	52	58	86.96	84.1	15.5	58.6	25.9
<i>Accipiters</i>	23	23	68.39	76.7	21.7	65.2	13.0
<i>Buteos</i>	21	26	115.57	92.9	3.8	53.8	42.3
<i>Northern Harrier</i>	2	2	23.50	100	100	0	0
<i>Eagles</i>	4	5	90.00	100	20.0	60.0	20.0
<i>Falcons</i>	2	2	57.50	100	0	100	0
<i>Owls</i>	0	0	0	0	0	0	0
Vultures	18	28	111.72	100	17.9	53.6	28.6
Upland Gamebirds	1	1	1.00	6.7	100	0	0
Doves/Pigeons	15	34	63.93	60.7	35.3	58.8	5.9
Passerines	384	1,235	29.79	53.6	69.7	29.5	0.8
Other Birds	52	85	18.56	52.5	75.3	24.7	0
Unidentified Birds	0	0	0	0	0	0	0
<b>Overall</b>	<b>523</b>	<b>1,449</b>	<b>38.39</b>	<b>54.8</b>	<b>65.7</b>	<b>31.3</b>	<b>3.0</b>

ZOR: The likely "zone of risk" for potential collision with a turbine blade, 35 – 130m or (114-427 ft) above ground level (AGL).

**Table 6. Relative exposure index and flight characteristics by species during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Species</b>	<b># Groups Flying</b>	<b>Overall Mean Use</b>	<b>% Flying</b>	<b>% Flying within ZOR based on initial obs</b>	<b>Exposure Index</b>	<b>% Within ZOR at anytime</b>
red crossbill	12	0.34	95.3	90.2	0.29	90.2
common raven	67	0.59	72.1	55.1	0.23	68.4
American robin	31	0.73	59.5	31.9	0.14	41.3
western bluebird	15	0.18	98.1	62.3	0.11	67.9
unidentified passerine	6	0.13	96.7	75.9	0.09	75.9
band-tailed pigeon	13	0.22	59.3	59.4	0.08	68.8
tree swallow	7	0.09	100	78.3	0.07	91.3
evening grosbeak	2	0.07	91.3	100	0.06	100
Vaux's swift	7	0.11	100	56.7	0.06	93.3
American goldfinch	18	0.47	96.5	12.6	0.06	12.6
red-tailed hawk	19	0.08	95.2	70.0	0.05	75.0
turkey vulture	18	0.10	100	53.6	0.05	78.6
violet-green swallow	16	0.11	100	45.2	0.05	59.5
pine siskin	8	0.07	100	58.3	0.04	58.3
purple finch	2	0.10	35.7	100	0.04	100
cedar waxwing	3	0.04	90.0	100	0.04	100
Steller's jay	37	0.52	62.3	9.3	0.03	46.5
sharp-shinned hawk	7	0.04	70.0	85.7	0.02	71.4
American crow	3	0.02	100	100	0.02	100
Cooper's hawk	11	0.05	78.6	45.5	0.02	54.5
bald eagle	2	0.03	100	66.7	0.02	66.7
northern goshawk	4	0.02	80.0	100	0.02	100
western tanager	15	0.23	30.3	20.0	0.01	25.0
northern flicker	12	0.16	25.0	25.0	0.01	25.0
northern rough-winged swallow	2	0.01	100	100	0.01	100
chestnut-backed chickadee	5	0.14	35.0	14.3	0.01	14.3
black-headed grosbeak	6	0.14	20.0	25.0	0.01	25.0

**Table 6. Relative exposure index and flight characteristics by species during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Species</b>	<b># Groups Flying</b>	<b>Overall Mean Use</b>	<b>% Flying</b>	<b>% Flying within ZOR based on initial obs</b>	<b>Exposure Index</b>	<b>% Within ZOR at anytime</b>
golden eagle	2	0.01	100	50.0	<0.01	100
mourning dove	2	0.01	100	50	<0.01	50.0
Clark's nutcracker	1	0.00	100	100	<0.01	100
prairie falcon	1	0.00	100	100	<0.01	100
brown-headed cowbird	3	0.03	33.3	33.3	<0.01	33.3
hairy woodpecker	9	0.07	52.4	9.1	<0.01	9.1
yellow-rumped warbler	25	0.45	65.1	1.0	<0.01	12.4
Townsend's solitaire	6	0.03	63.6	14.3	<0.01	14.3
American kestrel	1	0.00	100	100	<0.01	100
barn swallow	1	0.00	100	100	<0.01	100
dark-eyed junco	37	0.92	68.4	0	0	0
white-crowned sparrow	8	0.81	30.3	0	0	0
spotted towhee	4	0.21	8.3	0	0	0
red-breasted nuthatch	3	0.19	5.6	0	0	0
Macgillivray's warbler	3	0.15	9.8	0	0	0
golden-crowned kinglet	2	0.12	29.0	0	0	0
unidentified finch	1	0.11	100	0	0	0
olive-sided flycatcher	2	0.10	7.4	0	0	50.0
varied thrush	2	0.09	14.3	0	0	50.0
black-throated gray warbler	0	0.09	0	0	0	0
golden-crowned sparrow	0	0.08	0	0	0	0
Wilson's warbler	0	0.07	0	0	0	0
red-breasted sapsucker	10	0.07	51.7	0	0	0
lazuli bunting	4	0.06	55.0	0	0	0
Townsend's warbler	0	0.06	0	0	0	0
western wood-pewee	0	0.06	0	0	0	0
black-capped chickadee	2	0.05	15.4	0	0	0
pileated woodpecker	1	0.05	6.7	0	0	0

**Table 6. Relative exposure index and flight characteristics by species during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Species</b>	<b># Groups Flying</b>	<b>Overall Mean Use</b>	<b>% Flying</b>	<b>% Flying within ZOR based on initial obs</b>	<b>Exposure Index</b>	<b>% Within ZOR at anytime</b>
Swainson's thrush	0	0.05	0	0	0	0
rufous hummingbird	12	0.05	100	0	0	0
warbling vireo	0	0.04	0	0	0	0
orange-crowned warbler	5	0.04	42.9	0	0	0
chipping sparrow	0	0.04	0	0	0	0
willow flycatcher	0	0.04	0	0	0	0
Nashville warbler	3	0.03	41.7	0	0	0
white-breasted nuthatch	1	0.03	7.7	0	0	0
unidentified buteo	2	0.03	85.7	0	0	0
ruby-crowned kinglet	3	0.03	50	0	0	0
hermit warbler	3	0.03	33.3	0	0	0
wild turkey	0	0.03	0	0	0	0
Hammond's flycatcher	0	0.02	0	0	0	0
house wren	1	0.02	16.7	0	0	0
hermit thrush	0	0.02	0	0	0	0
Canada goose	1	0.02	100	0	0	0
red-winged blackbird	0	0.02	0	0	0	0
song sparrow	1	0.01	50.0	0	0	0
gray jay	2	0.01	100	0	0	0
unidentified bird	0	0.01	0	0	0	0
brown creeper	1	0.01	25.0	0	0	0
downy woodpecker	0	0.01	0	0	0	0
mountain chickadee	1	0.01	66.7	0	0	0
pacific-slope flycatcher	1	0.01	75.0	0	0	0
ruffed grouse	1	0.01	50.0	0	0	0
Cassin's vireo	0	0.01	0	0	0	0
northern harrier	2	0.01	100	0	0	50.0
sooty grouse	0	<0.01	0	0	0	0

**Table 6. Relative exposure index and flight characteristics by species during the fixed-point bird use surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Species</b>	<b># Groups Flying</b>	<b>Overall Mean Use</b>	<b>% Flying</b>	<b>% Flying within ZOR based on initial obs</b>	<b>Exposure Index</b>	<b>% Within ZOR at anytime</b>
Lincoln's sparrow	0	<0.01	0	0	0	0
unidentified accipiter	1	<0.01	100	0	0	0
Bewick's wren	0	<0.01	0	0	0	0
unidentified empidonax	0	<0.01	0	0	0	0
unidentified warbler	1	<0.01	100	0	0	0
yellow warbler	0	<0.01	0	0	0	0
northern saw-whet owl	0	<0.01	0	0	0	0
Bullock's oriole	1	<0.01	100	0	0	0
Cassin's finch	0	<0.01	0	0	0	0
Say's phoebe	1	<0.01	100	0	0	0
snowy owl	0	<0.01	0	0	0	0
unidentified hummingbird	1	<0.01	100	0	0	0

ZOR: The likely “zone of risk” for potential collision with a turbine blade, or 114-427 ft (35-130 m) above ground level (AGL).



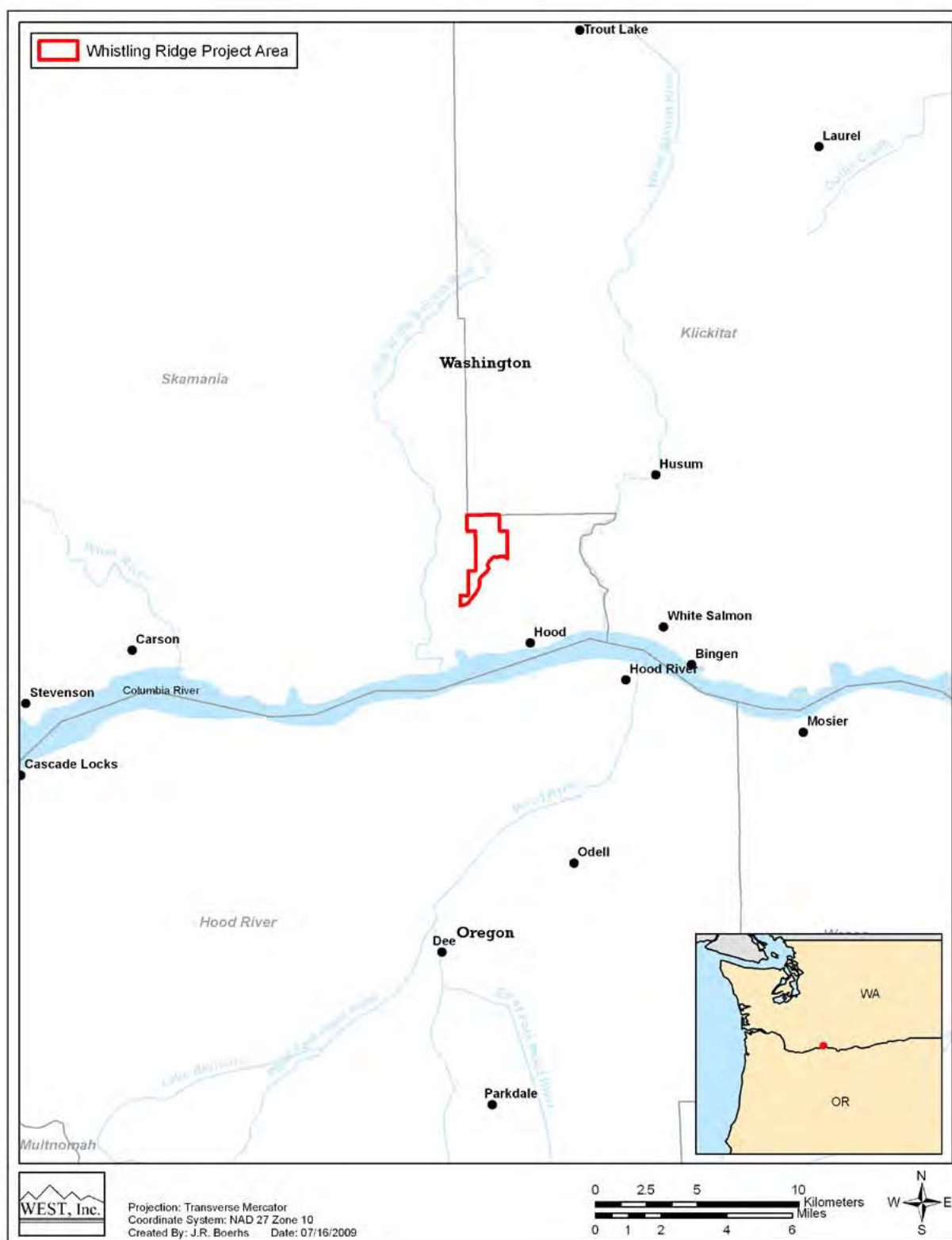
**Table 7. Incidental wildlife observed while conducting all surveys at the Whistling Ridge Wind Resource Area, September 11, 2004 - May 29, 2009.**

<b>Species</b>	<b>Scientific Name</b>	<b># grps</b>	<b># obs</b>
pine siskin	<i>Carduelis pinus</i>	1	9
Canada goose	<i>Branta canadensis</i>	1	6
red-tailed hawk	<i>Buteo jamaicensis</i>	3	4
osprey	<i>Pandion haliaetus</i>	1	2
common poorwill	<i>Phalaenoptilus nuttallii</i>	1	1
ruffed grouse	<i>Bonasa umbellus</i>	1	1
<b>Bird Subtotal</b>	<b>6 Species</b>	<b>8</b>	<b>23</b>
mule deer	<i>Odocoileus hemionus</i>	7	43
black-tailed deer	<i>Odocoileus hemionus columbianus</i>	4	9
elk	<i>Cervus elephus</i>	2	3
Douglas squirrel	<i>Tamiasciurus douglasii</i>	1	1
gray squirrel	<i>Sciurus sp.</i>	1	1
<b>Mammal Subtotal</b>	<b>5 Species</b>	<b>15</b>	<b>57</b>

**Table 8. Summary of sensitive species observed at the Whistling Ridge Wind Resource Area during fixed-point bird use surveys (FP) and as incidental wildlife observations (Inc.), September 11, 2004 – May 29, 2009.**

Species	Scientific Name	Status	FP		Inc.		Total	
			# grps	# obs	# grps	# obs	# grps	# obs
Vaux's swift	<i>Chaetura vauxi</i>	SCS	7	30	0	0	7	30
pileated woodpecker	<i>Dryocopus pileatus</i>	SCS	15	15	0	0	15	15
northern goshawk	<i>Accipiter gentilis</i>	SCS	5	5	0	0	5	5
bald eagle	<i>Haliaeetus leucocephalus</i>	SSC	2	3	0	0	2	3
golden eagle	<i>Aquila chrysaetos</i>	SCS	2	2	0	0	2	2
gray squirrel	<i>Sciurus sp.*</i>	ST?	0	0	1	1	1	1
<b>Total</b>	<b>5 Species</b>		<b>31</b>	<b>55</b>	<b>1</b>	<b>1</b>	<b>32</b>	<b>56</b>

ST = state threatened; SSC = State species of concern; SCS = State candidate species (Data from WDFW 2009). \* The gray squirrel was only observed briefly and was not positively identified as being either a western or eastern gray squirrel.



**Figure 1. Location of the Whistling Ridge Wind Resource Area.**



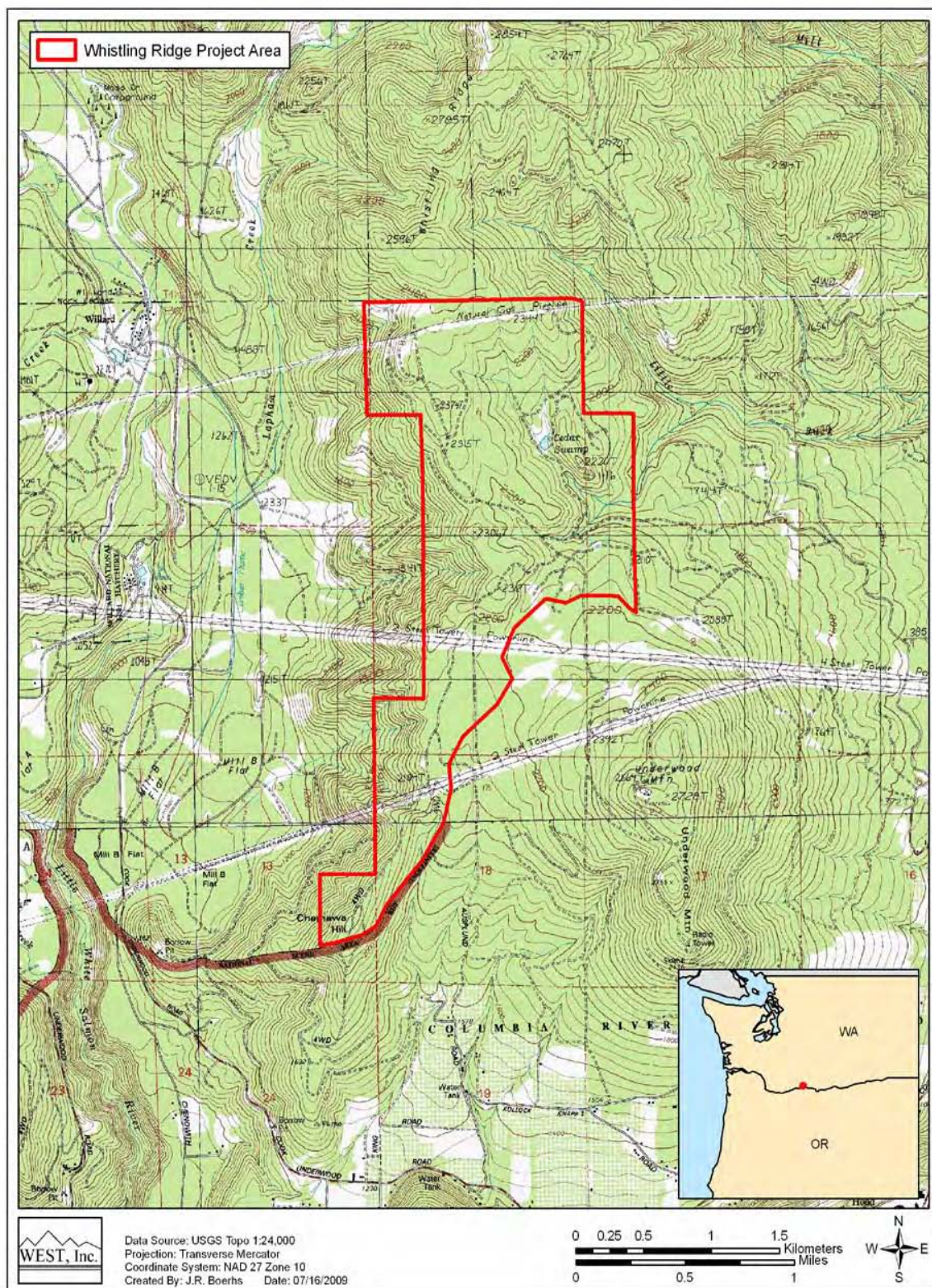
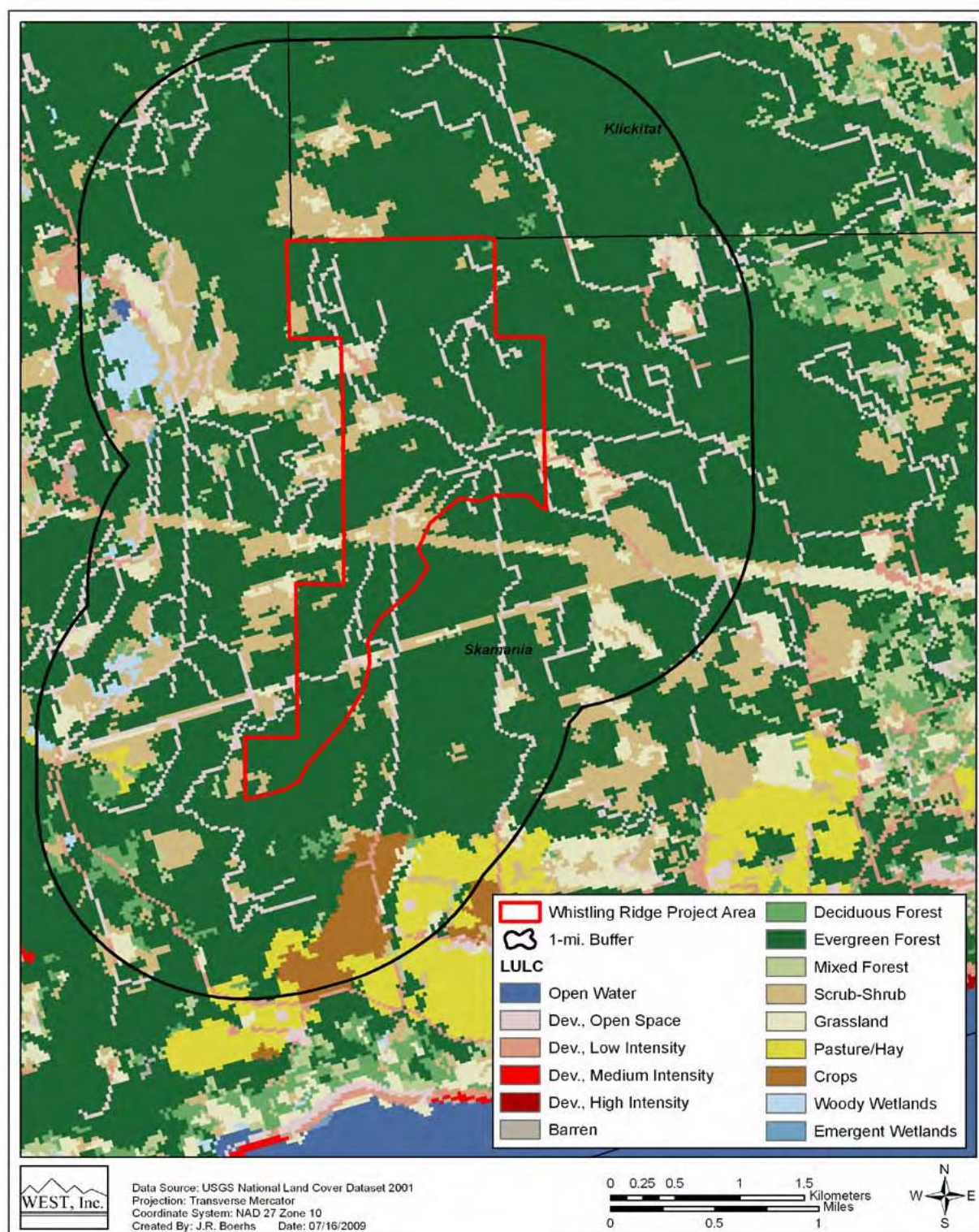


Figure 2. Elevation and topography of the Whistling Ridge Wind Resource Area.





**Figure 3. The land cover types and coverage within the Whistling Ridge Wind Resource Area (USGS NLCD 2001).**



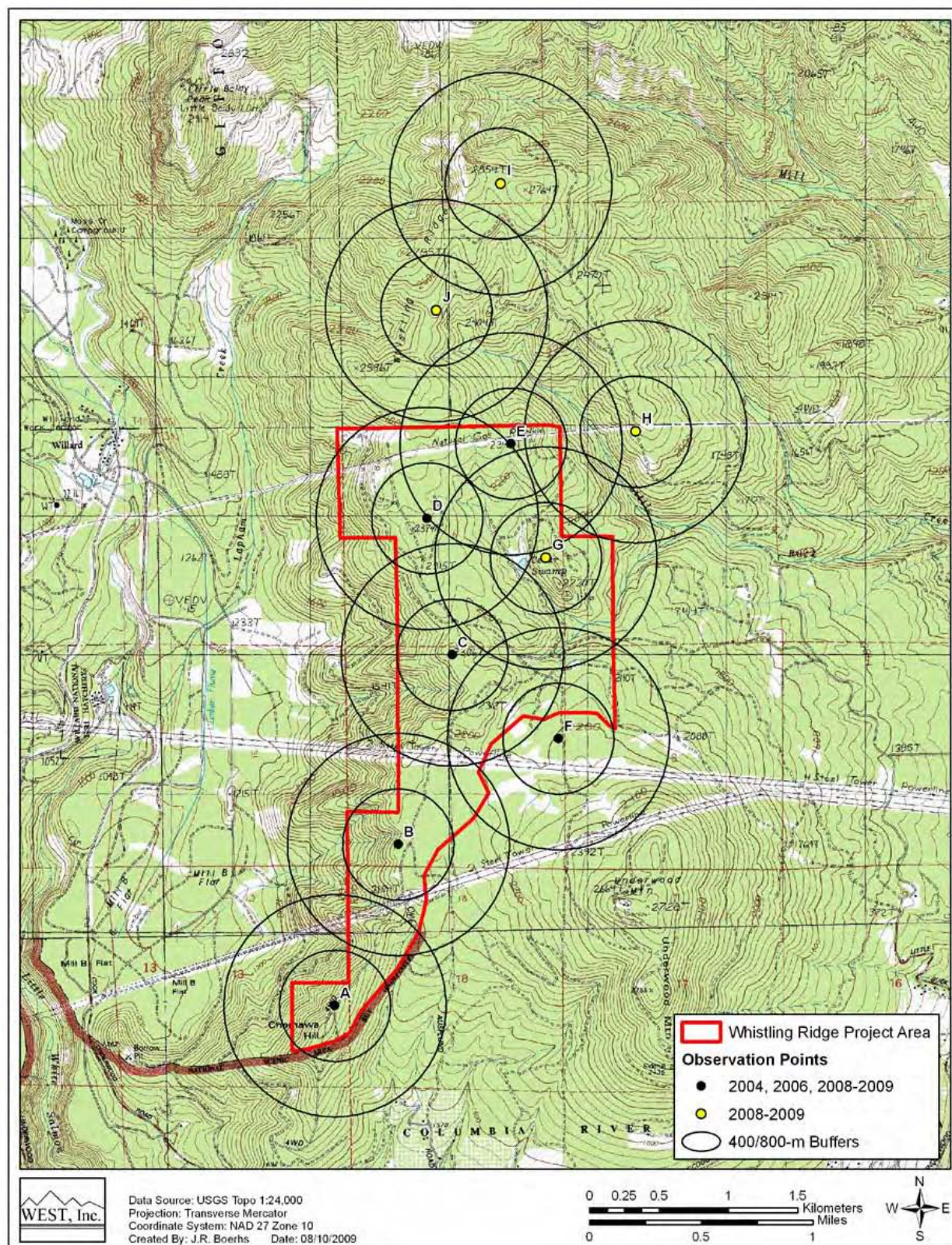
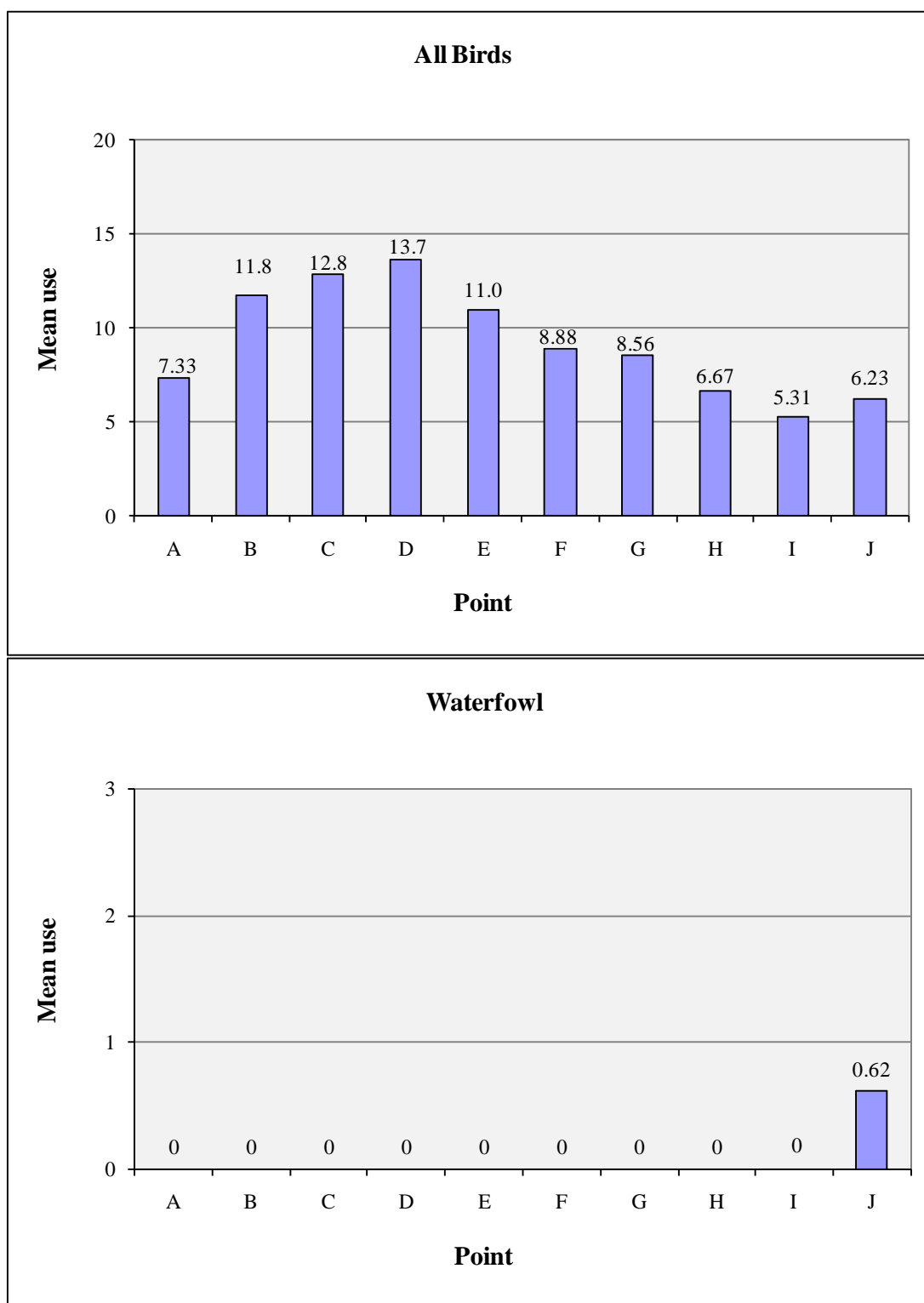
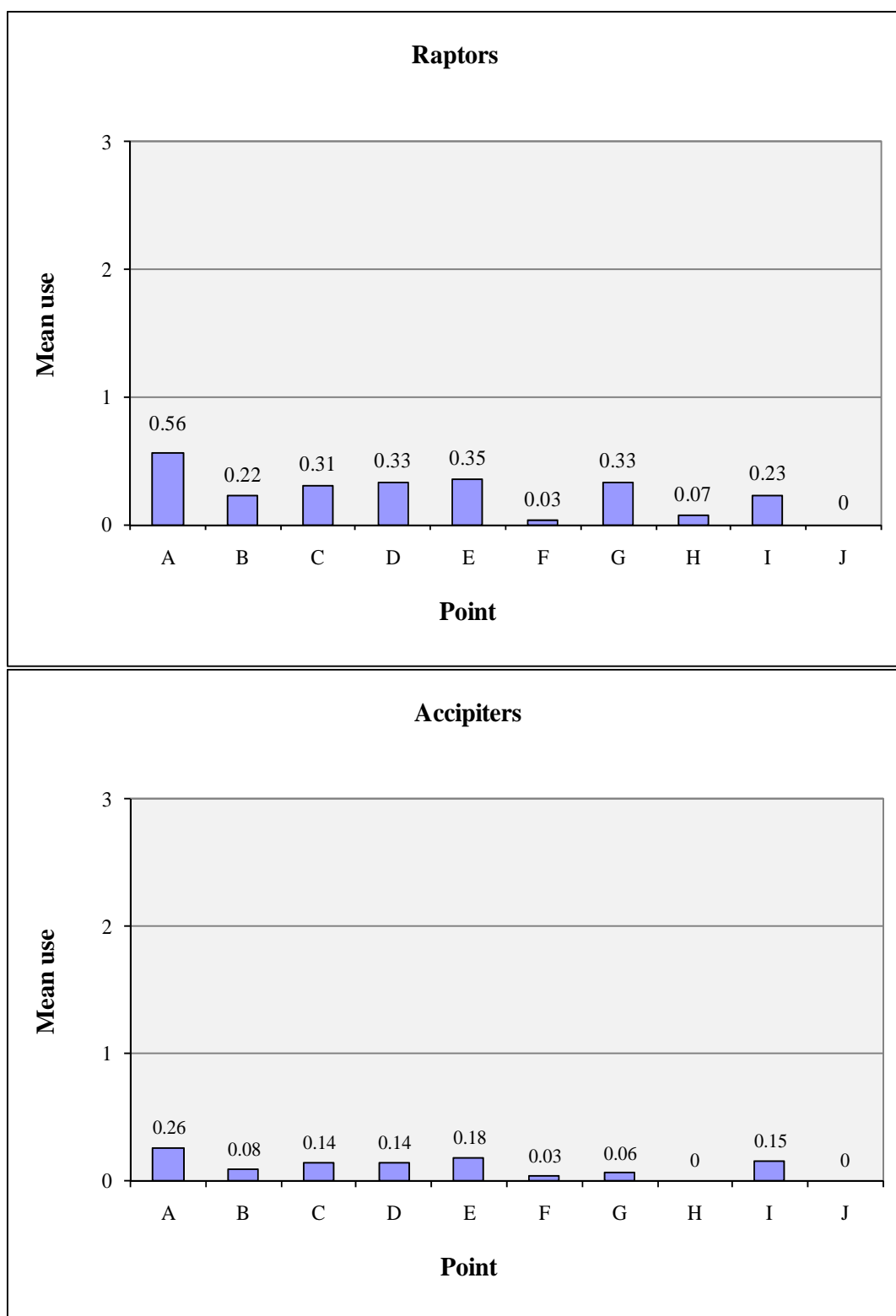


Figure 4. Fixed-point bird use survey points at the Whistling Ridge Wind Resource Area.

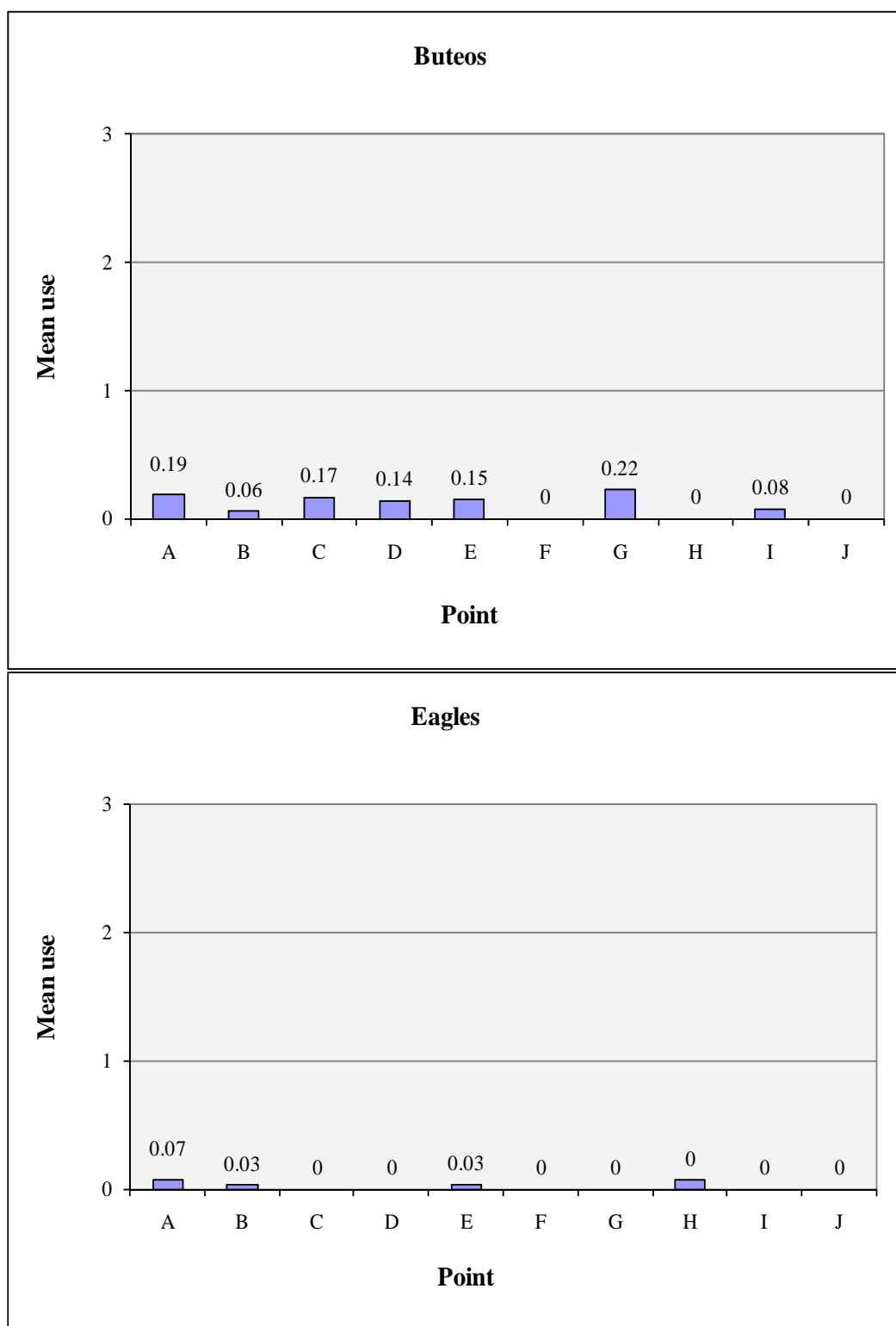


**Figure 5. Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds major bird types at the Whistling Ridge Wind Resource Area.**

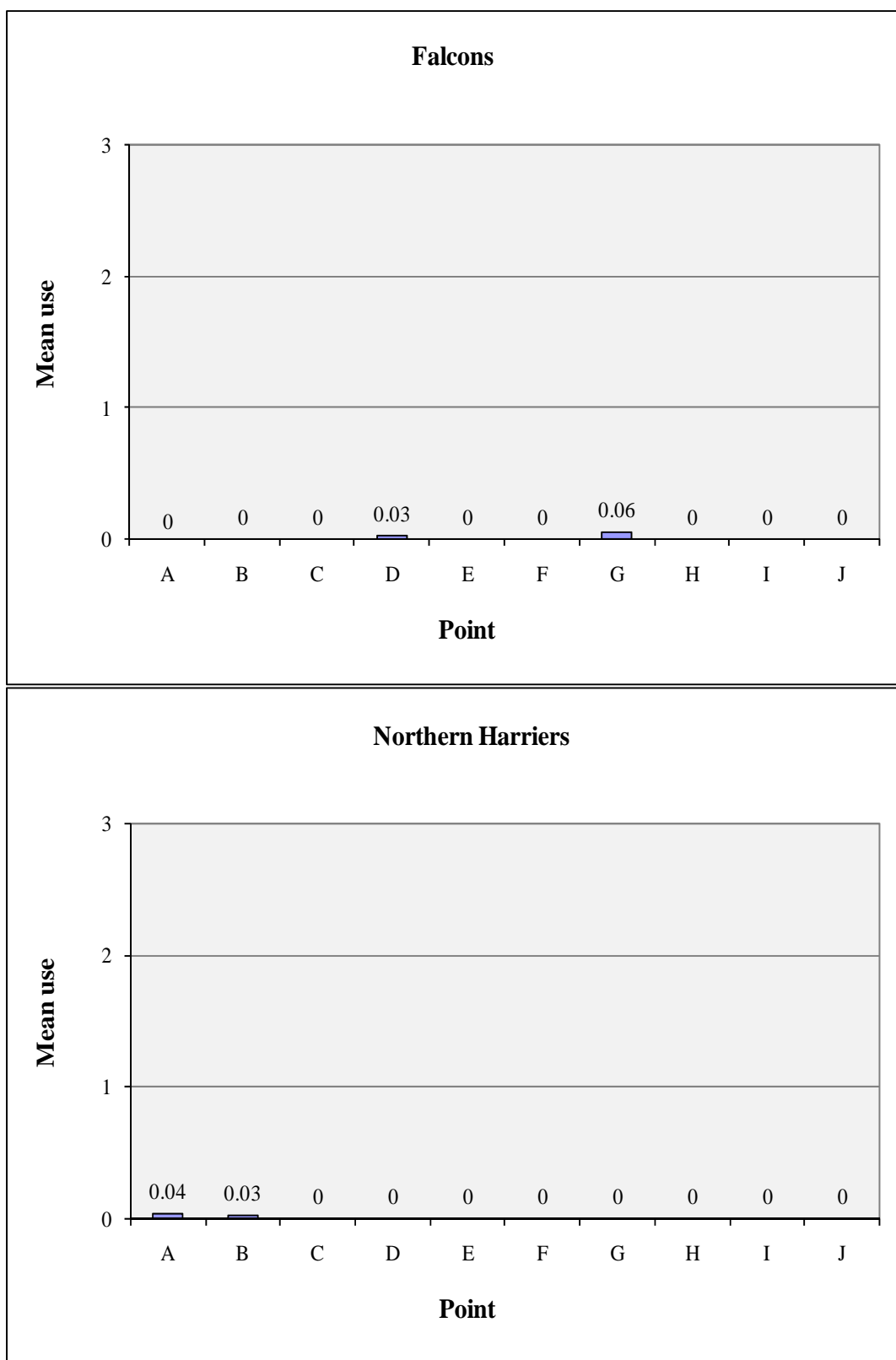




**Figure 5 (continued).** Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.

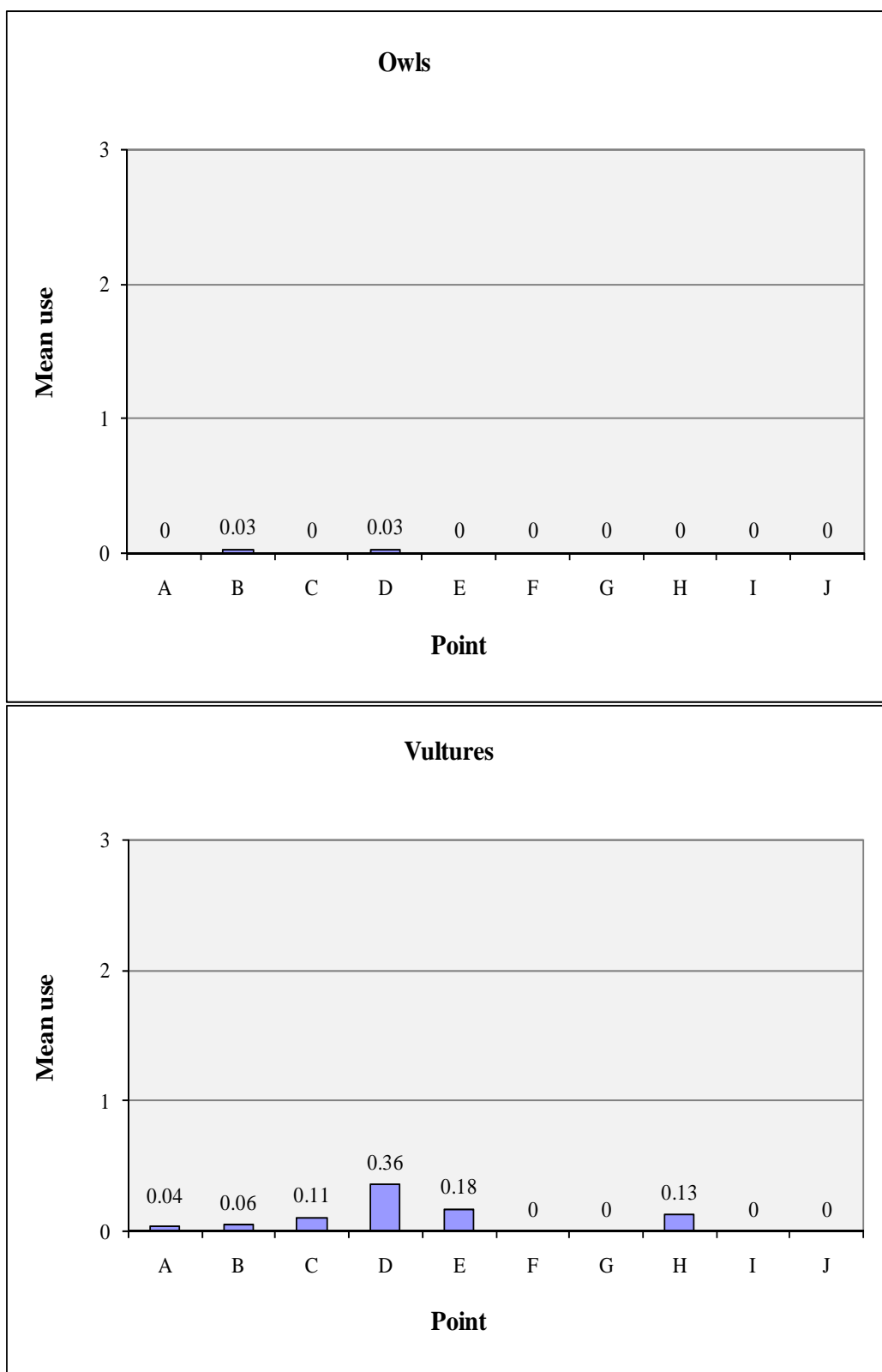


**Figure 5 (continued).** Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.

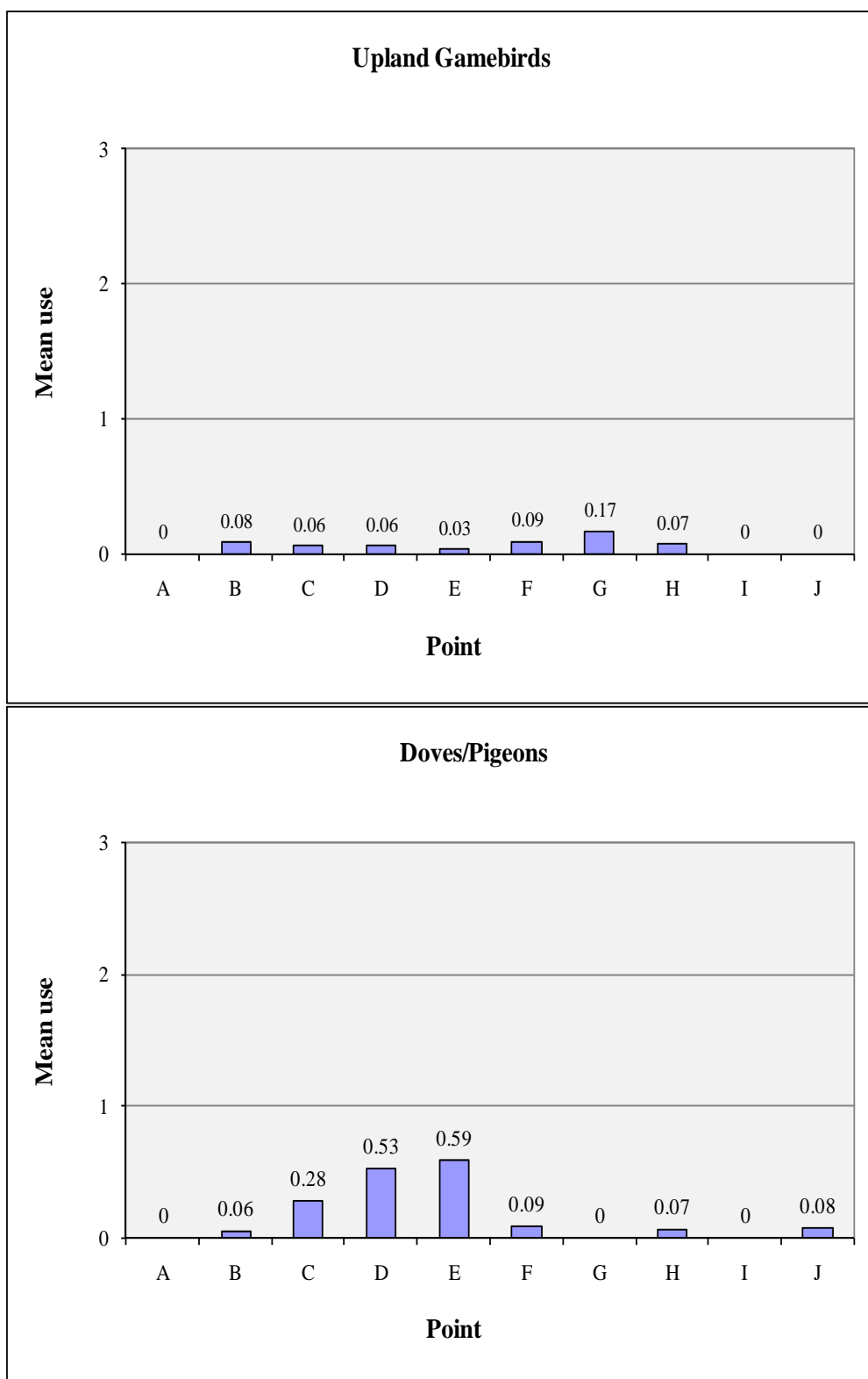


**Figure 5 (continued).** Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.

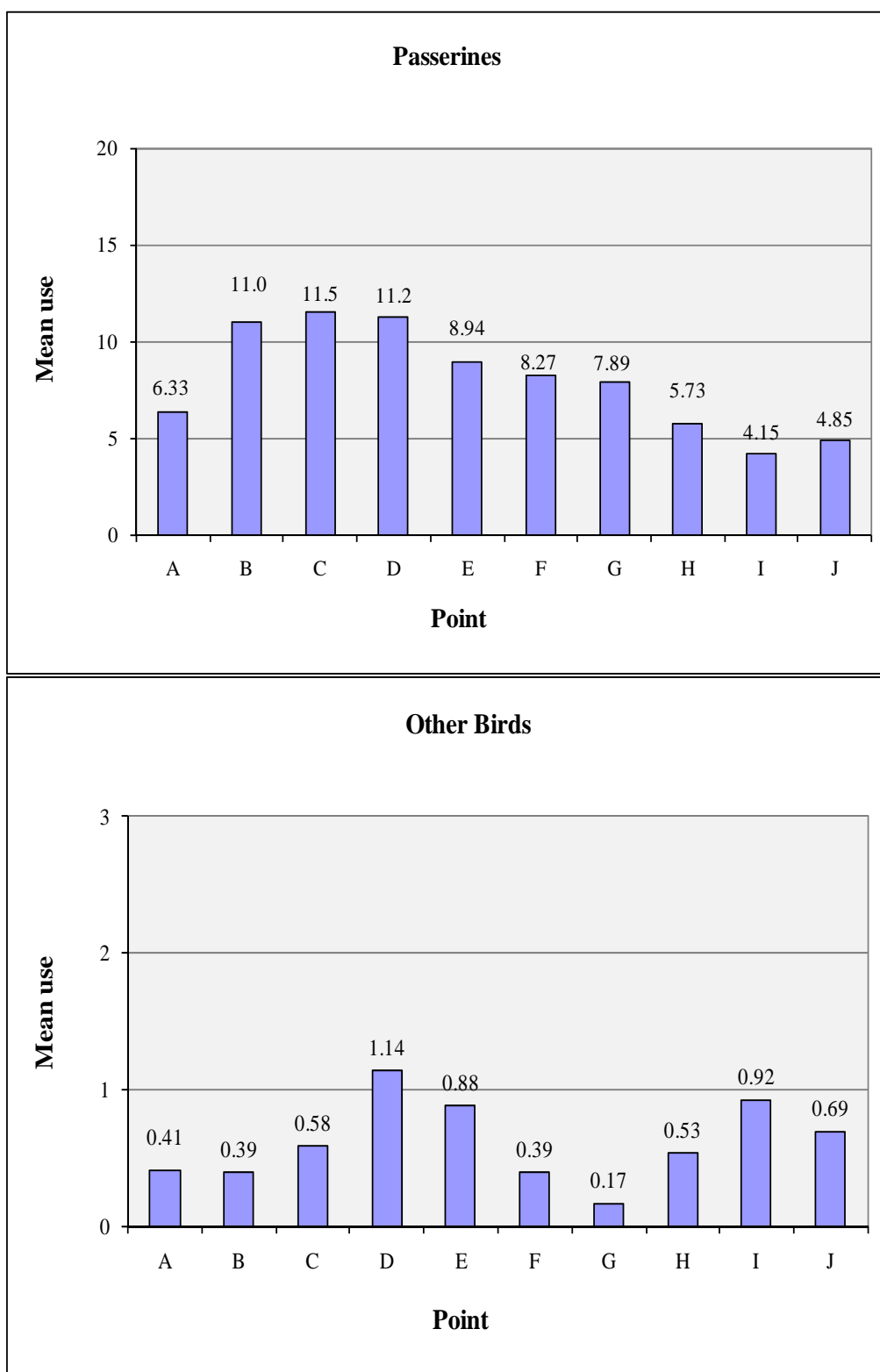




**Figure 5 (continued).** Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.



**Figure 5 (continued). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.**



**Figure 5 (continued).** Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Whistling Ridge Wind Resource Area.

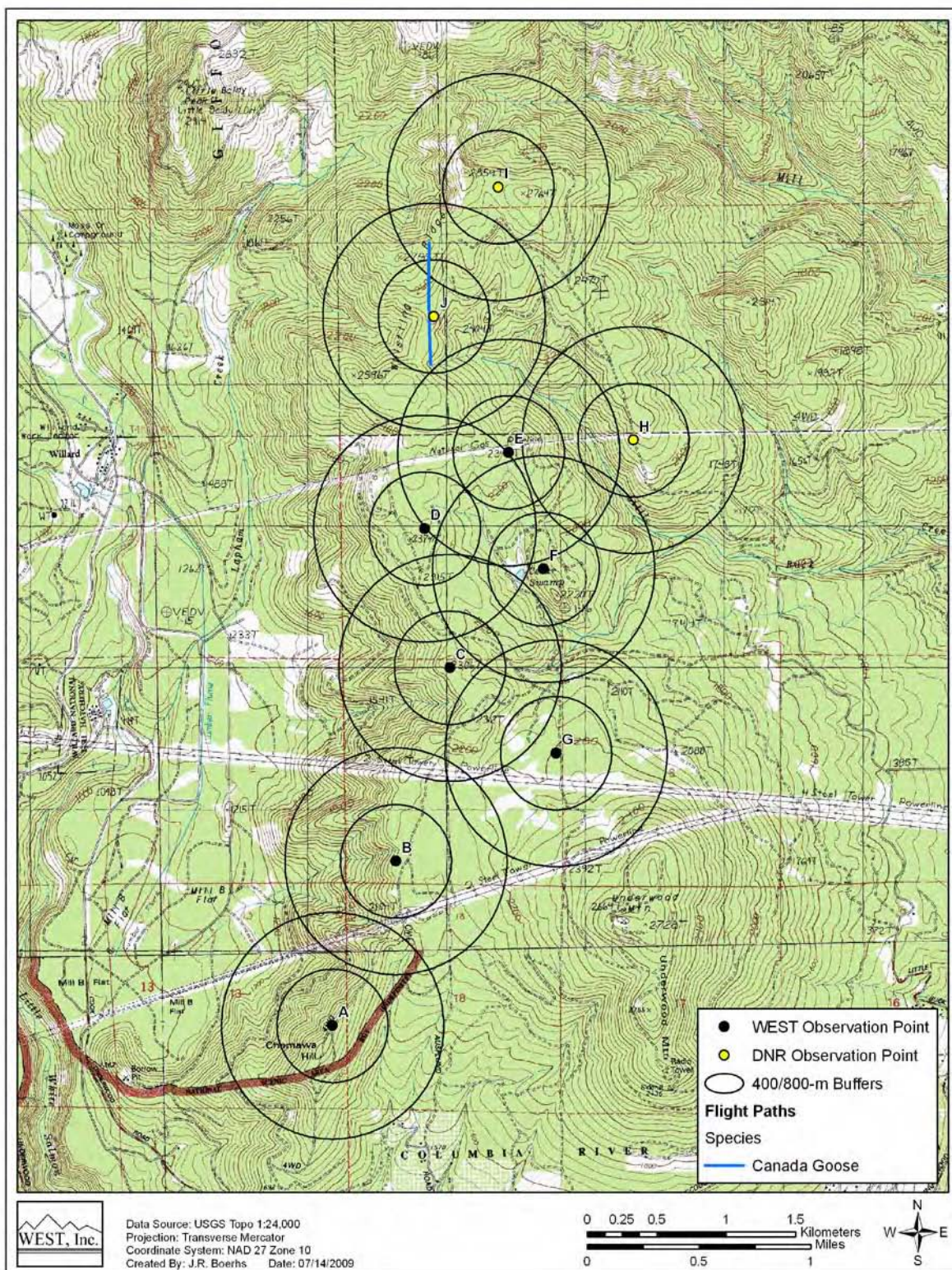


Figure 6a. Flight paths of waterfowl at the Whistling Ridge Wind Resource Area.



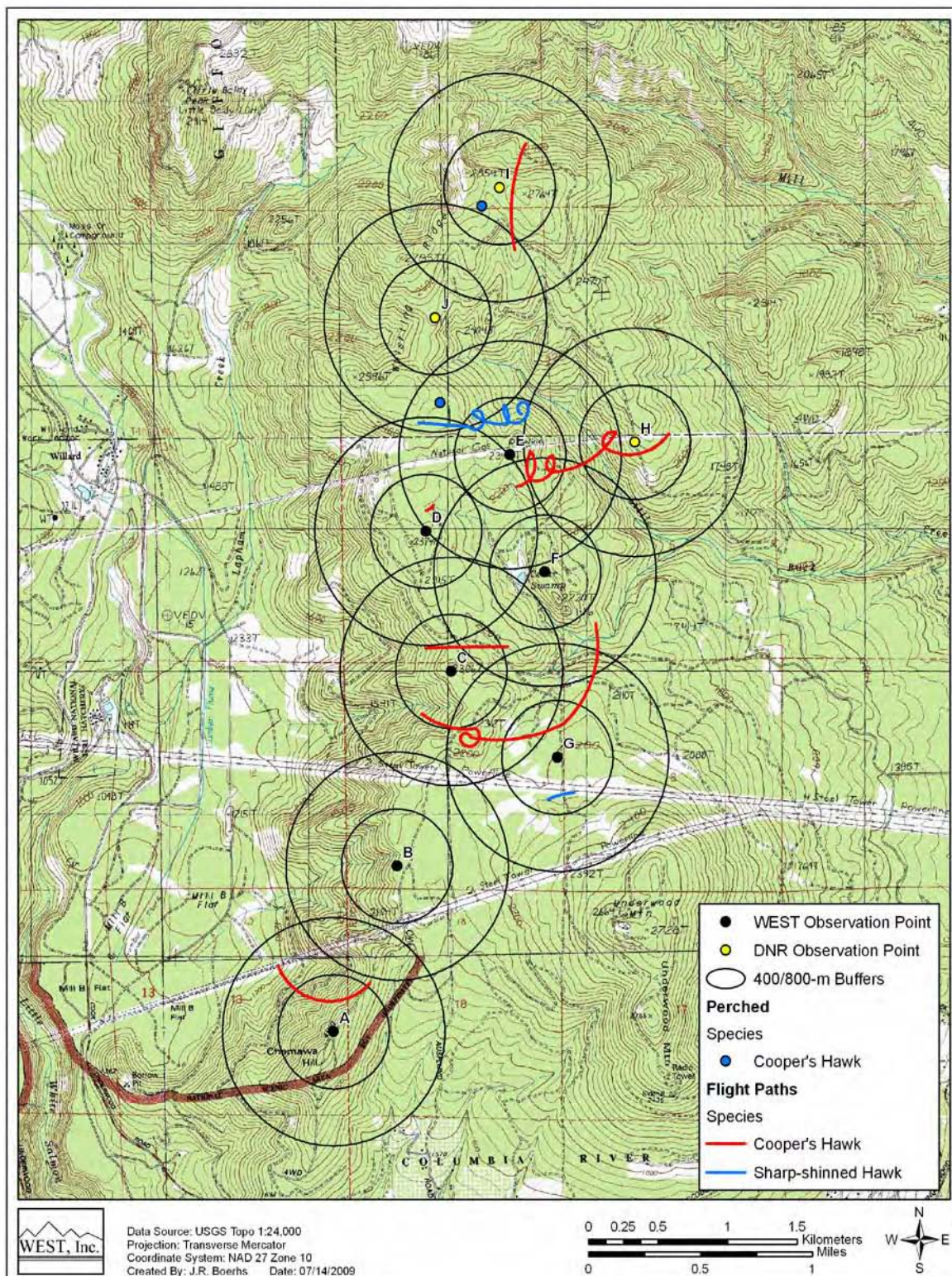


Figure 6b. Flight paths of accipiters at the Whistling Ridge Wind Resource Area.



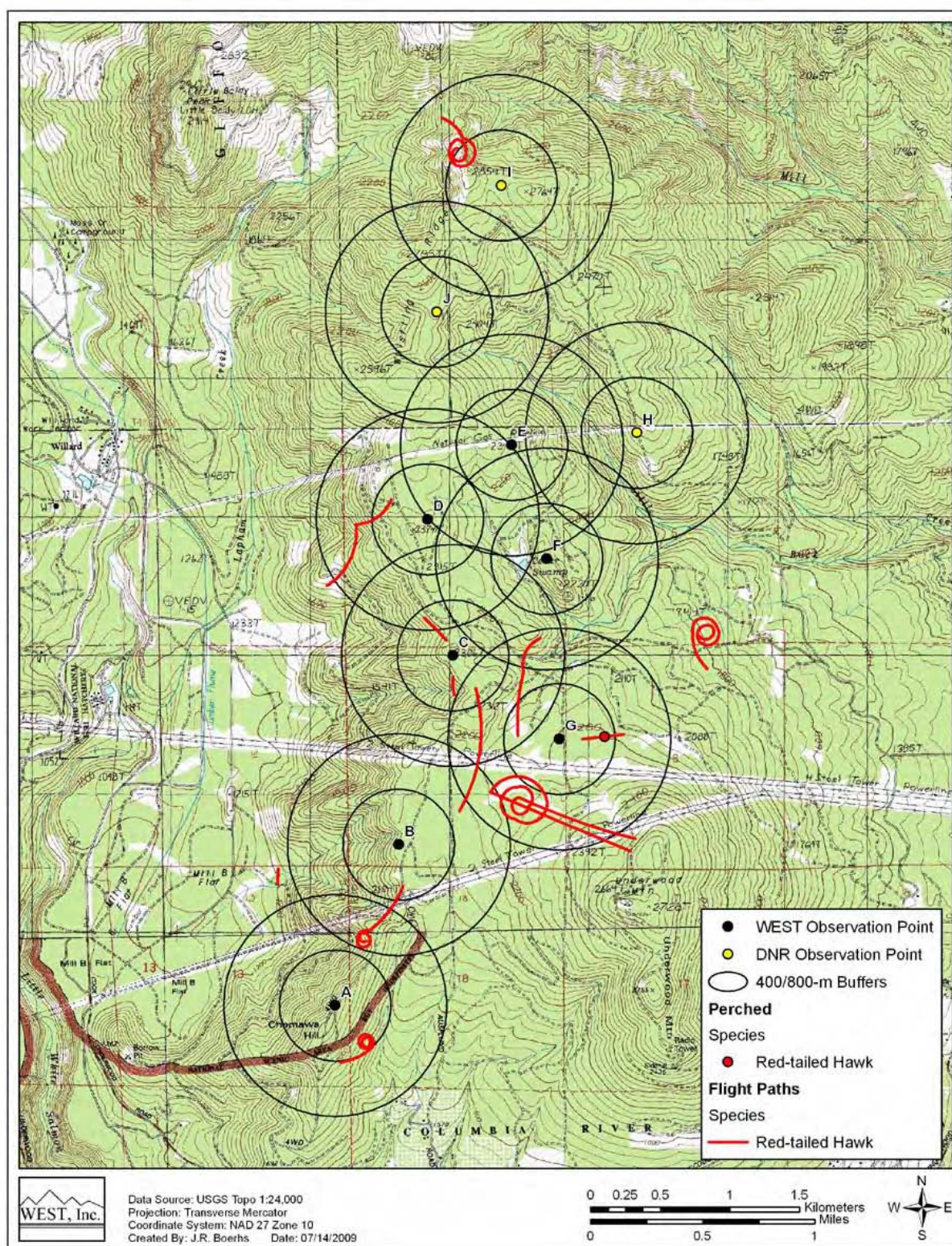


Figure 6c. Flight paths of buteos at the Whistling Ridge Wind Resource Area.



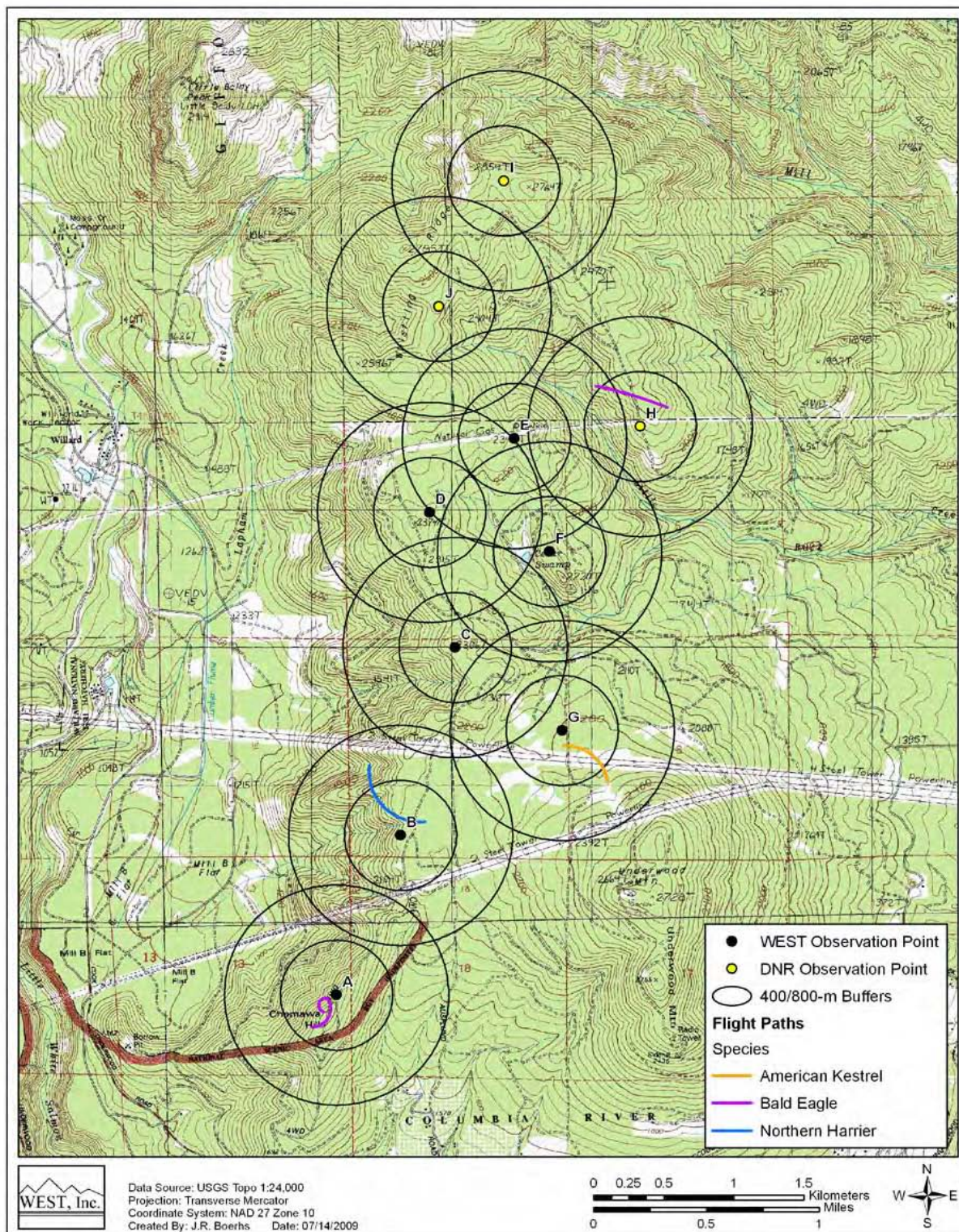
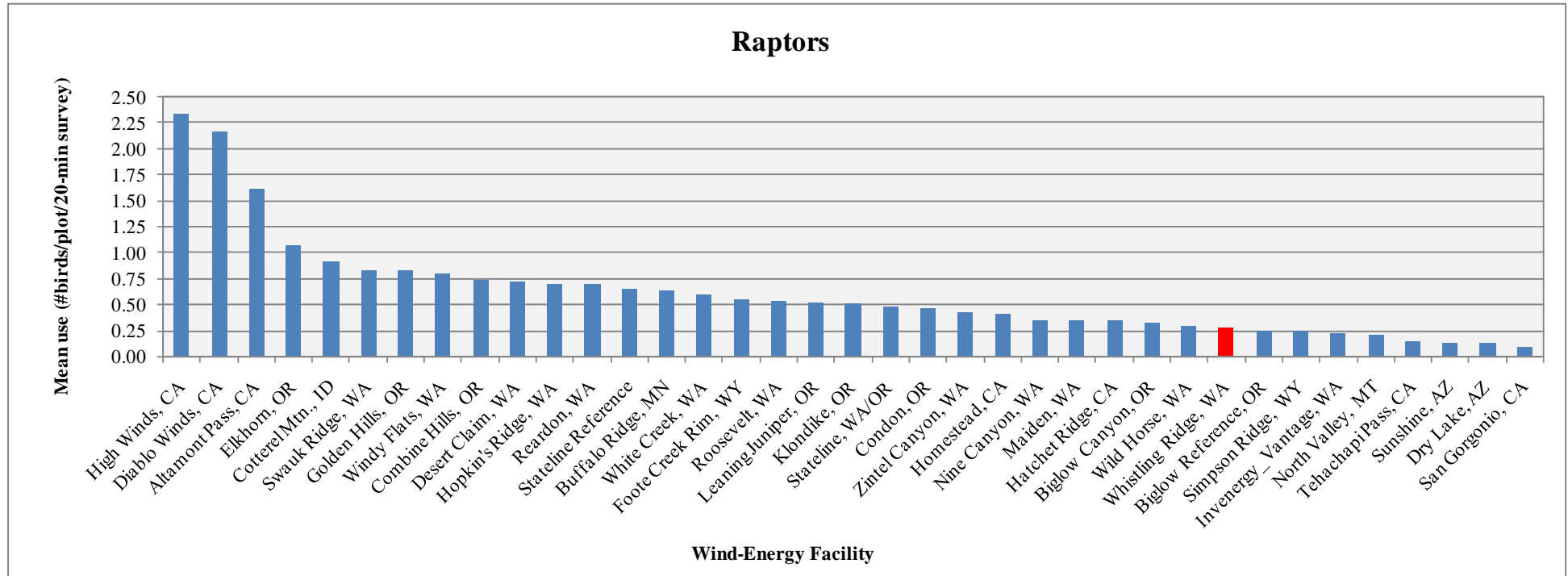


Figure 6d. Flight paths of other raptors at the Whistling Ridge Wind Resource Area.

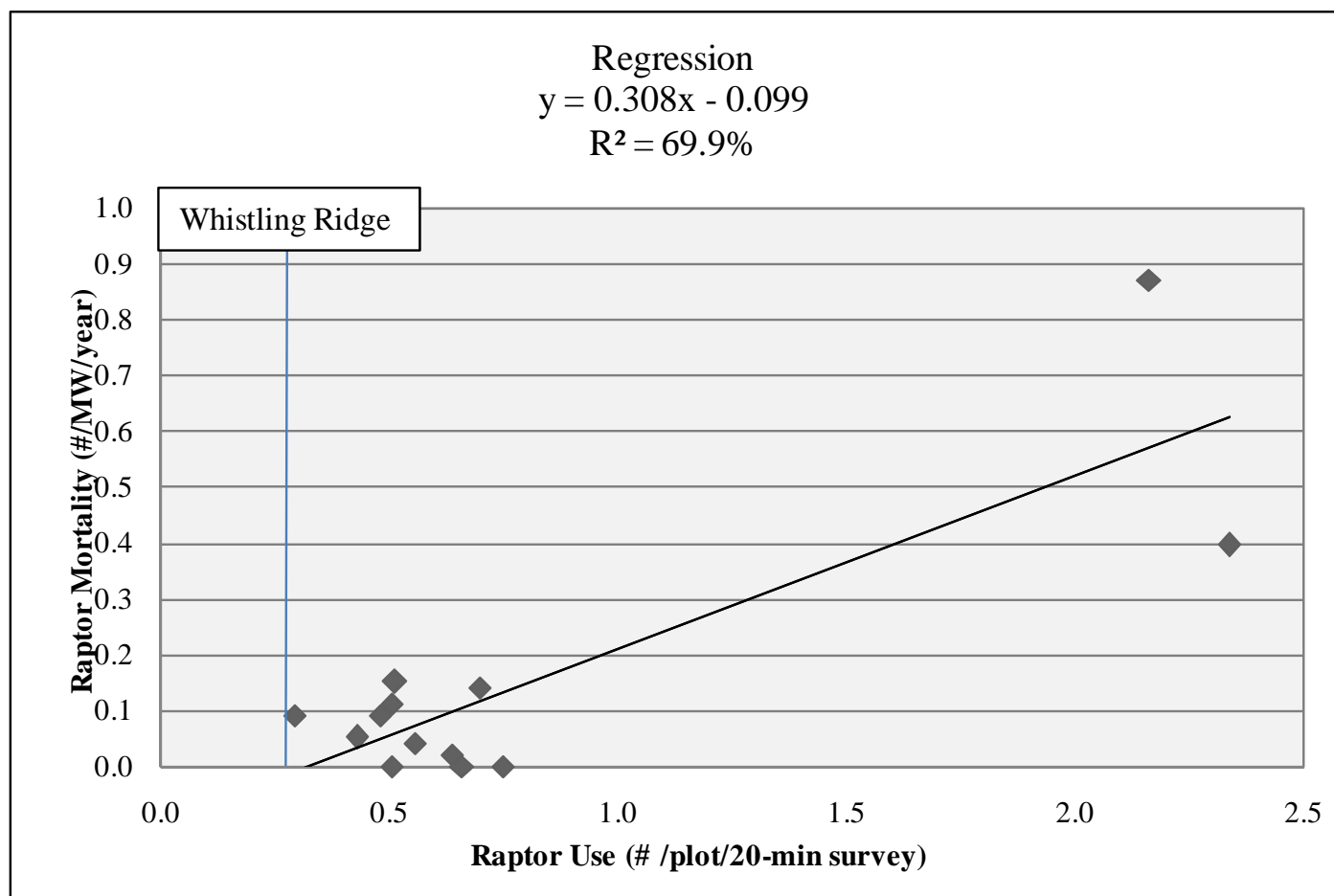


**Figure 7. Comparison of annual raptor use between the Whistling Ridge Wind Resource Area and other US wind-energy facilities.**

Data from the following sources:

Whistling Ridge, WA	This study.				
High Winds, CA	Kerlinger et al. 2005	Stateline Reference	URS et al. 2001	Maiden, WA	Erickson et al. 2002b
Diablo Winds, CA	WEST 2006a	Buffalo Ridge, MN	Erickson et al. 2002b	Hatchet Ridge, CA	Young et al. 2007b
Altamont Pass, CA	Erickson et al. 2002b	White Creek, WA	NWC and WEST 2005a	Biglow Canyon, OR	WEST 2005c
Elkhorn, OR	WEST 2005a	Foot Creek Rim, WY	Erickson et al. 2002b	Wild Horse, WA	Erickson et al. 2003a
Cotterel Mtn., ID	Cooper et al. 2004	Roosevelt, WA	NWC and WEST 2004	Biglow Reference, OR	WEST 2005c
Swauk Ridge, WA	Erickson et al. 2003b	Leaning Juniper, OR	NWC and WEST 2005b	Simpson Ridge, WY	Johnson et al. 2000b
Golden Hills, OR	Jeffrey et al. 2008	Klondike, OR	Johnson et al. 2002a	Invenergy_Vantage, WA	WEST 2007
Windy Flats, WA	Johnson et al. 2007	Stateline, WA/OR	Erickson et al. 2002b	North Valley, MT	WEST 2006b
Combine Hills, OR	Young et al. 2003c	Condon, OR	Erickson et al. 2002b	Tehachapi Pass, CA	Erickson et al. 2002b
Desert Claim, WA	Young et al. 2003b	Zintel Canyon, WA	Erickson et al. 2002a	Sunshine, AZ	WEST and the CPRS 2006
Hopkin's Ridge, WA	Young et al. 2003a	Homestead, CA	WEST et al. 2007	Dry Lake, AZ	Young et al. 2007c
Reardon, WA	WEST 2005b	Nine Canyon, WA	Erickson et al. 2001b	San Gorgonio, CA	Erickson et al. 2002b



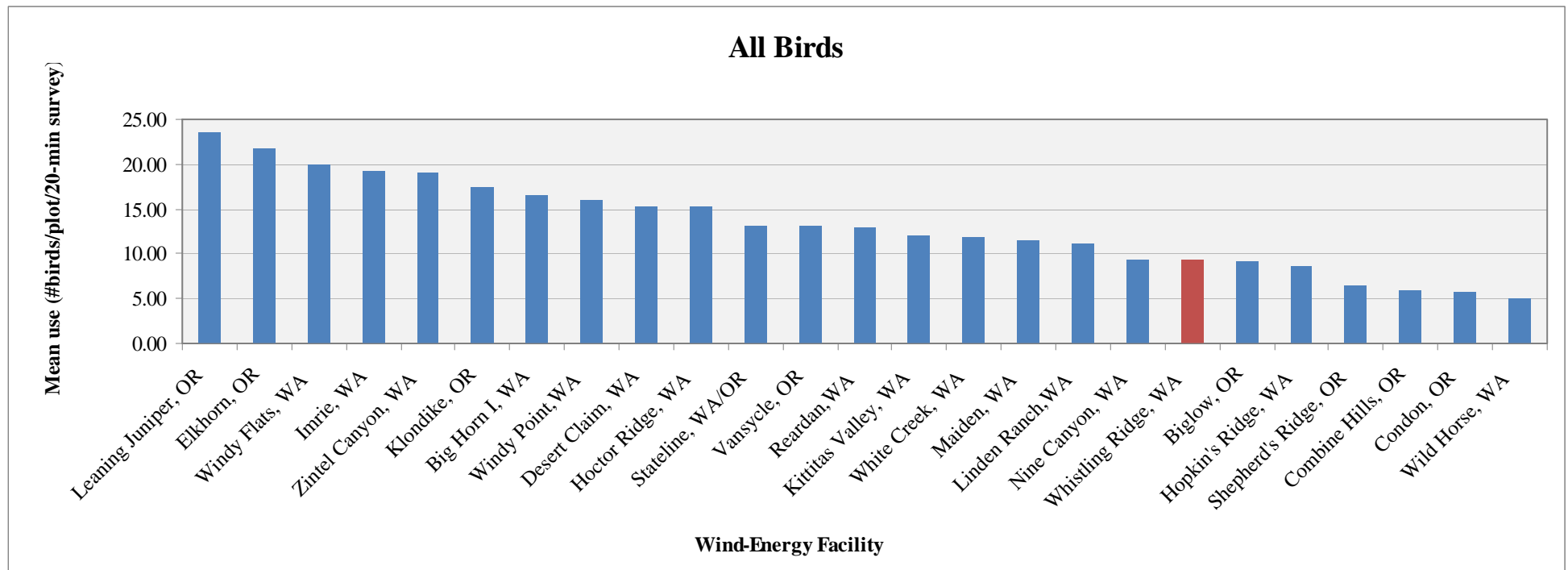


Overall Raptor Use 0.28  
 Predicted Fatality Rate zero fatalities/MW/year  
 90.0% Prediction Interval (0, 0.25 fatalities/MW/year)

**Figure 8. Regression analysis comparing raptor use estimates versus estimated raptor mortality.**

Data from the following sources:

Study and Location	Raptor Use (birds/plot /20-min survey)	Source	Raptor Mortality (fatalities/MW/yr)	Source
Buffalo Ridge, MN	0.64	Erickson et al. 2002b	0.02	Erickson et al. 2002b
Combine Hills, OR	0.75	Young et al. 2003c	0.00	Young et al. 2005
Diablo Winds, CA	2.161	WEST 2006a	0.87	WEST 2006a
Foote Creek Rim, WY	0.55	Erickson et al. 2002b	0.04	Erickson et al. 2002b
High Winds, CA	2.34	Kerlinger et al. 2005	0.39	Kerlinger et al. 2006
Hopkins Ridge, WA	0.70	Young et al. 2003a	0.14	Young et al. 2007a
Klondike II, OR	0.50	Johnson 2004	0.11	NWC and WEST 2007
Klondike, OR	0.50	Johnson et al. 2002a	0.00	Johnson et al. 2003
Stateline, WA/OR	0.48	Erickson et al. 2002b	0.09	Erickson et al. 2002b
Vansycle, OR	0.66	WCIA and WEST 1997	0.00	Erickson et al. 2002b
Wild Horse, WA	0.29	Erickson et al. 2003a	0.09	Erickson et al. 2008
Zintel, WA	0.43	Erickson et al. 2002a	0.05	Erickson et al. 2002b
Bighorn, WA	0.51	Johnson and Erickson 2004	0.15	Kronner et al. 2008



**Figure 9. Comparison of mean overall bird use between the Whistling Ridge Wind Resource Area and other Pacific Northwest wind resource areas.**



**C-5**

**Final Report: Northern Spotted Owl, Northern Goshawk,  
Western Gray Squirrel Survey Results Conducted for the  
Saddleback Wind Energy Project. Submitted to CH2M HILL.**

**Turnstone Environmental Consultants, Inc. 2004**

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# FINAL REPORT

## ***NORTHERN SPOTTED OWL NORTHERN GOSHAWK WESTERN GRAY SQUIRREL SURVEY RESULTS CONDUCTED FOR THE SADDLEBACK WIND ENERGY PROJECT***

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*Submitted to:*

**CH2MHILL**  
Natural Resource Division

*Submitted by:*



Turnstone Environmental Consultants, Inc.  
October 2004



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## INTRODUCTION

PPM Energy, Inc. (PPM) with guidance from CH2MHILL retained the services of Turnstone Environmental Consultants Inc. (TECI) to perform wildlife studies as part of the proposed Saddleback Wind Energy Project. PPM performs extensive environmental impact studies evaluating existing land use as well as impacts on birds, bats, rare plants and waterways to determine whether a site is suitable for wind power generation. PPM is committed to minimize impacts on natural resources by selecting wind development sites that are designed to be as environmentally friendly to the land and communities as it is to the air. Wind energy, the least-cost renewable technology, is a remarkable, sustainable resource for electricity generation. Wind power is the fastest growing area of power generation in the world. PPM Energy Inc. is leading the market to make this green power source as dependable and affordable as any other form of energy.

TECI performed surveys for the northern spotted owl (*Strix occidentalis caurina*), northern goshawk (*Accipiter gentilis*), and western gray squirrel (*Sciurus griseus*) in consultation with CH2MHILL for the Saddleback Wind Energy Project. Throughout Oregon and the Pacific Northwest, TECI specializes in natural resource inventory, assessment and analysis. TECI is committed to providing the highest quality work product for our clients in the field of natural resource management - assisting land owners and managers in the decision making process. TECI is an Oregon based company founded in 1995 with offices in Portland and Corvallis. The TECI staff has extensive experience in a wide variety of wildlife and fisheries survey, inventory, rehabilitation and research projects, and has worked with federal, state and tribal governments as well as private landowners.

## Northern Spotted Owl

The northern spotted owl (*Strix occidentalis caurina*) was listed in 1990 as a “threatened” species under the Endangered Species Act (ESA) of 1973 by both the U.S. Fish and Wildlife Service and the State of Washington. Both federal and state agencies determined that the northern spotted owl was likely to become an endangered species in the foreseeable future throughout all or a significant portion of its existing range. The physiographic range and habitat requirements of the northern spotted owl are located within the forestlands of the PPM Saddleback Wind Energy Project. As part of the process to avoid a “take” of any northern spotted owls under the ESA, PPM with guidance from CH2MHILL had surveys completed for northern spotted owls in and around suitable habitat prior to any management activity.

### Suitable Habitat

In Washington, northern spotted owls inhabit the Eastern and Western Cascades, Western Lowlands and Olympic Peninsula Provinces. Within these regions, the northern spotted owl requires a multitude of habitat types for nesting, roosting, foraging and dispersal. The species seeks forests composed of a multi-layered, multi-species canopy with a high incidence of large trees with appropriate structure for nesting and roosting. Northern spotted owls generally rely on large home ranges and use large tracts of land containing older forest to meet their biological needs. Fragmented habitats may be used for dispersal and foraging. Spotted owls nest primarily in stick nests of northern goshawks, on clumps of mistletoe, in large tree cavities, on broken tops of large trees, on large branches or cavities in banks and rock faces.





### **Survey Locations**

With the guidance of CH2MHILL, TECI conducted northern spotted owl surveys within and adjacent to properties managed by SDS Lumber Co. (SDS) and other willing adjacent landowners. Surveys were conducted in suitable habitat in four core project sections located in Township 3N, Range 10E, Sections 5, 6, 7, and 8. The provincial home range radius surrounding the core area appropriate for this physiographic location is 1.8 miles. Surveys were conducted in suitable habitat in the provincial home range radius in Township 3N, Range 10E, Sections 4, 9, 10, 17, 19, 20, 21; Township 4N, Range 10E, Sections 28, 29, 30, 31, 32, 33, 34; Township 4N, Range 09E, Sections 25, 35, 36; Township 3N, Range 09E, Sections 1, 2, 11, 12, 13, 24.

### **Survey Methods**

Potential habitat was surveyed in 2003-2004 in accordance to the 1992 Revised Version of “Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls” endorsed by the U.S. Fish and Wildlife Service. TECI used the 1-year survey methodology, surveying the project area six times from March 24, 2003 to July 23, 2003 and used the 2-year survey methodology, surveying three times from March 31, 2004 to August 18, 2004. TECI surveyed again in 2004 to lengthen the time period in which management activities could occur in the area of potential impact before northern spotted owl surveys would again be required. TECI collected information on northern spotted owl historical sites and potential owl activity in proposed areas of future management projects. CH2MHILL and the Washington Department of Fish and Wildlife (WDFW) will use this survey information to assess occupancy and reproductive status of the northern spotted owl within areas of proposed management activities.

TECI biologists analyzed the project area using topographic maps and aerial photography to determine suitable habitat and potential spot calling station placement. Spot calling stations were placed along ridges and away from streams to maximize coverage by enhancing sound transmission. Spot calling stations and survey routes were situated to achieve complete coverage of the area, preferably with coverage from more than one calling point. Stations were spaced approximately 1/4 to 1/2 mile apart where access was permitted and suitable habitat warranted. Most spot calling stations were surveyed at night when owls are more active and are thought to be more responsive to standard survey techniques (USDI 1992b). Some stations were called during daylight in remote/difficult to access areas. TECI biologist used ten-minute calling periods for each station. Voice hooting and “hoot flutes” were used to broadcast both male and female spotted owl vocalizations that included four note contact calls and agitated calls. TECI conducted surveys between March 15 and August 31 as stipulated by the protocol.

During the 2003/2004 survey season, TECI recorded all owl species responses in the field from each calling station during each site visit on the field data forms. Barred owls have been thought to displace spotted owls; therefore, special attention was given to any responses recorded in the survey area. Barred owl responses were recorded on the field data and mapped (locations are approximate) to provide additional information to help direct any future management decisions (map 6).

### **Survey Results**



TECI conducted northern spotted owl surveys in and adjacent to SDS properties (maps 1-6). During the 2003 northern spotted owl survey season, TECI completed six site visits to protocol (survey dates are found in Table 2). During the 2004 northern spotted owl survey season, three site visits were completed to protocol. Calling stations were strategically set throughout the proposed area of impact with the inclusion of a 1.8-mile radius around the potential area of future management activities.

- In 2003, during the first two site visits, 64 calling stations were originally set and called. During the remaining four site visits, 63 calling stations were surveyed after consultation with the SDS foresters. (One calling station, B-17, was dropped due to a logging operation.) No northern spotted owl responses were recorded during any of the six site visits for 2003. Nine barred owl responses were recorded during the six site visits (map 6).
- In 2004, 64 calling stations were surveyed during the first site visits. During the remaining two site visits, 62 calling stations were surveyed. (Two calling stations were dropped, B-17 and B-19, due to logging operations.) No northern spotted owl responses were recorded during any of the three site visits for 2004. Three barred owl responses were recorded during the three site visits (map 6).

Two historical owl sites were surveyed to obtain information on the presence of northern spotted owls. TECI combined efforts with National Council for Air and Stream Improvement (NCASI) to investigate the status of northern spotted owls at the Moss Creek and Mill Creek sites.

- In 2003, three-day site visits were performed at the historical nest sites of both Moss Creek and Mill Creek with no northern spotted owl observations or responses. TECI continued to call the two historical nest sites in the evening six more times with no northern spotted owl responses. On May 5, 2003, a NCASI surveyor observed an unidentified *Strix* owl at dusk (barred or northern spotted owl observation). Five surveys were conducted after the *Strix* observation with no visual conformation or audible responses to confirm the *Strix* presence. Eight of the nine barred owl responses for 2003 occurred within 1.5 miles of the Mill Creek historical nest site. No barred owls were observed while conducting the Moss Creek nest status day surveys.
- In 2004, three site visits were performed at the historical nest sites of both Moss Creek and Mill Creek with no northern spotted owl observations or responses. Two of the three barred owl responses for 2004 occurred within 1.5 miles of the Mill Creek historical nest site. One of the three barred owl responses for 2004 occurred within 1.5 miles of the Moss Creek historical nest site.

With the consistent barred owl responses during the evening surveys so close to the historical nest sites, it appears that barred owls are using areas once inhabited by northern spotted owls.

The following tables summarize all survey site results for the project area including the 1.8 mile radius around the proposed project area of future management activities. Table 1 depicts the Survey Summary Results for 2003 - 2004 and Table 2 depicts the historical site information for Moss Creek and Mill Creek.



## NORTHERN SPOTTED OWL Survey Summary Results 2003-2004

**Table 1:** Northern spotted owl survey and results summary 2003-2004

	Visit #	Dates	# of Stations	Northern Spotted Owl Response	Barred Owl Response	Comments
2003	1	3/18/03-3/24/03	64	None	2	Barred owl detected from station: A11/B17
	2	4/21/03-4/24/03	64	None	2	Barred owl detected from station: A6/B6
	3	5/23/03-5/26/03	63	None	1	Barred owl detected from station: A10. B-17 not surveyed (logging)
	4	6/18/03-6/21/03	63	None	2	Barred owl detected from station: A9/A11. B-17 not surveyed (logging)
	5	6/29/03-7/2/03	63	None	1	Barred owl detected from station: A6. B-17 not surveyed (logging)
	6	7/20/03-7/23/03	63	None	1	Barred owl detected from station: A10. B-17 not surveyed (logging)
2004	1	3/31/04-4/3/04	64	None	0	
	2	6/14/04-6/17/04	62	None	1	Barred owl detected from station: A12. B-17 & B-19 not surveyed (logging)
	3	8/16/04-8/18/04	62	None	2	Barred owl detected from station: A6 (incidental while camping)/A26. B-17 & B-19 not surveyed (logging)



## NORTHERN SPOTTED OWL Historical Site Observations Summary 2003 - 2004

**Table 2:** Northern spotted owl historical site observations 2003-2004

	Visit #	Date	Name of Station	Northern Spotted Owl Response	*Barred Owl Response
<b>2003</b>	1	3/24/03 Day	Mill Creek	None	None
		3/20/03 Day	Moss Creek	None	None
	2	4/22/03 Night	Mill Creek	None	None
		4/21/03 Night	Moss Creek	None	None
	3	5/24/03 Day	Mill Creek	None	None
		5/26/03 Day	Moss Creek	None	None
	4	6/20/03 Night	Mill Creek	None	None
		6/21/03 Night	Moss Creek	None	None
	5	7/1/03 Night	Mill Creek	None	None
		7/2/03 Night	Moss Creek	None	None
	6	7/22/03 Night	Mill Creek	None	None
		7/23/03 Night	Moss Creek	None	None
<b>2004</b>	1	4/2/2004 Night	Mill Creek	None	None
		4/3/04 Night	Moss Creek	None	None
	2	6/17/04 Day	Mill Creek	None	None
		6/16/04 Night	Moss Creek	None	None
	3	8/16/04 Day	Mill Creek	None	None
		8/18/04 Night	Moss Creek	None	None

*\*TECI recorded no barred owl responses at the historical nest sites*





## NORTHERN SPOTTED OWL

### Historic Site Summary 1994 - 2004

**Table 3:** Northern spotted owl historic site summary 1994- 2004

Year	Mill Creek Results	Moss Creek Results
2004	Barred Owl Pair Observed (NCASI)	Barred Owl Pair with 1+ Juvenile Observed (NCASI)
2003	No Responses	Unknown Strix Observed (NCASI)
2002	Male Barred Owl Observed	Barred Owl Pair with 1 Juvenile Observed
2001	No Responses	Barred Owl Pair Observed
2000	Non-nesting Spotted Owl Pair Observed	Spotted Owl Pair with 1 Juvenile Observed
1999	Female Spotted Owl Observed	Spotted Owl Pair with 1 Juvenile Observed
1998	Non-nesting Spotted Owl Pair Observed with Female Barred Owl	Spotted Owl Pair with 2 Juveniles Observed
1997	Non-nesting Spotted Owl Pair Observed	No Responses Observed
1996	Spotted Owl Pair with 2 Juveniles Observed	Spotted Owl Pair with 3 Juveniles Observed
1995	No Responses	Male Spotted Owl Observed
1994	Spotted Owl Pair with 2 Juveniles Observed	N/A

Any inquiries on site-specific information should be directed to Tracy Flemming of NCASI (360.896.8013)

## Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is categorized as a “species of concern” by the U.S. Fish and Wildlife Service and as a “listing candidate” for sensitive, threatened or endangered species by the State of Washington Department of Fish and Wildlife. The physiographic range and habitat requirements of the northern goshawk are located within the forestlands of the PPM Saddleback Wind Energy Project.

### Suitable Habitat

Goshawks inhabit a wide variety of forest habitats, including true fir (red fir, white fir, and subalpine fir), mixed conifer, lodgepole pine, ponderosa pine, Jeffrey pine, montane riparian deciduous forest and Douglas fir. They are occasionally found nesting in coast redwood and mixed hardwood forest. Goshawk nest sites tend to be associated with patches of relatively larger, denser forest than the surrounding landscape; however, home ranges often consist of a wide range of forest age classes and conditions. Numerous habitat studies and modeling efforts have found nest sites to be associated with similar factors including proximity to water or meadow habitat, forest openings, level terrain or “benches” of gentle slope, northerly aspects and patches of larger, denser trees, but these factors



vary widely. (USDI 2002).

### **Survey Locations**

With the guidance of CH2MHILL, TECI conducted northern goshawk surveys within and adjacent to properties managed by SDS and other willing adjacent landowners. Surveys were conducted in suitable habitat in four core project sections located in Township 4N, Range 10E, Sections 5, 6, 7, and 8. The provincial home range radius surrounding the core area appropriate for this physiographic location is 0.5 miles. Surveys were conducted in suitable habitat in the provincial home range radius in Township 3N, Range 09E, Sections 13, 24; Township 3N, Range 10E, Section 18.

### **Survey Methods**

Potential habitat was surveyed in accordance to the 2002 “Survey Methodology for Northern Goshawks in the Pacific Southwest Region” developed by the United States Forest Service (USFS 2002). TECI biologists analyzed the project area using topographic maps and aerial photography to determine suitable habitat and potential station placement. TECI biologists established stations in the field at approximately 350 yards (0.2 miles) apart on roads and trails in suitable habitat within 0.5 miles of the proposed wind turbine location. Call stations were established to achieve complete coverage in all portions of the project area. At each station, calls were broadcast for 10 seconds; TECI biologists would then stop and listen for 30 seconds. This sequence was repeated four times at each station, broadcasting in four cardinal directions. Surveys started ½ hour before sunrise continued through the day and concluded ½ hour before sunset as specified by the protocol. During the 2004 survey season, TECI recorded all raptor species responses from every calling station during each site visit on the field data forms.

### **Survey Results**

Turnstone Environmental Consultants Inc. conducted northern goshawk surveys in and adjacent to SDS properties (map 7), all calling stations were strategically set throughout the proposed area of impact with the inclusion of a 0.5-mile radius around the potential area of future management activities. TECI completed two site visits to protocol during the 2004 northern goshawk survey season (survey dates are found in Table 6). One hundred eighty five calling stations were surveyed for both protocol visits. No northern goshawk responses were recorded during any of the two site visits.



## NORTHERN GOSHAWK Survey and Results Summary 2004

**Table 4:** Northern goshawk survey and results summary results 2004

Visit #	# of Stations	Date	Northern Goshawk Response	Other Raptors Observed	Comments
1	47	6/15/04	None	COHA (1) near station 102. RTHA (1) near station 172	Western gray squirrel visuals at station 88 and near station 99
	36	6/16/04	None	RTHA(1) near station 9	
	17	6/17/04	None		
	85	6/18/04	None	RTHA(2) near station 199	RTHA pair was observed no nest ever located
2	103	8/29/04	None	RTHA(1) near station 222	
	82	8/30/04	None		

COHA = Cooper's hawk; RTHA = Red-tailed hawk

## Western Gray Squirrel

The western gray squirrel (*Sciurus griseus*) is listed as a "threatened" species by the Washington State Department of Fish and Wildlife (WDFW). The physiographic range and habitat requirements of the western gray squirrel are located within the forestlands of the PPM Saddleback Wind Energy Project.

### Suitable Habitat

Western gray squirrels are arboreal (adapted for living in trees) and, although they forage on the ground, they rarely stray far from trees. They use tree canopies for escape, cover and nesting. Western gray squirrels can move rapidly and cover long distances among tree canopies when canopy conditions permit. A contiguous tree canopy that allows arboreal travel for at least 198 feet (60 meters) around the nest is an important feature of western gray squirrel habitat (Ryan and Carey 1995a). Western gray squirrels are active throughout the day but are most active in the morning. Western gray squirrels are most active in August and September, when they are collecting and storing food for winter, and they are less visible in June and July (Ryan and Carey 1995a).

Currently in Washington, the western gray squirrel distribution has been reduced to three geographically isolated western gray squirrel populations in Washington: the "Puget Trough" population, now centered in Thurston and Pierce counties in the Puget Sound region; the "South Cascades" population in extreme eastern Skamania County and Klickitat and Yakima counties; and the "North Cascades" population in Chelan and Okanogan counties.



In Washington, and elsewhere within the subspecies' range, the principal food is acorns, although the seeds of Douglas-fir and other conifers are also eaten (Dalquest 1948). While pine nuts and acorns are considered essential foods for storing body fat and conditioning western gray squirrels for winter, green vegetation, seeds and nuts of trees and shrubs, fleshy fruits, mushrooms and other foods are also consumed. Hypogeous fungi (underground fungi such as truffles) comprise a large portion of the western gray squirrel diet (WDW 1993; Carraway and Verts 1994; Ryan and Carey 1995a).

### Survey Locations

With the guidance of CH2MHILL, TECI conducted general western gray squirrel surveys while conducting northern goshawk surveys within and adjacent to properties managed by SDS and other willing adjacent land owners. General surveys were conducted during station placement and surveys for the northern goshawk (see northern goshawk section for location description). Intensive surveys were performed in oak stands in Township 4N, Range 10E, Sections 28, 33, 28; Township 3N, Range 10E, Section 4.

### Survey Methods

TECI conducted western gray squirrel surveys in and adjacent to SDS properties (maps 8-10). Surveys were modeled according to the WDFW report "Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines: analysis of nest use and operator compliance" (Haegen, Van Leuven, and Anderson 2004). TECI biologists performed a general search for western gray squirrels and nests while conducting northern goshawk station placement and surveys. During the general search, TECI's biologists identified two adult western gray squirrels. Intensive walk-through surveys using serpentine transects were conducted in oak and oak/conifer stands but no squirrels or nests were located.

### Survey Results

Turnstone Environmental Consultants, Inc. conducted western gray squirrel surveys in and adjacent to SDS properties (map 7). TECI completed two general site visits and one intensive site visit to protocol during the 2004 western gray squirrel survey season. Two adult western gray squirrels were sighted on June 15<sup>th</sup> foraging during a goshawk general survey. An intensive search occurred for nest sites in the area where the western gray squirrels were observed. No nests were ever located in the area of the western gray squirrel observations or any other area where intensive surveys were conducted.

## WESTERN GRAY SQUIRREL Survey and Results Summary 2004

**Table 5:** Western gray squirrel survey and results summary 2004

Visit #	Date	Type Of Visit	Results
1	6/15/2004	General	Western gray squirrel visuals at station 88 and near station 99
1	6/16/2004	General	No squirrel or squirrel nest located
1	6/17/2004	General	No squirrel or squirrel nest located
1	6/18/2004	General	No squirrel or squirrel nest located
2	8/29/2004	General	No squirrel or squirrel nest located





2	8/30/2004	General	No squirrel or squirrel nest located
3	8/16/2004	Intensive	No squirrel or squirrel nest located
3	8/17/2004	Intensive	No squirrel or squirrel nest located

## Conclusions

### Northern Spotted Owl

During the 2003-2004 northern spotted owl breeding season, TECI conducted 9 site visits in the Saddleback Wind Energy Project area. TECI recorded no northern spotted owl observations or responses on any of the 9 site visits during the 2003-2004 field seasons. Based on the surveying parameters of the 1992 Revised Version of "Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls" endorsed by the U.S. Fish and Wildlife and the survey results documented by TECI in the 2 breeding seasons. PPM will not be required to conduct northern spotted owl surveys again until the March 15, 2007. NCASI will continue to monitor the Moss Creek and Mill Creek northern spotted owl historical sites.

### Northern Goshawk

No northern goshawk responses or observations were recorded during the 2 site visits during the 2004 breeding season. The 2002 "Survey Methodology for Northern Goshawks in the Pacific Southwest Region" developed by the United States Forest Service (USFS 2002) recommends a two year survey effort. CH2MHILL has negotiated a 1-year survey effort with WDFW. Therefore, no surveys will be conducted in the 2005 northern goshawk breeding season.

### Western Gray Squirrel

TECI proposed a 1-year search effort for western gray squirrel nests while conducting northern goshawk surveys. Intensive surveys in oak dominated forests were also conducted in areas of potential impact. No western gray squirrel nests were ever found while conducting these searches. However, while conducting the northern goshawk surveys 2 western gray squirrels were observed. The 2 western gray squirrels were documented in different locations; both were on the ground possibly foraging at the edge of clear-cuts (Map 9). Based on harvest maps provided by CH2MHILL, the first western gray squirrel observation is approximately 3,520 ft from the most easterly wind turbine stringer well outside of the home range of a western gray squirrel (.2 -.47 hectares WDFW "Status of the Western Gray Squirrel (*Sciurus griseus*) in Washington" July 1993). The second western gray squirrel observation was documented approximately 440ft north of the most easterly stringer. This stringer maybe in the observed western gray squirrel home range based on the .47 hectare home range suggested by WDFW. An intensive survey effort was conducted in and around the western gray squirrel visual with no nests observed.



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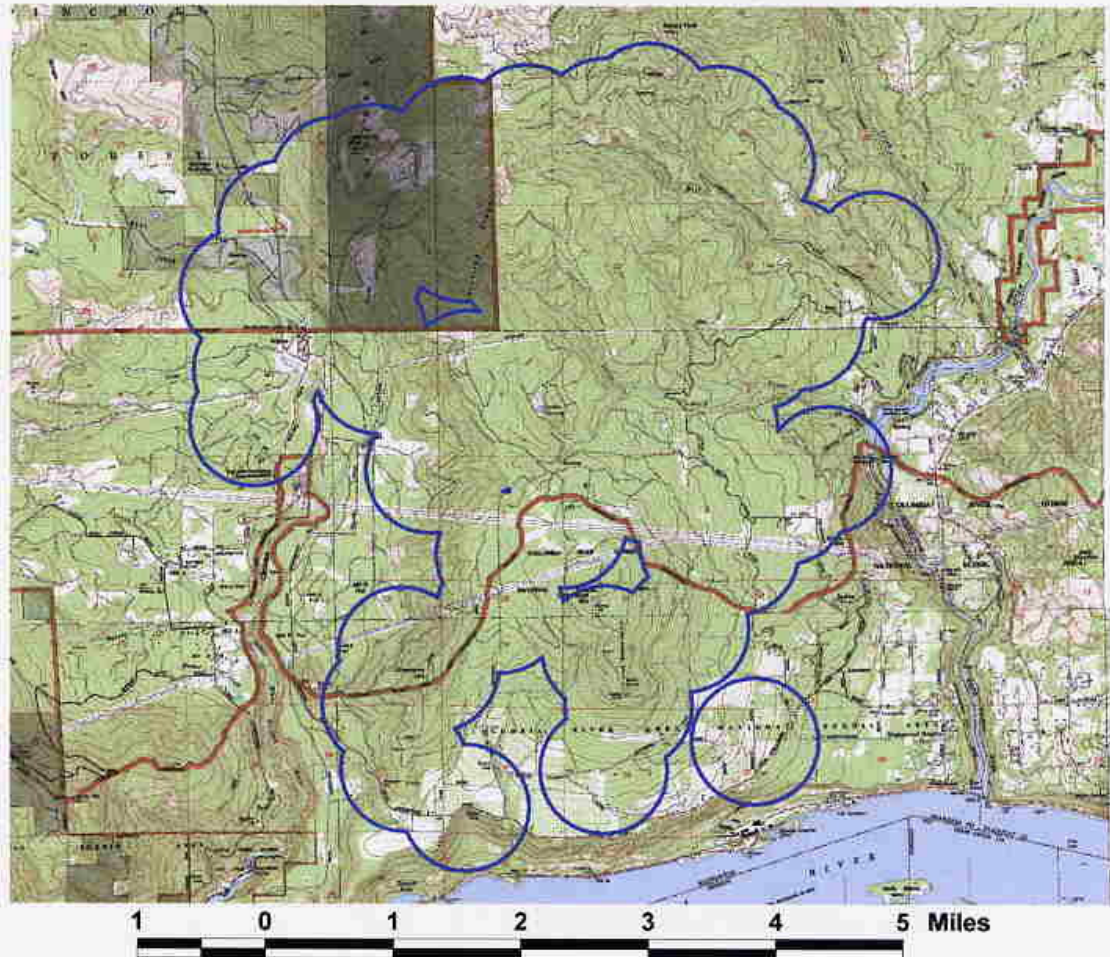


*Turnstone Environmental Consultants Inc.*  
*PPM Saddleback Wind Energy Project Biological Surveys*

## APPENDIX A: MAPS



# Saddleback Wind Power Project Northern Spotted Owl Calling Point Coverage



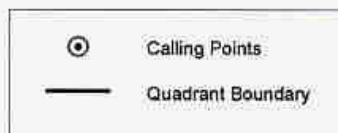
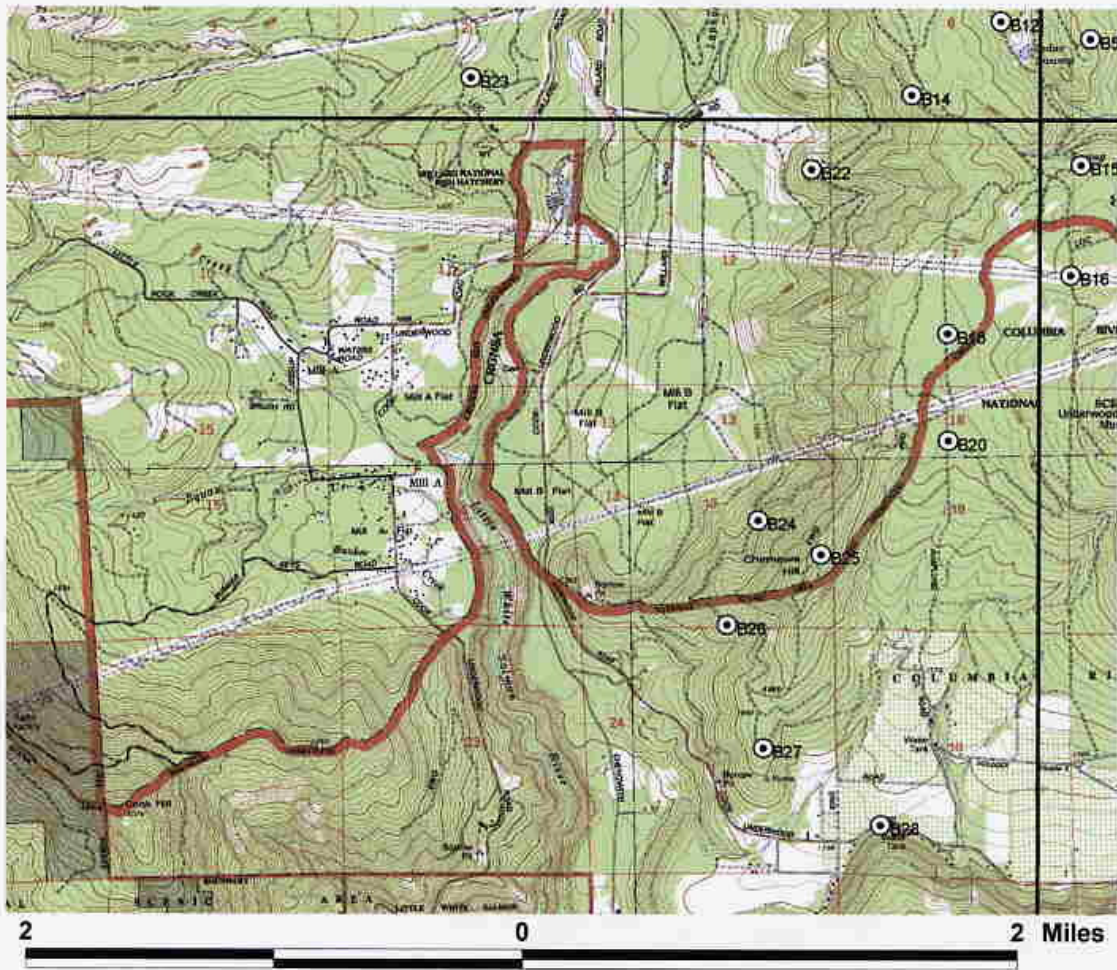
TECI GIS LAB

Map 1





## Saddleback Wind Power Project Northern Spotted Owl Survey Stations Southwest Quadrant



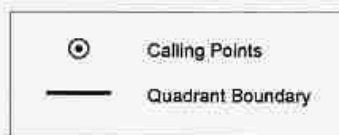
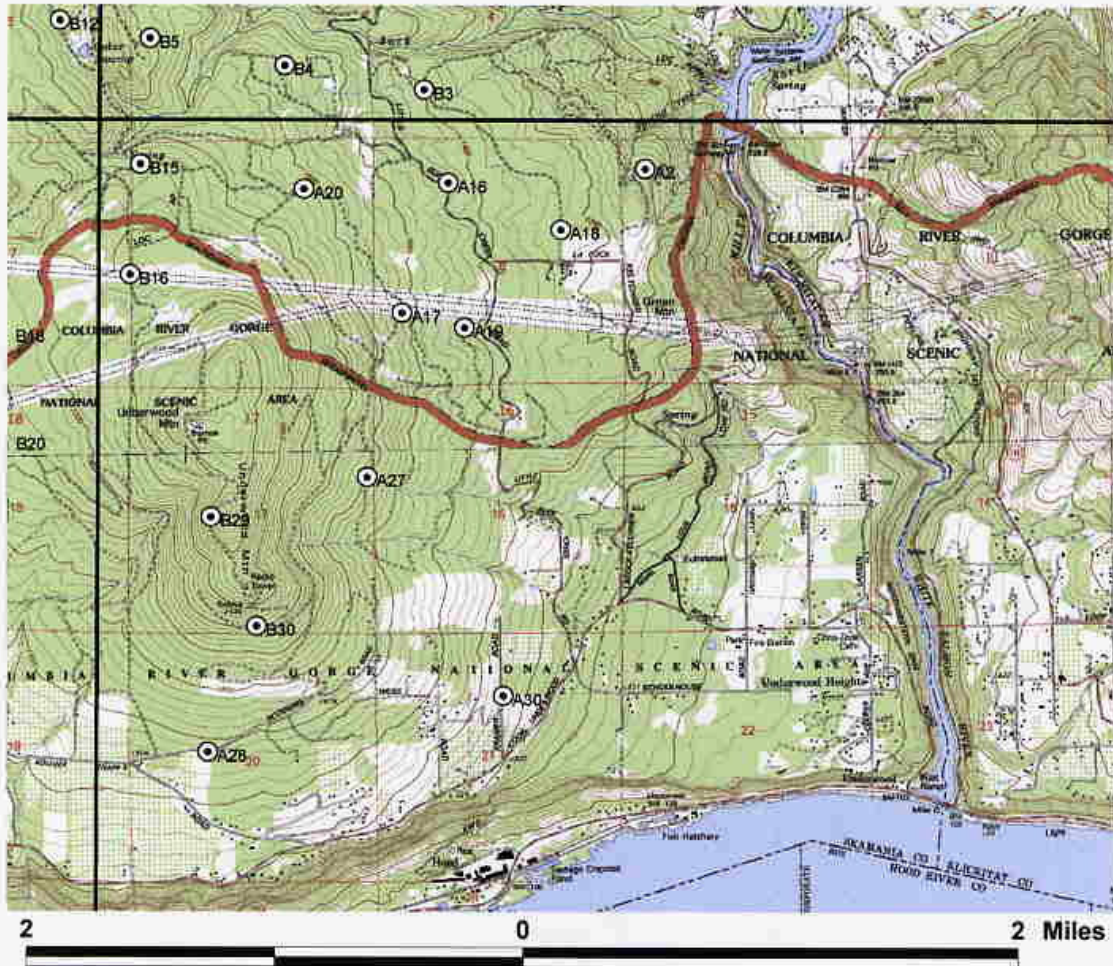
TECI GIS LAB

Map 2





## Saddleback Wind Power Project Northern Spotted Owl Survey Stations Southeast Quadrant

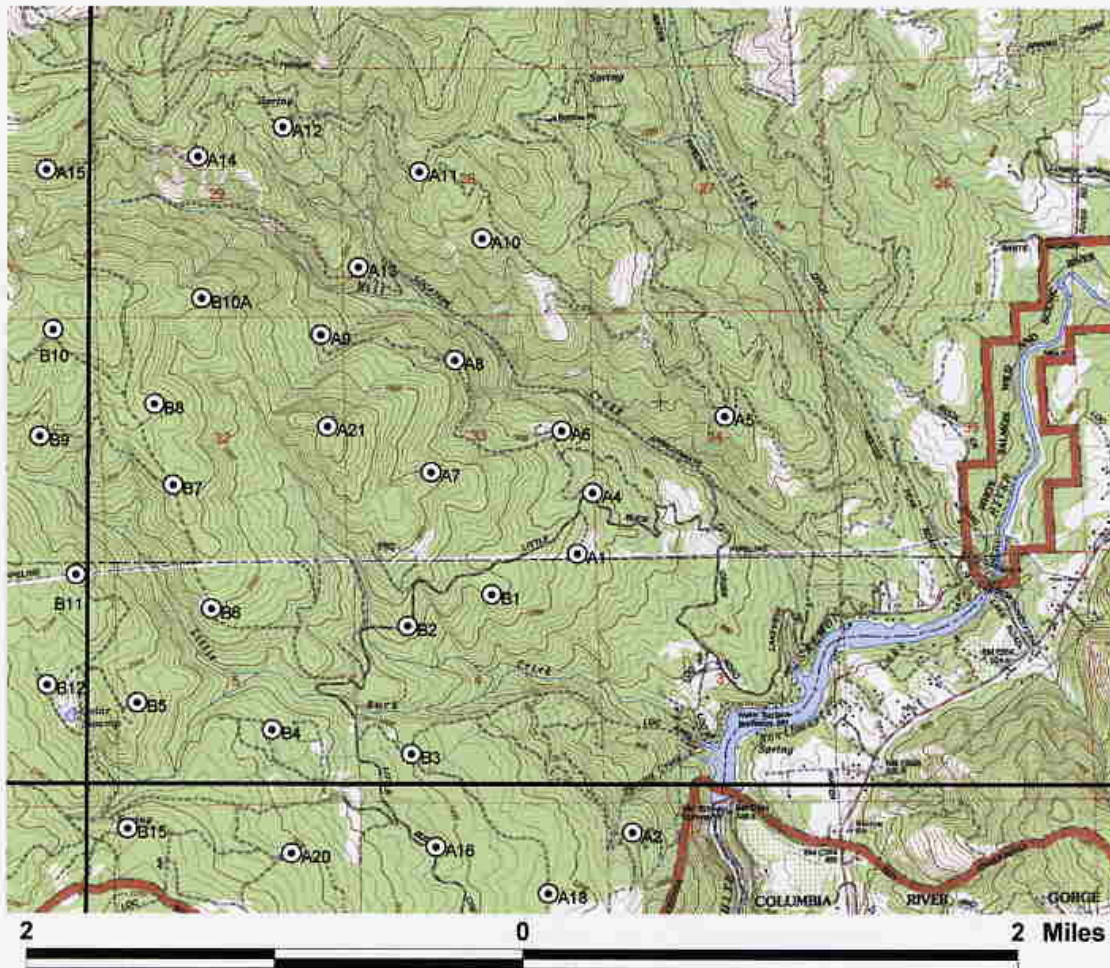


TECI GIS LAB

Map 3



## Saddleback Wind Power Project Northern Spotted Owl Survey Stations Northeast Quadrant



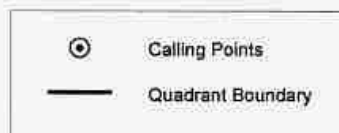
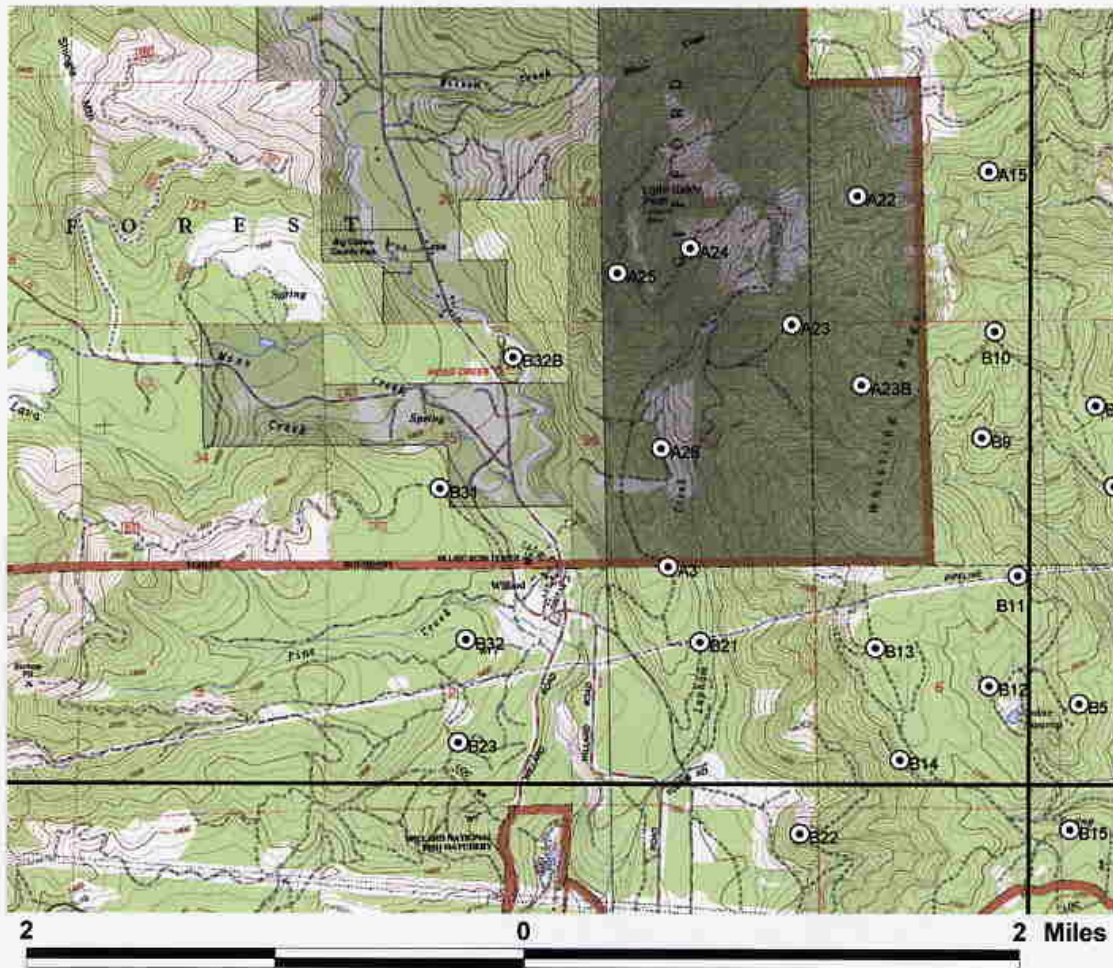
TECI GIS LAB

Map 4





## Saddleback Wind Power Project Northern Spotted Owl Survey Stations Northwest Quadrant

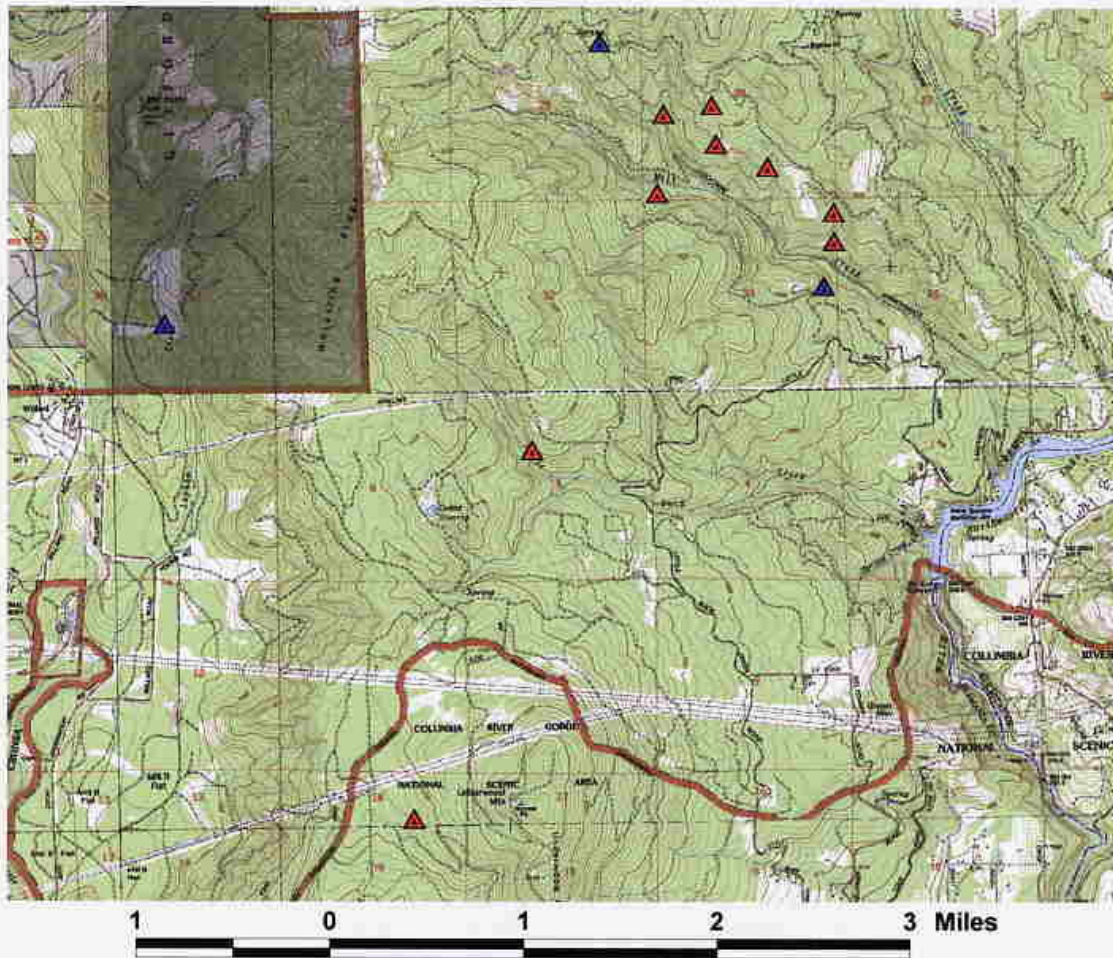


TECI GIS LAB

Map 5



## Saddleback Wind Power Project Barred Owl Locations



- ▲ Barred Owl Location 2004
- ▲ Barred Owl Location 2003



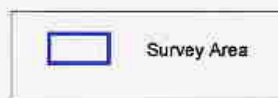
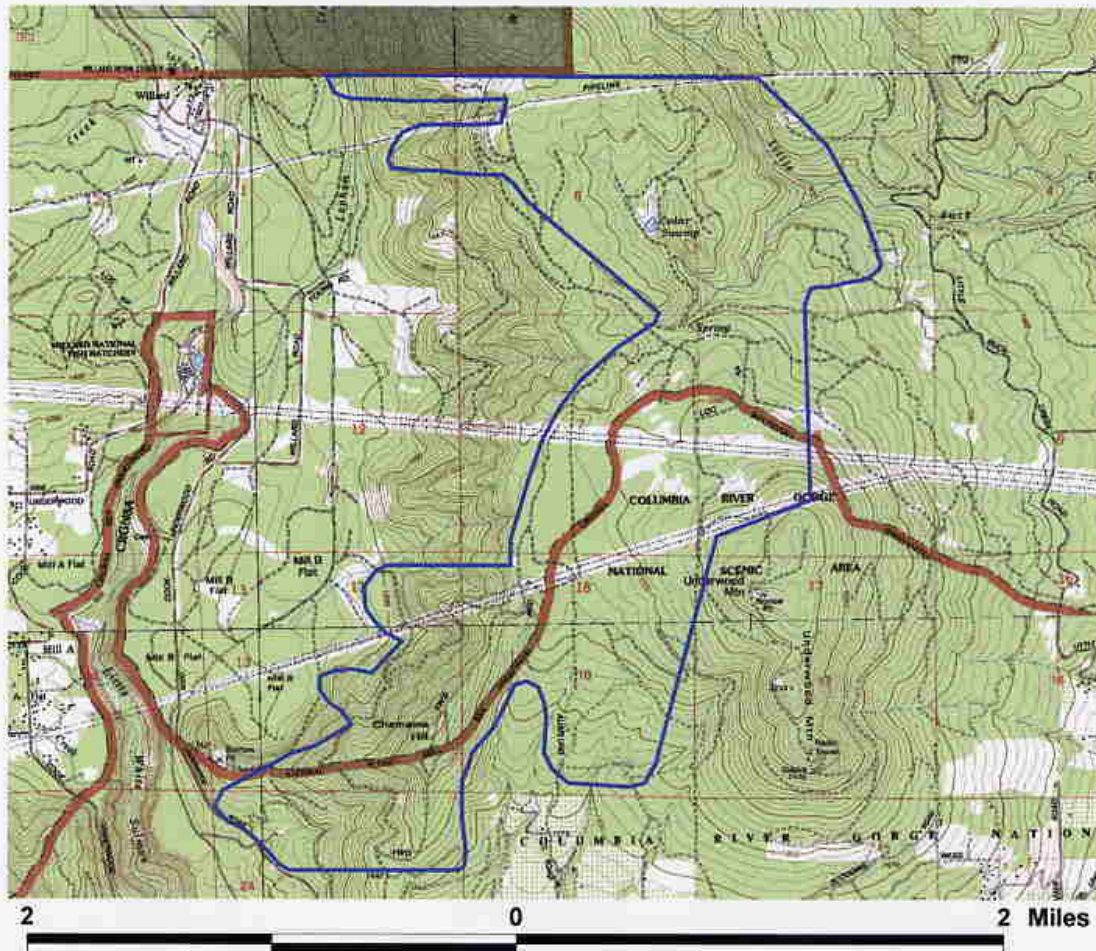
TECI GIS LAB

Map 6





## Saddleback Wind Power Project Northern Goshawk Survey Area



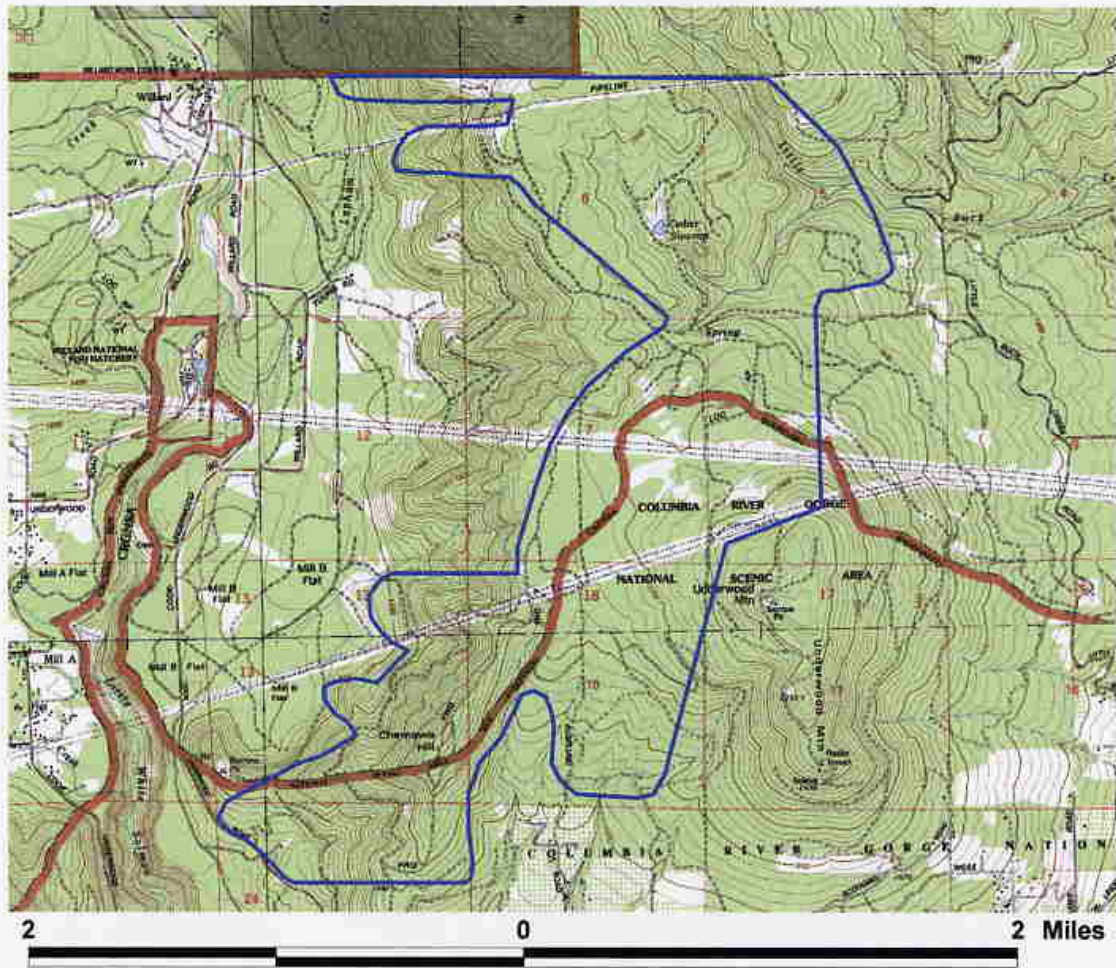
TECI GIS LAB

Map 7





# Saddleback Wind Power Project Western Gray Squirrel General Survey Area



Survey Area

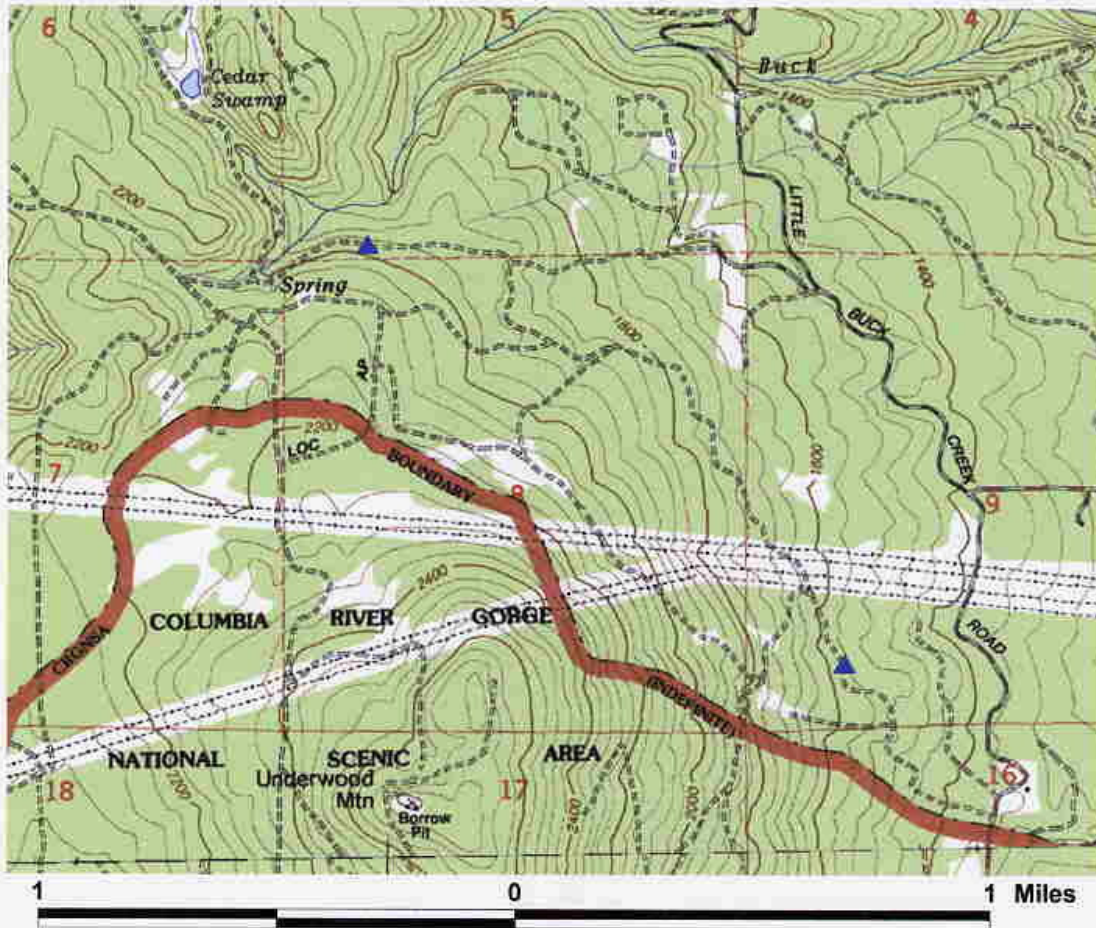


TECI GIS LAB

Map 8



## Saddleback Wind Power Project Western Gray Squirrel Locations



▲ Squirrel Location



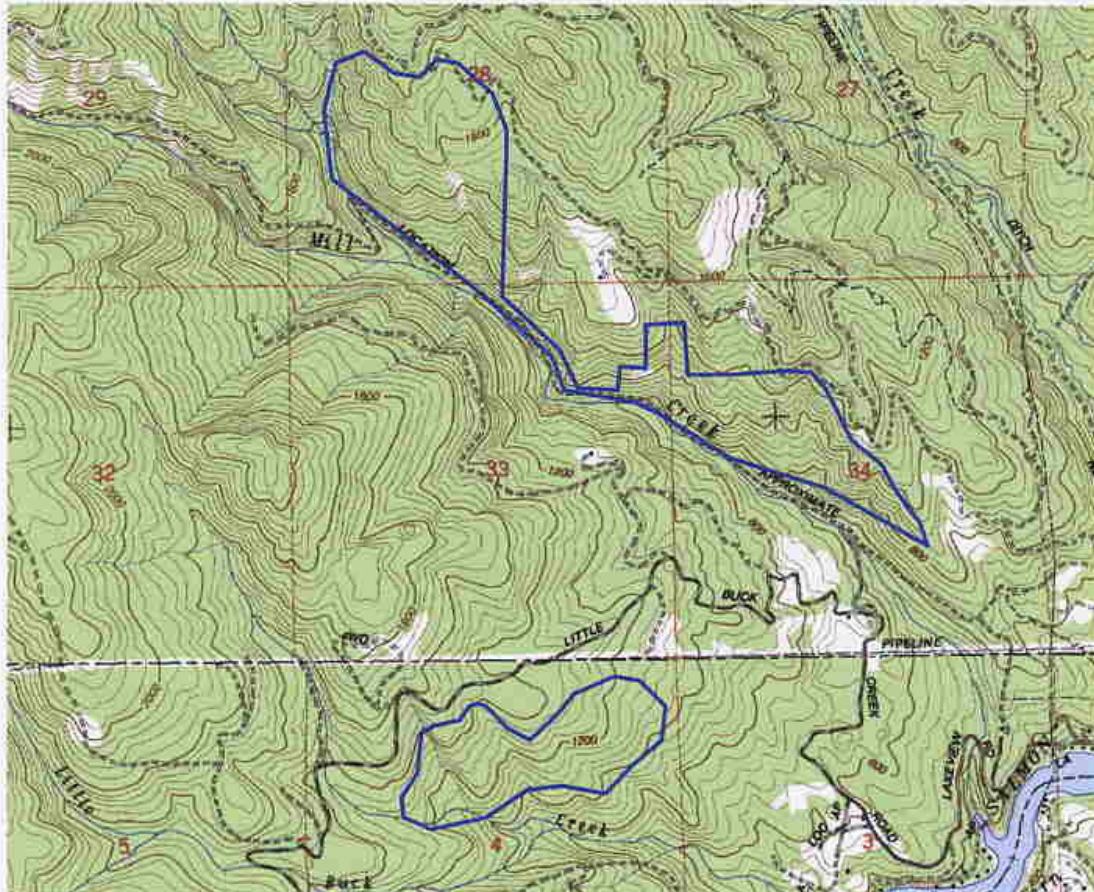
TECI GIS LAB

Map 9





## Saddleback Wind Power Project Western Gray Squirrel Intensive Survey Area



1 0 1 Miles

Survey Area



TECI GIS LAB

Map 10



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*PPM Saddleback Wind Energy Project Biological Surveys*

**APPENDIX B:**  
**2004 NORTHERN SPOTTED OWL SURVEY DATA**



*Turnstone Environmental Consultants Inc.*  
*PPM Saddleback Wind Energy Project Biological Surveys*

APPENDIX C:  
2004 NORTHERN SPOTTED OWL CALLING STATION LOCATIONS  
NAD 1927 UTM





STATION NUMBER	X COORDINATE	Y COORDINATE
A01	612809.74626	5070718.96470
A02	613169.26479	5068897.20043
A03	607286.17970	5070634.17310
A04	612906.65094	5071118.69649
A05	613766.67994	5071621.38950
A06	612706.78504	5071524.48482
A07	611858.86912	5071251.94042
A08	612010.28268	5071984.78203
A09	611144.19713	5072148.30867
A10	612185.92240	5072778.18907
A11	611780.13407	5073214.26012
A12	610895.87890	5073504.97415
A13	611386.45882	5072590.43626
A14	610344.73355	5073311.16479
A15	609363.57370	5073226.37320
A16	611890.57048	5068802.04178
A17	611593.19971	5067951.56138
A18	612622.10258	5068498.72360
A19	611997.62396	5067856.40273
A20	610956.82626	5068760.40987
A21	611186.59293	5071548.71099
A22	608509.60124	5073062.84656
A23	608085.64328	5072220.98718
A23B	608539.88395	5071827.31193
A24	607425.48017	5072717.62365
A25	606953.06987	5072554.09701
A26	607237.72736	5071409.41052
A27	611368.28920	5066879.11689
A28	610338.67701	5065080.32383
A30	612252.54437	5065449.77291
B01	612252.54437	5070452.47684
B02	611707.45556	5070246.55440
B03	611731.68173	5069410.75156
B04	610829.25693	5069568.22166
B05	609957.11484	5069743.86139
B06	610435.58168	5070355.57216
B07	610187.26345	5071167.14883
B08	610066.13261	5071694.06800



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STATION NUMBER	X COORDINATE	Y COORDINATE
B09	609321.17790	5071482.08902
B10	609405.96950	5072178.59139
B10A	610368.95972	5072384.51382
B11	609557.38305	5070579.66422
B12	609369.63024	5069858.93569
B13	608630.73208	5070107.25393
B14	608789.81169	5069375.00731
B15	609896.54942	5068920.17164
B16	609829.92746	5068199.44311
B18	609024.40733	5067817.88094
B20	609030.46387	5067115.32204
B21	607492.10214	5070143.59318
B22	608140.15216	5068889.88893
B23	605923.45768	5069483.43007
B24	607794.92925	5066594.45940
B25	608206.77412	5066370.36734
B26	607595.06335	5065910.07012
B27	607831.26850	5065104.55000
B28	608594.39283	5064601.85699
B29	610356.84663	5066618.68557
B30	610653.61721	5065904.01358
B31	605802.32684	5071142.92266
B32	605971.91002	5070155.70626
B32B	606274.73714	5072002.95166



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*PPM Saddleback Wind Energy Project Biological Surveys*

## APPENDIX D: NORTHERN GOSHAWK DATA FORMS



*Turnstone Environmental Consultants Inc.*  
*PPM Saddleback Wind Energy Project Biological Surveys*

**APPENDIX E:**  
**WESTERN GRAY SQUIRREL DATA FORMS**

**C-6**

**Final Report: Results of Northern Spotted Owl, Northern Goshawk, Western Gray Squirrel Surveys Conducted for the Saddleback Wind Energy Project. Prepared for SDS Lumber.**

**Turnstone Environmental Consultants, Inc. 2008**



# 2008 Final Report

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## *Results of Northern Spotted Owl, Western Gray Squirrel and Northern Goshawk Surveys Conducted for the Saddleback Wind Energy Project*

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Prepared for:

**SDS Lumber Company**

Prepared by:



Turnstone Environmental Consultants, Inc.  
10902 NW Skyline Blvd  
Portland, Oregon 97231

March, 2009



2008 Final Report – Results of Northern Spotted Owl, Northern Goshawk and Western Gray Squirrel Surveys for the Saddleback Wind Energy Project

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<b>APPENDIX C - NORTHERN GOSHAWK SURVEY FORMS.....</b>	<b>ERROR! BOOKMARK NOT DEFINED.</b>

**APPENDIX D - WESTERN GRAY SQUIRREL SURVEY FORMS****ERROR! BOOKMARK NOT**  
**DEFINED.**

## 1. PROJECT OVERVIEW

SDS Lumber Company (SDS) retained the services of Turnstone Environmental Consultants, Inc. (Turnstone) to perform Northern spotted owl (spotted owl), Western gray squirrel (gray squirrel) and Northern goshawk (goshawk) surveys in potential habitat for the Saddleback Wind Energy Project, located in Skamania County, Washington. Survey information will be used to assess the presence, occupancy and reproductive status of spotted owl, gray squirrel and goshawk individuals and populations within areas of proposed management activities.

The physiographic range of spotted owl, gray squirrel and goshawk populations are potentially located within the forestlands of the Saddleback Wind Energy Project. As part of the process to avoid “take” of any state or federally listed species, landowners must conduct surveys to determine the presence of any potentially listed species, prior to conducting any management activities.

Wildlife surveys were conducted using the best information available at the time, following strict adherence to protocol guidelines and habitat requirements to obtain full compliance with agency requirements. All potential habitat and buffers were determined based on the proposed location of the proposed wind turbine locations. In late October of 2008, the final proposed turbine alignment was released and the locations of the turbines were slightly altered from their original location. Following the analysis of the new alignment, Turnstone biologists determined that a few areas that were surveyed for spotted owls, goshawks and gray squirrels in 2008, now did not require surveys, while other areas now required additional survey effort. The survey implications caused by the adjustments to the turbine locations, will be discussed in further detail in the results sections of this document.

## 2. NORTHERN SPOTTED OWL

Under the federal Endangered Species Act of 1973, the Northern spotted owl (*Strix occidentalis caurina*) was listed in 1990 as “threatened” by the United States Fish and Wildlife Service. The Washington Fish and Wildlife commission listed the Northern



spotted owl as a state endangered species in 1988 (Buchanan and Swedeen, 2004). Both federal and state agencies determined that the spotted owl is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its existing range. The northern spotted owl's range extends from Washington State to Northern California. A recently revised species recovery plan is in effect for the northern spotted owl (USFWS 2008).

## **2.1. Suitable Habitat**

In Washington, spotted owls inhabit the Eastern and Western Cascades, Western Lowlands, and Olympic Peninsula Provinces. Within these regions, the spotted owl has specific habitat requirements for nesting, roosting, foraging and dispersal. The species utilizes forests with multi-layered canopies and a high incidence of large trees for nesting and roosting. Fragmented habitats may be used for dispersal and foraging. Spotted owls nest primarily in large tree cavities and on broken tops of large trees. Spotted owls have also been reported as nesting on clumps of mistletoe, on large branches, in abandoned stick nests of Northern goshawks and in cavities of embankments and rock faces (LaHaye 1999).

For the purposes of this project, potentially suitable spotted owl habitat was determined to be coniferous stands with average tree DBH greater than 12 inches and canopy closure of at least 60% or greater. Cut areas or young coniferous plantations that did not meet the minimum DBH or canopy closure parameters were excluded from the survey effort. The resulting designated survey areas would contain nesting roosting, foraging and, dispersal habitat.

## **2.2. Survey Locations**

Turnstone conducted spotted owl surveys within and adjacent to properties managed by SDS and cooperating adjacent landowners. Surveys were conducted in all potentially suitable habitat within the 1.8 mile provincial home range radius of the proposed project area. To determine the potential spotted owl survey areas, the proposed turbine alignments were buffered out to a 1.8 mile radius. This created a large polygon of





potential survey area that included 14,901 acres of land area. This polygon did not contain a contiguous area of potentially suitable spotted owl habitat. Suitable habitat within the overall polygon resembled a patchwork of stands that would require survey.

The delineated potential survey area polygon intersected 2 owl activity centers where historic spotted owl individuals once resided. A designated spotted owl activity center in this area of Washington is equal to a circle with a 1.8 mile radius. The spotted owl activity centers are located on public land north of the project area. The nest cores of these activity centers reside on public land managed by the Washington Department of Natural Resources (WDNR) and the U.S. Forest Service (USFS). Typically spotted owl activity centers will have their status changed to historic after three consecutive years of not being occupied by spotted owls. Currently the state of Washington has a moratorium on changing the status of a known spotted owl activity center to a historic status. The activity center areas intersect (1.8 mile radius provincial range), the northern reach of the delineated potential survey area polygon. The Mill Creek activity center (MSNO# 0991) was located and designated in 1992 and was last considered to have spotted owls present in 2000. The Moss Creek activity center (MSNO#1003) was located and established in 1994 and was last considered to have spotted owls present in 2002. Table 4, in the results section of this document, represents the survey summaries for these activity centers for 1994 thru 2008. These two activity centers are adjacent to one another and overlap by approximately 15%. Due to the adjacency of these spotted owl activity centers, it was decided to survey potential suitable habitat within the activity centers in addition to the survey area determined by 1.8 mile buffer of the proposed turbine alignments. This added an additional 7,222 acres of area that was included in the overall potential survey area. Within this 7,222 acres of area there was a patchwork mix of potentially suitable spotted owl habitat and non-habitat

**Table 1. Township and Range information for northern spotted owl survey areas.**

<b>Legal Descriptions for Spotted Owl Survey Areas</b>		
<b>Township</b>	<b>Range</b>	<b>Section</b>
3N	9E	1,2,11,12,12,14,23,24,25
3N	10E	4-6,7-9,16-18,19,20,30



4N	9E	23,24,25,26,27,34,35,36
4N	10E	19-22, 27-30,31-34

### 2.3. Survey Methods

Potential northern spotted owl habitat was surveyed in 2008 in accordance with the 1992, revised version of “Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls”. This survey protocol is endorsed by the U.S. Fish and Wildlife Service. Under this protocol, Turnstone initiated the 2-year survey effort in early May of 2008. Under the two year survey methodology, a minimum of 3 visits must be performed for 2 consecutive years in order to determine presence/absence of the spotted owl.

Prior to initiating field surveys, Turnstone biologists analyzed the project area using topographic maps, aerial photography and stand classification data to determine suitable habitat for potential broadcast calling station placement. When possible, broadcast calling stations were placed along ridges and away from streams to maximize coverage by enhancing sound transmission. Broadcast calling stations and survey routes were situated to achieve complete coverage of the potential survey area, preferably with coverage from more than one calling point. Stations were spaced approximately ¼ to ½ mile apart where access was possible and permitted and suitable habitat was present. All broadcast calling stations were surveyed at night when owls are more active and are thought to be more responsive to standard survey techniques (USDI 1992). Per protocol guidelines, Turnstone biologists used ten-minute calling periods at each designated broadcast calling station. Voice hooting, amplified PA systems and “hoot flutes” were used to broadcast both male and female spotted owl vocalizations that included four-note contact calls and various agitated calls. Turnstone conducted surveys between March 15th and August 31st, 2008, as stipulated by the protocol.

During the first round of spot calling, an additional day visit was made to each of the two spotted owl activity centers adjacent to the main project (Mill Crk, and Moss Crk.). The day visits conducted by Turnstone staff were made in addition to the 3 required survey



visits per the protocol guidelines. The intent of these day visits was to further verify if spotted owls were occupying the historic spotted owl nest cores. Turnstone biologists hiked into the historic nest cores and hiked intuitive meandering survey transects, broadcasting spotted owl vocalizations with an amplified PA system while listening for responses.

The Mill Creek and Moss Creek nest cores are currently being surveyed as part of a long term demography study conducted by the Washington Department of Natural Resources on lands within the Klickitat Habitat Conservation Plan Planning Unit. The study was initiated in 2001 and was slated to run for 5 years. In 2007, a new 3 year contract was initiated to extend the survey effort for another 3 years. The fieldwork for the project is carried out by staff from the National Council for Air and Stream Improvement (NCASI), and follows a different standardized survey protocol. Each year NCASI performs a minimum of 6 day/night survey visits to the monitored owl cores. Survey summary details of the survey results for each of these spotted owl cores can be reviewed in Table 4 of this document.

During the 2008 survey season, Turnstone recorded all owl species responses from each calling station during each site visit. Turnstone biologists also recorded all sightings of or responses by potential spotted owl predators to include: barred owls, great horned owls, northern goshawks and other raptor species. The presence of any of these species may affect northern spotted owl responses.

### **3. Western Gray Squirrel**

The western gray squirrel (*Sciurus griseus*) was listed as a “threatened” species by the Washington Fish and Wildlife Commission in 1993. In November of 2007, the State of Washington adopted a species recovery plan for the Western Gray Squirrel which is currently in effect.

In January of 2001, a petition was filed with the United States Fish and Wildlife Service to list the Washington State population of the western gray squirrel as a distinct



population segment (DPS) in an effort to secure protection for the species under the Endangered Species Act of 1973 (ESA). The petition underwent a 12 month period of review and a ruling was announced May 30, 2003. This ruling stated the petition action was not warranted because the Washington population of the Western Gray Squirrel is not a DPS therefore, no protection under the ESA would be granted (Federal Register, 2003). There is currently no federal protection for the western gray squirrel.

The physiographic range and habitat requirements of the western gray squirrel are located within the forestlands of the Saddleback Wind Energy Project.

### **3.1. Suitable Habitat**

Western gray squirrels are arboreal (adapted for living in trees) and, although they forage on the ground, they rarely stray far from trees. They use tree canopies for escape, cover and nesting. Western gray squirrels can move rapidly and cover long distances among tree canopies when canopy conditions permit. A contiguous tree canopy that allows arboreal travel for at least 198 feet (60 meters) around the nest is an important feature of western gray squirrel habitat (Ryan and Carey 1995a). Western gray squirrels are active throughout the day but are most active in the morning. Western gray squirrels are most active in August and September, when they are collecting and storing food for winter, and they are less visible in June and July (Ryan and Carey 1995a).

Currently in Washington, the western gray squirrel distribution has been reduced to three geographically isolated western gray squirrel populations in Washington: the “Puget Trough” population, now centered in Thurston and Pierce counties in the Puget Sound region; the “South Cascades” population in extreme eastern Skamania County and Klickitat and Yakima counties; and the “North Cascades” population in Chelan and Okanogan counties.

In Washington, and elsewhere within the subspecies’ range, the principal food is acorns, although the seeds of Douglas-fir and other conifers are also eaten (Dalquest 1948). While pine nuts and acorns are considered essential foods for storing body fat and conditioning western gray squirrels for winter, green vegetation, seeds and nuts of trees



and shrubs, fleshy fruits, mushrooms and other foods are also consumed. Hypogeous fungi (underground fungi such as truffles) comprise a large portion of the western gray squirrel diet (WDW 1993; Carraway and Verts 1994; Ryan and Carey 1995a).

For the purposes of this project, potentially suitable western gray squirrel potential habitat was defined as any coniferous, deciduous or mixed stands of trees that contained trees with an average diameter at breast height (DBH) of at least 10 inches or greater

### **3.2. Survey Locations**

Turnstone conducted western gray squirrel nest surveys on approximately 738 acres of potentially suitable habitat within the project area. The survey methodology was determined with consultation with a WDFW staff biologist. Within the project area, potential gray squirrel survey areas were determined by using GIS analysis and ground-truthing. The GIS analysis was used to determine areas of potentially suitable squirrel habitat prior to conducting field visits and the ground-truthing was used to validate and finalize the initial GIS analysis.

Western gray squirrel nest surveys were required in any areas where project activities would remove potential western gray squirrel habitat or possibly impact habitat due to structural modification, including stand thinning. Surveys would be required on all habitat that would be altered and continue 400 feet into unaltered habitat. To determine the areas to be surveyed, the proposed energy project infrastructure (primarily proposed wind turbines), was buffered out 150 feet (150 foot radius) to establish a work zone. Then an additional 500 feet of buffer was added, to encompass any areas that may need to be altered due to obstructions (tall trees) within wind corridors of the proposed turbines. Finally an additional 400 feet was buffered onto this distance to satisfy the guideline to survey 400 feet into unaltered habitat. Adding all buffers together, totaled 1,050 foot radius of area to be surveyed. The overall area delineated out by using this buffering process was equal to 1,420 acres. Within this area 738 acres was determined to be potentially suitable western gray squirrel habitat. The remaining 682 acres was determined to be non-habitat for the western gray squirrel.





The survey area was broken up into smaller discrete units to facilitate an efficient survey effort by Turnstone biologists. The discrete units were referred to as polygons and each got a unique identifier. A map of the western gray squirrel survey area polygons is located in Appendix A.

### **3.3. Survey Methods**

Surveys were conducted according to the guidelines in the WDFW report, “Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines: analysis of nest use and operator compliance” (Haegen, Van Leuven, and Anderson 2004). Turnstone biologists performed a general search for western gray squirrels nests and western gray squirrel individuals in the fall of 2008.

Walk-through surveys using meandering transects were conducted in all conifer, deciduous, and mixed composition stands within the designated survey area that met the minimum DBH threshold of 10 inches. Surveyors were looking for squirrel nests and squirrel individuals of any species but focusing their attention on evidence of the western gray squirrel. Transects were oriented to parallel the topographic features of the survey polygons when possible. All transect were laid out systematically to ensure that they were evenly spaced and located close enough together so that no habitat areas were excluded from the survey.

## **4. NORTHERN GOSHAWK**

The northern goshawk (*Accipiter gentiles*) is classified as a “species of concern” by the U.S. Fish and Wildlife Service and as a “listed candidate” for sensitive, threatened or endangered species by the Washington Fish and Wildlife Commission. Physiographic range and habitat requirements of the northern goshawk can be found within the forest lands of the Saddleback Wind Energy Project.

### **4.1. Suitable Habitat**

Northern goshawks inhabit a wide variety of forest habitats, including true fir (red fir, white fir, and subalpine fir), mixed conifer, lodgepole pine, ponderosa pine, Jeffrey pine, montane riparian deciduous forest and Douglas fir. Occasionally, goshawks nest in



coastal redwood and mixed hardwood forests. Goshawk nest sites are associated with patches of forest that are larger and denser than the surrounding landscape. However, home ranges often consist of a wide range of forest age classes and conditions. Numerous habitat studies and modeling efforts have found nest sites to be associated with similar factors, including proximity to water or meadow habitat, forest openings, level terrain or “benches” of gentle slope, northerly aspects and patches of larger, denser trees, but these factors vary widely (Woodbridge 2006).

#### 4.2. Survey Locations

During the 2008 northern goshawk survey window, Turnstone conducted northern goshawk surveys within properties managed by SDS Lumber Co. These surveys covered approximately 1,100 acres of potential goshawk habitat. The potential survey area for the northern goshawk was determined by protocol parameters, consultation with biologists from the Washington Department of Fish and Wildlife and GIS analysis. Survey protocol methodology was outlined in the United States Forest Service document, *“Northern Goshawk Inventory and Monitoring Technical Guide, July 2006.”* Table 2 depicts the legal descriptions of the where the goshawk survey areas occurred.

**Table 2. Township and Range information for northern goshawk survey areas.**

Legal Descriptions for Goshawk Survey Areas		
Township	Range	Section
4N	9E	1, 36
4N	10E	31,32
3N	9E	12,13,24
3N	10E	5,6,7,8,18

It was determined that the ‘Broadcast Acoustical Survey’ methodology outlined in this protocol would best suit the needs of the project. This approach requires a one or a two year survey effort determined by the characteristics of the site and the project. Due to the size of the goshawk survey area and the potential level of initial disturbance, a 2 year

survey effort will be used for the original 1,100 acres of potential goshawk habitat. The survey effort for goshawks will be complete after the 2009 surveys are complete.

To determine the area that would require goshawk surveys, a GIS analysis was executed using protocol parameters and available data. The proposed wind energy project infrastructure was buffered out 150 feet to establish a work area that would likely be permanently disturbed. Then an additional 2,624 feet, per protocol recommendations, was added to this initial buffer to establish an area that was considered the potential northern goshawk survey area. Within this area, GIS data was analyzed to identify stands of conifers that may contain suitable habitat structure based on an age class of greater than 25 years and average tree DBH of at least 12 inches. The resulting suitable habitat areas, or polygons, were then overlaid on current aerial photography (2006), to verify that the stands were still intact. This exercise created an initial potential survey area of 3,013 acres of land area. Of this area 1,093 acres was determined to be forested and contain the habitat characteristics needed to support goshawks. Initial calling points and survey transects were then established in GIS to adequately cover the 1,093 acres of potential goshawk habitat that would require survey. During the first goshawk survey field visit additional refinements were made to the goshawk survey areas based on ground-truthing of the potential habitat that was delineated out in GIS.

#### **4.3. Survey Methods**

The “broadcast acoustical” survey methodology requires 2 visits to the survey area in a season. The first site visit occurs in the ‘nestling period’, alarm and wail calls are broadcast at the designated calling points. During the second site visit in the ‘fledgling period’, wail and begging calls are broadcast. At each station, goshawk calls were broadcast with a portable amplified PA system for ten seconds. Turnstone biologists pause for thirty seconds to listen for goshawk responses, immediately following the broadcast calls. The sequence of broadcasting and listening for responses was repeated four times at each station, directed toward each of the four cardinal directions. During foot travel between broadcast points, the surveyor is staying alert and listening for



potential goshawk calls and looking for potential goshawk nests. The surveyor is also documenting observations of other raptors species.

Survey periods begin ½ hour before sunrise and conclude ½ hour before sunset, as specified by protocol. If there was a goshawk detected in the project area, then a search for an active nest would ensue, following the ‘intensive search’ protocol. Locating an active nest is recommended immediately following any goshawk detections; however, reviewing results from several surveys and stations can be advantageous for locating active nests. Turnstone also recorded all other incidental raptor species observed during site visit on the field data forms, which are included in *Appendix C*.

## **5. Survey Results**

### **5.1. Northern Spotted Owl**

Turnstone conducted the first year of spotted owl surveys with a minimum of three visits per calling station on SDS property and some adjacent property (*Appendix A*). Two spotted owl nest cores located public lands (WDNR, USFS) to the north of the project area were also surveyed. The Mill Creek (MSNO#: 0991) and Moss Creek (MSNO#: 1003) cores are located in Township 4N and Range 10E section 28 and Township 4N and Range 9E section 35, respectively. A total of 80 calling stations were established and surveyed with no northern spotted owl responses or observations. Responses from single barred owls and barred owl pairs were recorded during the three site visits from several different calling stations. The following table summarizes all of the Turnstone survey site results for the project area for the 2008 survey season. A map depicting the locations of the calling stations and locations of other owl observations is available for review in *Appendix A* of this document.



**Table 3. Survey Summary Results for 2008.**

Visit #	Dates	# of Stations	Northern Spotted Owl Response	Comments
1	21-May	12	None	No owl responses
1	22-May	20	None	No owl responses
1	24-May	18	None	Barred owls (2) one adult male, one adult female; near Stations #45 & #82
1	25-May	22	None	Barred owls (2) likely pair; near Stations #74 & #86
1	26-May	8	None	No owl responses
2	10-Jun	22	None	Barred owls (2) Male and unk. sex Barred owl; likely a pair, near Stations #74 & #86
2	11-Jun	20	None	No owl responses
2	15-Jun	17	None	No owl responses
2	16-Jun	21	None	Barred owl (1) Unk. Adult Barred owl from Stations #44 & #45
3	27-Jul	15	None	No owl responses
3	28-Jul	20	None	Barred owl (1) Male adult Barred owl detected from Station #82
3	29-Jul	24	None	No owl responses
3	30-Jul	22	None	No owl responses

Table 3 outlines the results of the northern spotted owl surveys at each of the two historic nest cores that intersect the project area. Results in the table were derived from combining data collected by the WDFW, NCASI demography study and Turnstone. The data shows no spotted owls were detected in the Mill Creek core since the 2000 breeding season. The Moss Creek core has not had a spotted owl detected since the 2002 breeding season. Both cores show an increased presence of barred owls detected while conducting the surveys for spotted owls in these areas.



**Table 4. NSO Activity Center Survey Details and Results**

Year	Mill Creek NSO Core Survey Results		Moss Creek NSO Core Survey Results	
	STOC	STVA	STOC	STVA
2008	No response	Present	No response	Present
2007	No response	Present	No response	Male observed
2006	No response	Present	No response	Male observed
2005	No response	Present	No response	Pair observed
2004	No response	Pair observed	No response	Pair with juvenile observed
2003	No response	None observed	No response	Pair observed
2002	No response	Male observed	Male	Pair with juvenile observed
2001	No response	None observed	No response	Pair observed
2000	Non-nesting pair observed	None observed	Reproducing pair with 1 juvenile	None observed
1999	Female observed	None observed	Reproducing pair with 1 juvenile	None observed
1998	Non-nesting pair observed	Female observed	Reproducing pair with 2 juveniles	None observed
1997	Non-nesting pair observed	None observed	No response	None observed
1996	Reproducing pair with 2 juveniles	N/A	Reproducing pair with 3 juveniles	N/A
1995	No response	N/A	Reproducing pair	N/A
1994	Reproducing pair with 2 juveniles	N/A	Reproducing pair	N/A

## 5.2. Alterations to the Northern Spotted Owl Survey Area

The final turbine alignment was released in late October of 2008 did not effect the survey coverage for the areas that were surveyed for spotted owls during the 2008 survey season. Micro-sighting adjustments were made to the north of the project area. Stations



were already set and surveyed due to the two activity centers at the northern reach of the project area.

### **5.3. Western Gray Squirrel**

Three field visits were made the western gray squirrel survey areas by a total of three different biologists over a 12 day period. These visits together constituted a complete round of surveys to cover all potential habitat within the survey polygons. During the round of surveys, efforts were made to determine if western gray squirrels were currently using or had historically used any potential habitat within the potential survey area by conducting systematic nest search surveys. The potential survey area was determined using guidelines provided by WDFW staff biologists and GIS analysis. Western gray squirrel surveys were required on any potential western gray squirrel habitat that would be altered by the proposed energy project and include surveys a minimum of 400 feet into adjacent undisturbed potentially suitable squirrel habitat (per WDFW protocol guidelines).

All 26 survey polygons (appendix A) were examined and a formal nest search for western gray squirrel nest structures was performed using guidelines outlined by the protocol, *Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines, WDFW 2004*. During these visits, no western gray squirrels or western gray squirrel nest structures were observed.



**Table 5. Western Gray Squirrel Survey Areas and Results**

<b>Survey Polygon Visited</b>	<b>Date</b>	<b>Surveyor</b>	<b>Notes</b>
A1, A3, A7	10/14/2008	D. Sahl	No nests or WGS observed
A4, A5, A10	10/14/2008	J.Kolozar	No nests or WGS observed
A2, A6, A9	10/14/2008	J.Kolozar	No nests or WGS observed
A12, A13	10/15/2008	D.Sahl	No nests or WGS observed
A14	10/15/2008	D. Bolen	No nests or WGS observed
A15	10/15/2008	J. Kolozar	No nests or WGS observed
A11, A17, A18	10/15/2008	D. Sahl, D. Bolen, J. Kolozar	No nests or WGS observed
B1-B8	11/18/2008	D.Sahl, D. Bolen	No nests or WGS observed
C1	10/9/2008	D. Sahl	No nests or WGS observed

#### **5.4. Alterations to the Western Gray Squirrel Survey Area**

The final turbine alignment that was released in late October of 2008 did not affect the survey coverage for the areas that were surveyed for western gray squirrels during the 2008 survey season. The changes made in the final turbine alignment did create additional western gray squirrel survey areas. The survey window to conduct western gray squirrels was still open when the new areas were determined and an additional field visit was conducted and the new areas were surveyed.

#### **5.5. Northern Goshawk**

Turnstone conducted protocol northern goshawk surveys on SDS properties during the 2008 goshawk survey window. The survey protocol methodology used was the “broadcast acoustical” methodology, outlined in the protocol; “*Northern Goshawk*



*Inventory and Monitoring Technical Guide, USFS, July 2006.*” Calling stations were strategically placed throughout the potential survey area, which was all suitable habitat within 2,624 feet of the designated work areas. Turnstone completed two protocol site visits to 136 calling stations during the 2008 goshawk survey season. One site visit was conducted during the nestling period and the second during the fledgling period as suggested in the protocol. No northern goshawk responses were documented during either of the two site visits. Survey dates and other incidental raptor observations are summarized in Table 6. Maps of the areas surveyed for northern goshawks are available for review in Appendix A. Copies of the field data sheets are available for review in Appendix C.

**Table 6. Northern goshawk survey results summary 2008.**

Visit #	# of Stations	Date	N. Goshawk Response	Other Raptors Observed
1	14	6/23	None	OSPR (1) near station 46 RTHA (1) near station 46
1	21	6/24	None	RTHA (1) near station 36
1	22	6/25	None	
1	25	6/26	None	
1	25	6/27	None	
1	11	7/15	None	TUVU (1) near station 62
1	15	7/16	None	COHA (1) near station 26
1	3	7/28	None	
2	7	7/28	None	
2	14	7/30	None	RTHA (1) near station 67
2	22	7/31	None	TUVU (1) near station 95 TUVU (1) near station 78
2	16	8/01	None	
2	23	8/04	None	RTHA (1) near station 22
2	25	8/05	None	SSHA (1) near station 9 TUVU (8) near station 12
2	19	8/06	None	
2	10	8/07	None	
COHA = Cooper's hawk ( <i>Accipiter cooperii</i> ) OSPR = Osprey ( <i>Pandion haliaetus</i> ) RTHA = Red-tailed hawk ( <i>Buteo jamaicensis</i> ) SSHA = Sharp-shinned hawk ( <i>Accipiter striatus</i> ) TUVU = Turkey vulture ( <i>Cathartes aura</i> )				

## **5.6. Alterations to the Northern Goshawk Survey Area**

The final turbine alignment that was released in late October of 2008, did affect the survey coverage for the areas that were surveyed for northern goshawks during the 2008 survey season. The changes made in the final turbine alignment created an additional 367 acres of potential survey area. The survey window to conduct northern goshawks was closed when the new survey areas were determined. These new survey areas will be included in the overall survey effort. The new survey area acreage may be reduced, if ground-truthing efforts in 2009 determine that some areas are composed of non-habitat. Due to the additional survey areas being determined after the close of the 2008 goshawk survey window, and the small size of the areas, a one year survey effort will be initiated in 2009, to the newly designated survey area. The survey methodology used will be the "Intensive Search Survey" protocol as outlined in the United States Forest Service document, "*Northern Goshawk Inventory and Monitoring Technical Guide, July 2006.*" Under this protocol methodology, the new survey areas will only need to receive a single year of goshawk surveys in order to determine goshawk presence.

Maps of the original and adjusted northern goshawk survey areas can be reviewed in appendix A of this document.

## **6. CONCLUSION**

### **6.1. Northern Spotted Owl**

During the 2008 Northern spotted owl survey season, Turnstone conducted three site visits in each of the designated spotted owl calling points and an additional day visit to two separate nest cores where spotted owls once resided. This survey effort covered potentially suitable northern spotted owl habitat within the approximately 22,123 acre survey area. A total of 80 calling stations were established and surveyed. Turnstone recorded no Northern spotted owl observations or responses during any of these visits. Under the direction of SDS, Turnstone will utilize the calling stations established in 2008 and continue to survey potential habitat within the project area in 2009 in order to ensure proper adherence to the US Fish and Wildlife northern spotted owl survey protocol.





## **6.2. Western Gray Squirrel**

During the 2008 western gray squirrel survey season, Turnstone biologists conducted nest searches to 26 different polygons of potential western gray squirrel habitat. These polygons totaled 738 acres of potentially suitable western gray squirrel habitat. All visits were conducted within the guidelines outlined the appropriate survey protocol. Turnstone biologists did not observe any Western gray squirrels or their nest structures during any of these visits.

Acorn crops from oak trees are an important food source for western gray squirrels. It should be noted that very few oak trees were observed in the project area. The few that were observed within the western gray squirrel survey area boundaries were small (less than 20 feet tall), stunted, and growing in openings on exposed rocky slopes in shallow soils.

## **6.3. Northern Goshawk**

During the 2008 northern goshawk survey season, turnstone conducted surveys at 138 calling points covering 1,100 acres of potentially suitable goshawk habitat. No northern goshawk responses or observations were recorded during the two site visits during the 2008 breeding season. The 2006 “Northern Goshawk Inventory and Monitoring Technical Guide” developed for the United States Forest Service (USFS) recommends a two year survey effort for assessing the occupancy and reproductive status northern goshawks when surveying large tracts of land with the “broadcast acoustical” survey methodology. Under the direction of SDS, Turnstone will conduct surveys in two visits at the same calling stations that were established in 2008 in 2009. Additional survey areas that were added after the close of the 2008 goshawk survey season, will be surveyed in 2009, with a one or two year effort depending on project parameters and consultation with WDFW.



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## Appendix A – Maps




## 2008 Owl Survey Results

## Calling Round 1






-  **2008 Owl Detections**  
 **2008 Owl Detections**  
 NSO Calling Points

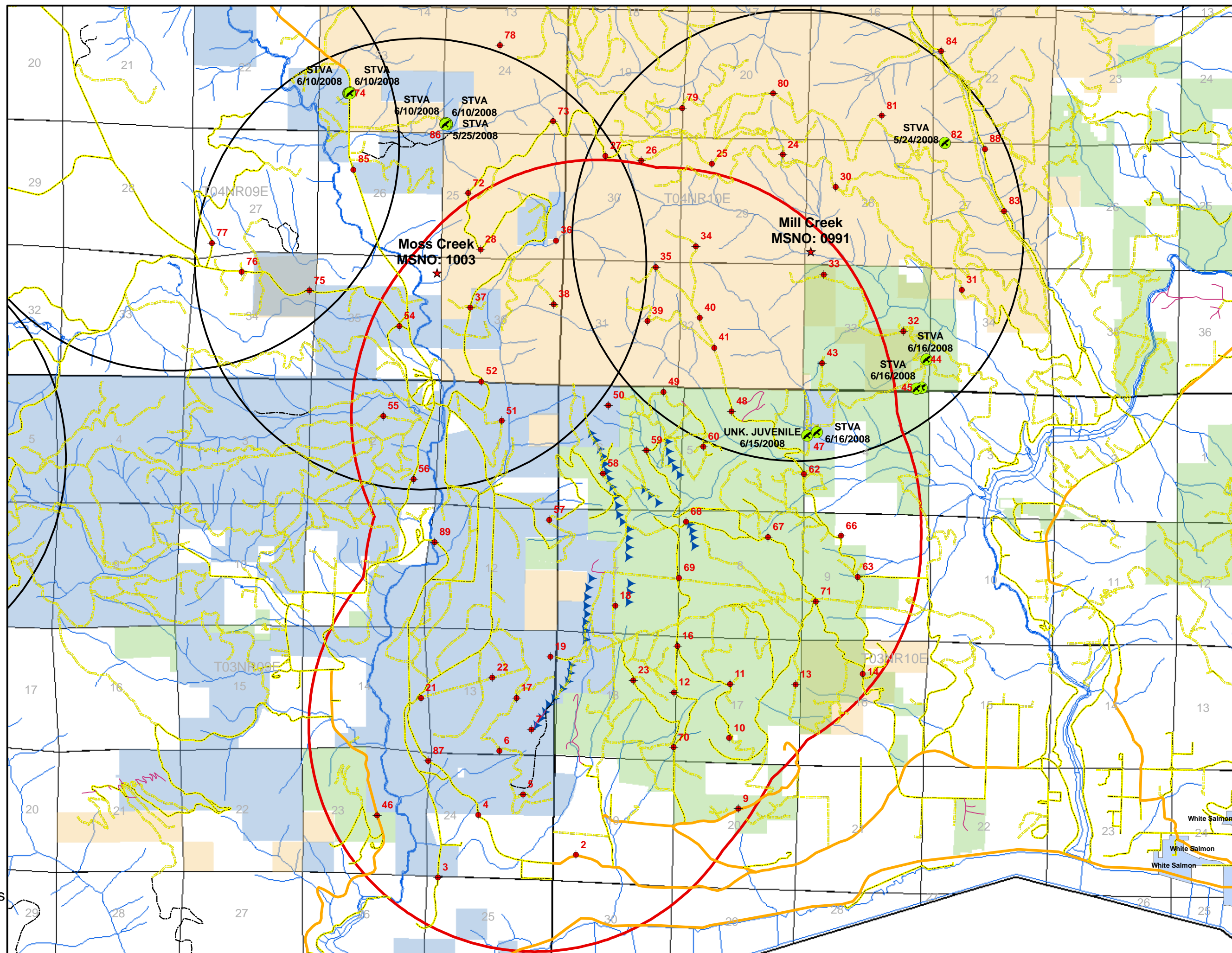
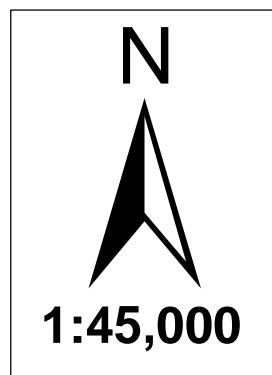
## ROADS

-  Other  
 HWY  
 DIRT  
 ROCK  
 TRAIL-4WD  
 Historic NSO Nests



**Project NSO  
Survey Area  
(1.8 mile buffer)**

-  NSO Circle
-  TOWER\_LOCATIONS
-  SDS Ownership
-  BLC Ownership
-  DNR Ownership

















Map Created 8/25/2008

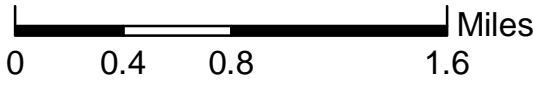
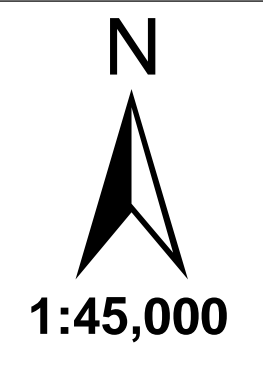


# Saddleback Mt. Project Area

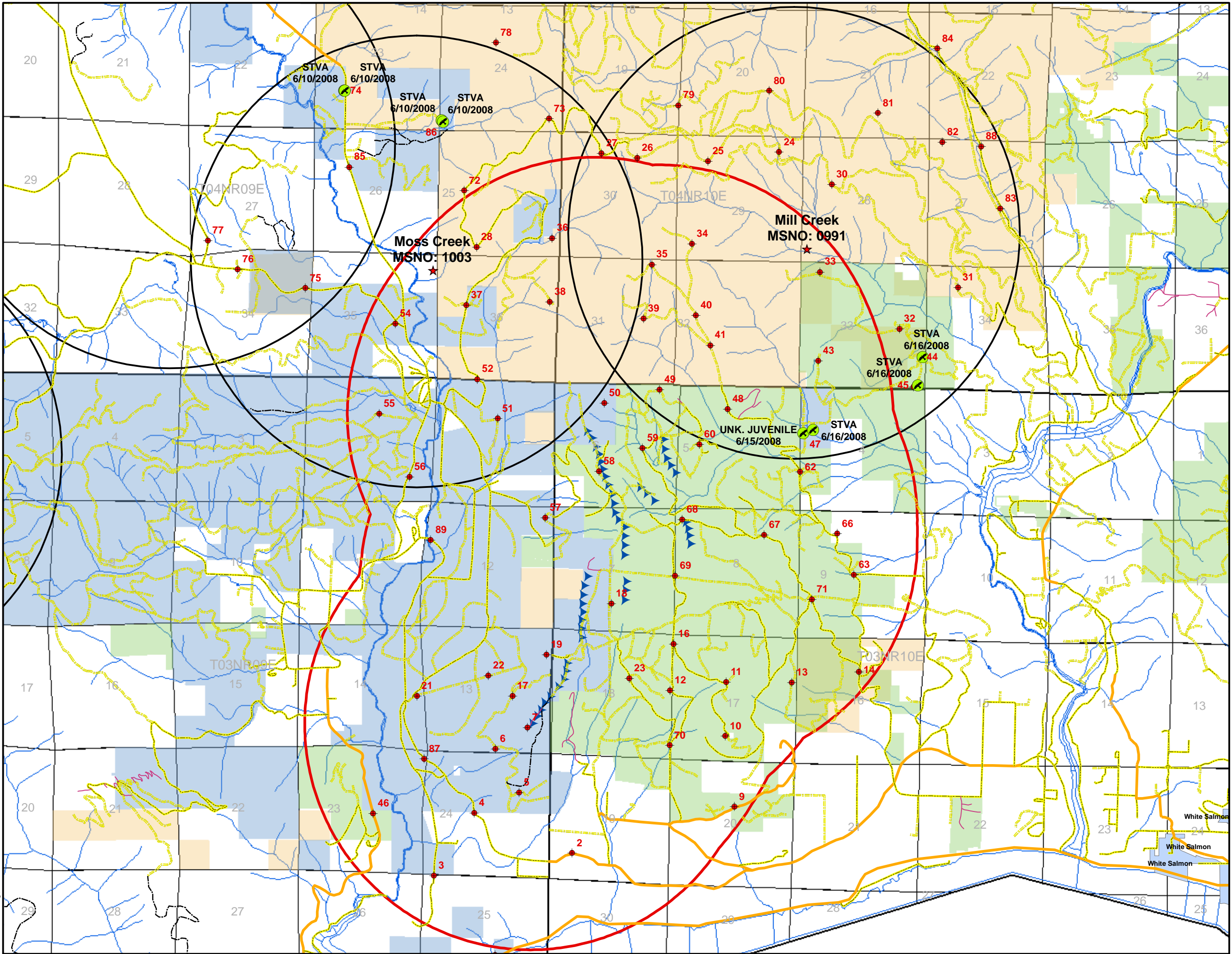
## 2008 Owl Survey Results

### Calling Round 2

-  **2008 Owl Detections**
-  NSO Calling Points
- ROADS**
  -  Other
  -  HWY
  -  DIRT
  -  ROCK
  -  TRAIL-4WD
-  Historic NSO Nests
-  **Project NSO  
Survey Area  
(1.8 mile buffer)**
-  NSO Circle
-  TOWER\_LOCATIONS
-  SDS Ownership
-  BLC Ownership
-  DNR Ownership



Map Created 8/25/2008

















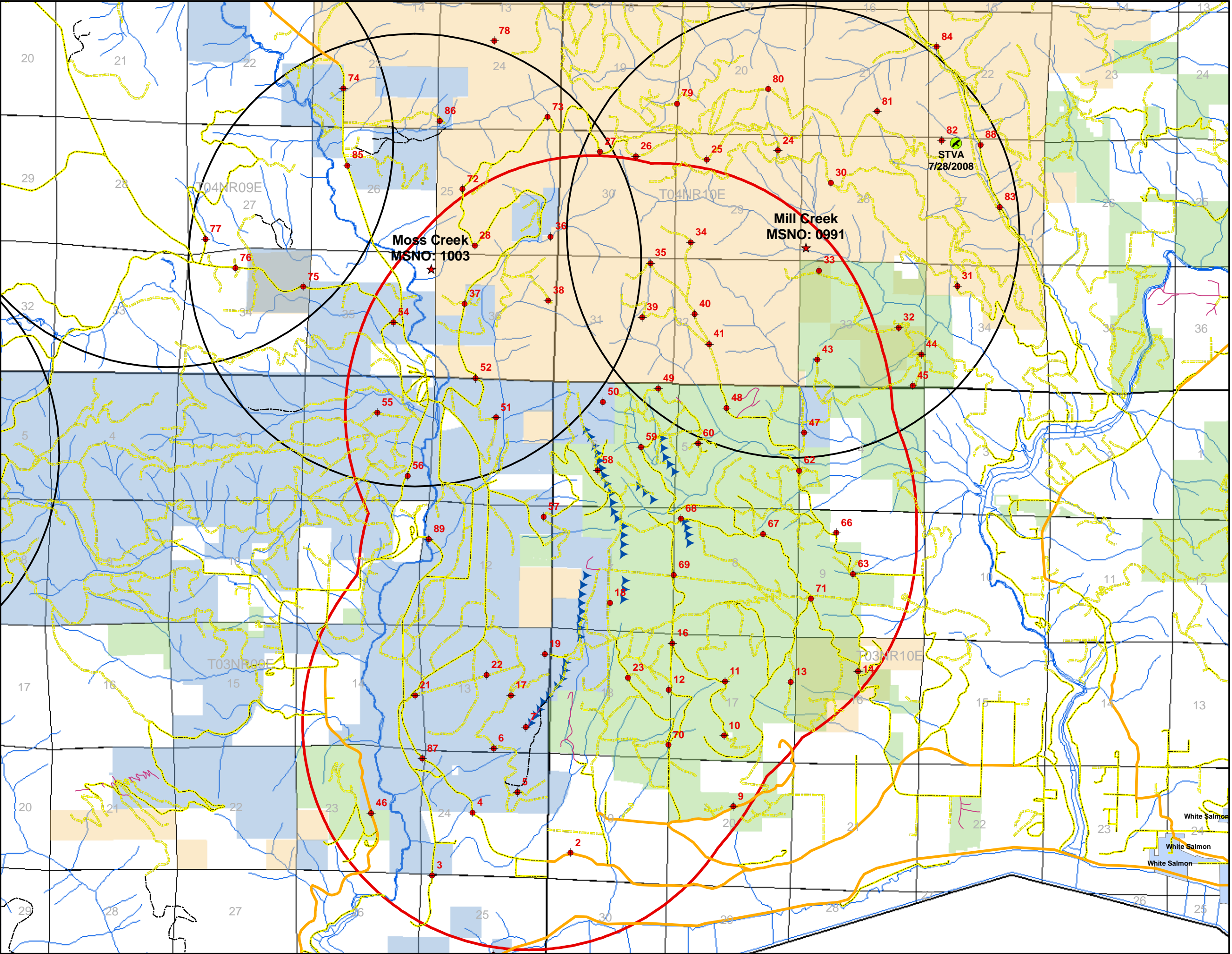
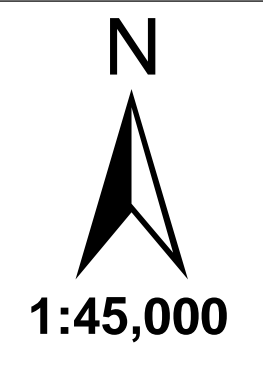


# Saddleback Mt. Project Area

## 2008 Owl Survey Results

### Calling Round 3

-  **2008 Owl Detections**
-  NSO Calling Points
- ROADS**
  -  Other
  -  HWY
  -  DIRT
  -  ROCK
  -  TRAIL-4WD
-  Historic NSO Nests
-  **Project NSO  
Survey Area  
(1.8 mile buffer)**
-  NSO Circle
-  TOWER\_LOCATIONS
-  SDS Ownership
-  BLC Ownership
-  DNR Ownership





# Saddleback Mt. Project Area 2008 Northern Goshawk Survey Areas Overview Map

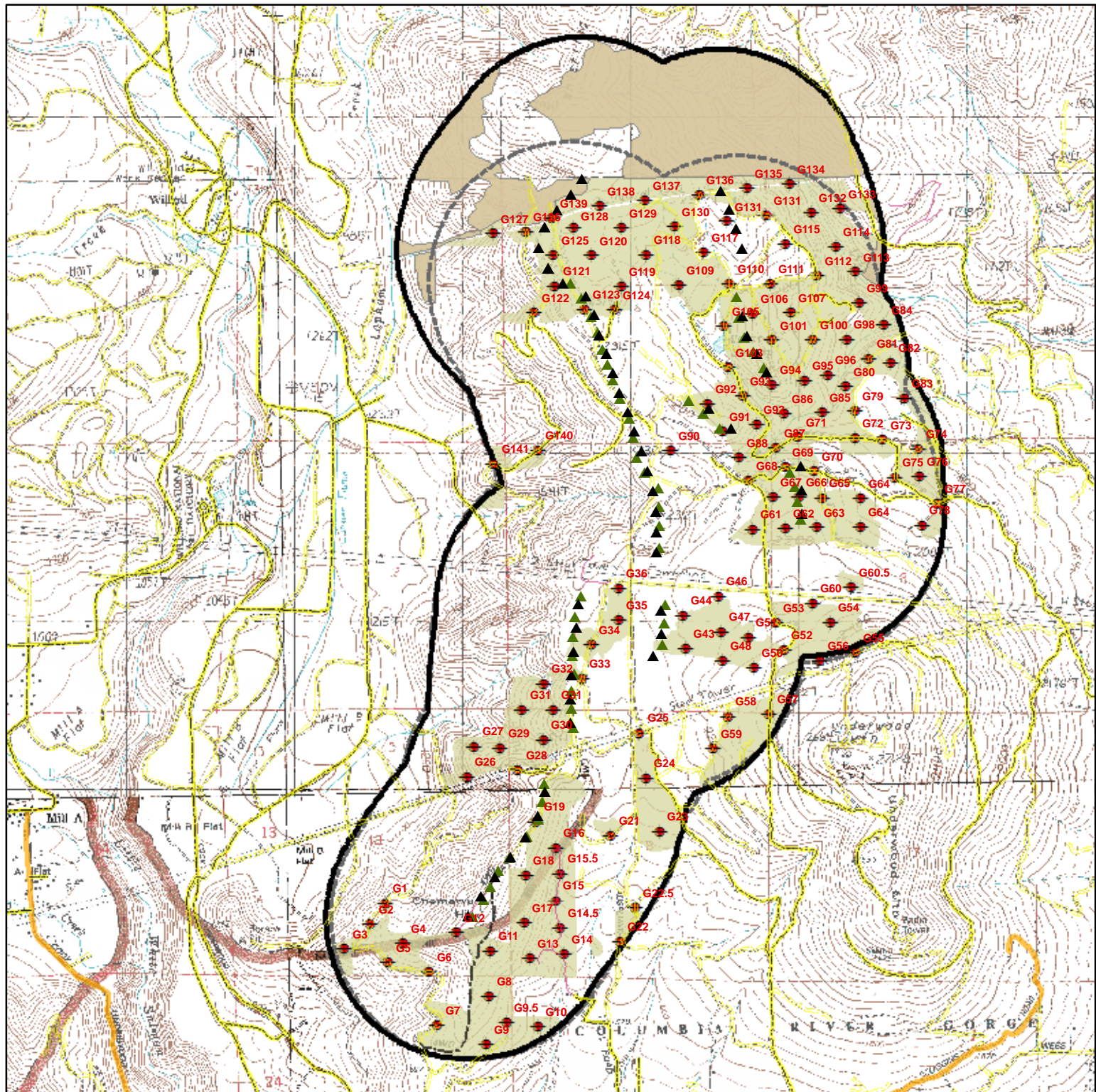
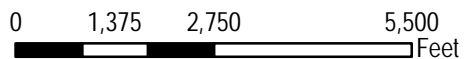
- ▲ Final Proposed Turbine Alignment  
▲ Original Proposed Turbine Alignment  
● Northern Goshawk Survey Points

**New Goshawk  
Survey Areas  
(not surveyed  
in 2008)**

## Original Goshawk Survey Areas

## Roads

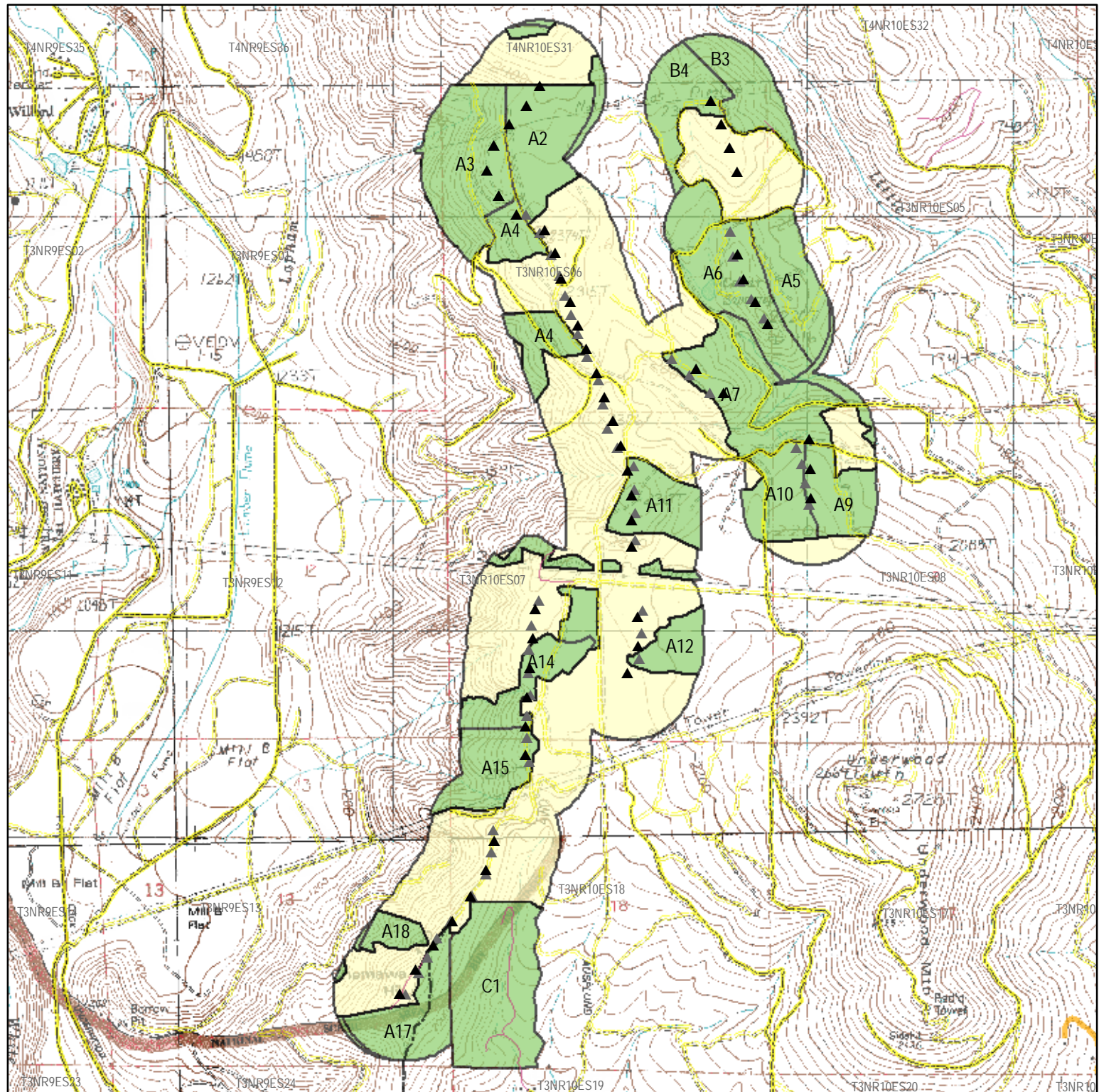
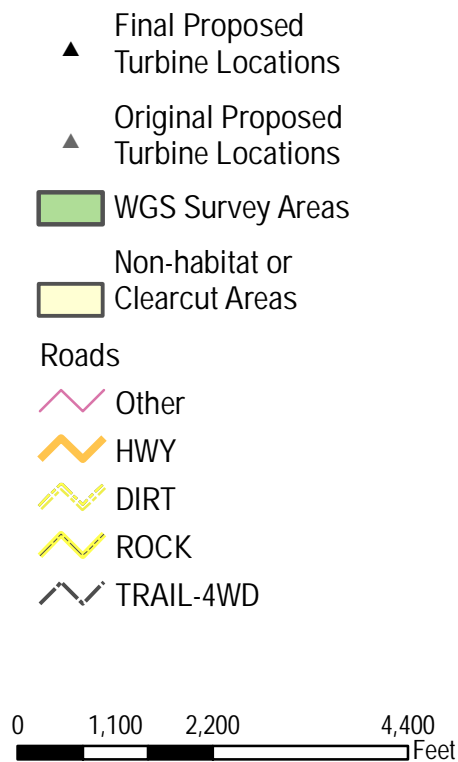
-  Other
-  HWY
-  DIRT
-  ROCK
-  TRAIL-4WD





# Saddleback Mt. Project Area

## 2008 Western Gray Squirrel Survey Areas Overview Map



## APPENDIX B - NSO SURVEY FORMS





Page 1 of 1 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 1

Crew: DANA N. McCoskey

Month: 05 Day: 21, 2008

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SIDS LUMBER

Owl Site(s): \_\_\_\_\_

Visit # 1

Project Area: Saddleback Mt. Project

Crew: DANA N. McLOSKEY

Month: 05 Day: 22, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
14		2031	2041	3	CL	N														
64		2048	2058	3	CL	N														
63		2101	2111	3	CL	N														
66		2112	2122	3	CL	N														
62		2124	2134	3	CL	N														
47		2137	2147	3	CL	N														
48		2152	2202	3	CL	N														
41		2205	2215	3	CL	N														
40		2217	2227	3	CL	N														
35		2231	2241	3	CL	N														
39		2245	2255	3	CL	N														
71		2321	2331	3	CL	N														
13		2333	2343	3	CL	N														
67		2347	2357	3	CL	N														
68		2359	0009	3	PC	N														
58		0012	0022	2	PC	N														
50		0026	0036	0	DR	N														
23		0049	0059	0	DR	N														
70		0102	0112	0	DR	N														
18		0123	0133	0	DR	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species: Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

## Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit #        /       

Crew: DANA N. McCoskey

Month: 05 Day: 22, 2008

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

## Page 1 of 1 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 1

Crew: D. SAHL

Month: 05 Day: 24, 2008

Block/Area ID: \_\_\_\_\_

**Wind Codes:** 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

[illegible]

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments: 43, short Hike due to Ruts / would be Accessible by ATV.

Comments: 43, short Hike due to Ruts/ would be Accessible by ATV.  
45: Bird Come in silent and flew off and disappeared for ~ 5min. then Returned + vocalized, Bird that returned may have been a different bird due to inability to sex bird before it disappeared.

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SDS LUMBER

Owl Site(s): \_\_\_\_\_

Visit # 1

Project Area: Saddleback Mt. Project

Crew: D. SAHL

Month: 05 Day: 25, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: 22A11

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End	Code	Code						Initial	Final			Town	Range	Sect	%		
49		2010	2020	Ø	PC	N														
60		2023	2033	Ø	PC	N														
59		2039	2049	Ø	PC	N														
69		2109	2119	2	PC	N														
10		2141	2151	2	PC	N														
11		2155	2205	2	PC	N														
16		2210	2220	Ø	PC	N														
12		2223	2233	Ø	PC	N														
9		2242	2252	Ø	PC	N														
57		2322	2332	Ø	PC	N														
74		2354	0009	Ø	PC	B	M	A	STVA	A/B	0003	0009	360	20	4N	9E	23	SW		
74		2354	0009	Ø	PC	B	F	A	STVA	A/B	0006	0009	360	20	4N	9E	23	SW		
86		0024	0034	Ø	PC	B	M	A	STVA	A/B	0031	0034	20	10	4N	9E	24	SW		
86		0024	0034	Ø	PC	B	F	A	STVA	B	0030	0034	20	10	4N	9E	24	SW		
76		0100	0110	Ø	PC	N														
75		0125	0135	Ø	PC	N														
54		0138	0148	Ø	PC	N														
85		0151	0201	1	DR	N														
56		0208	0218	1	DR	N														
52		0223	0233	1	DR	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments: 74: Birds appear to be apart, very vocal + agitated  
86: Likely same birds as #74



## Page 2 of 2 (including maps)

Visit # 1

Month: 05 Day: 25, 2008

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

## Page 1 of 1 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # /

Crew: D. SAHL

Month: 05 Day: 26, 2008

Block/Area ID: \_\_\_\_\_

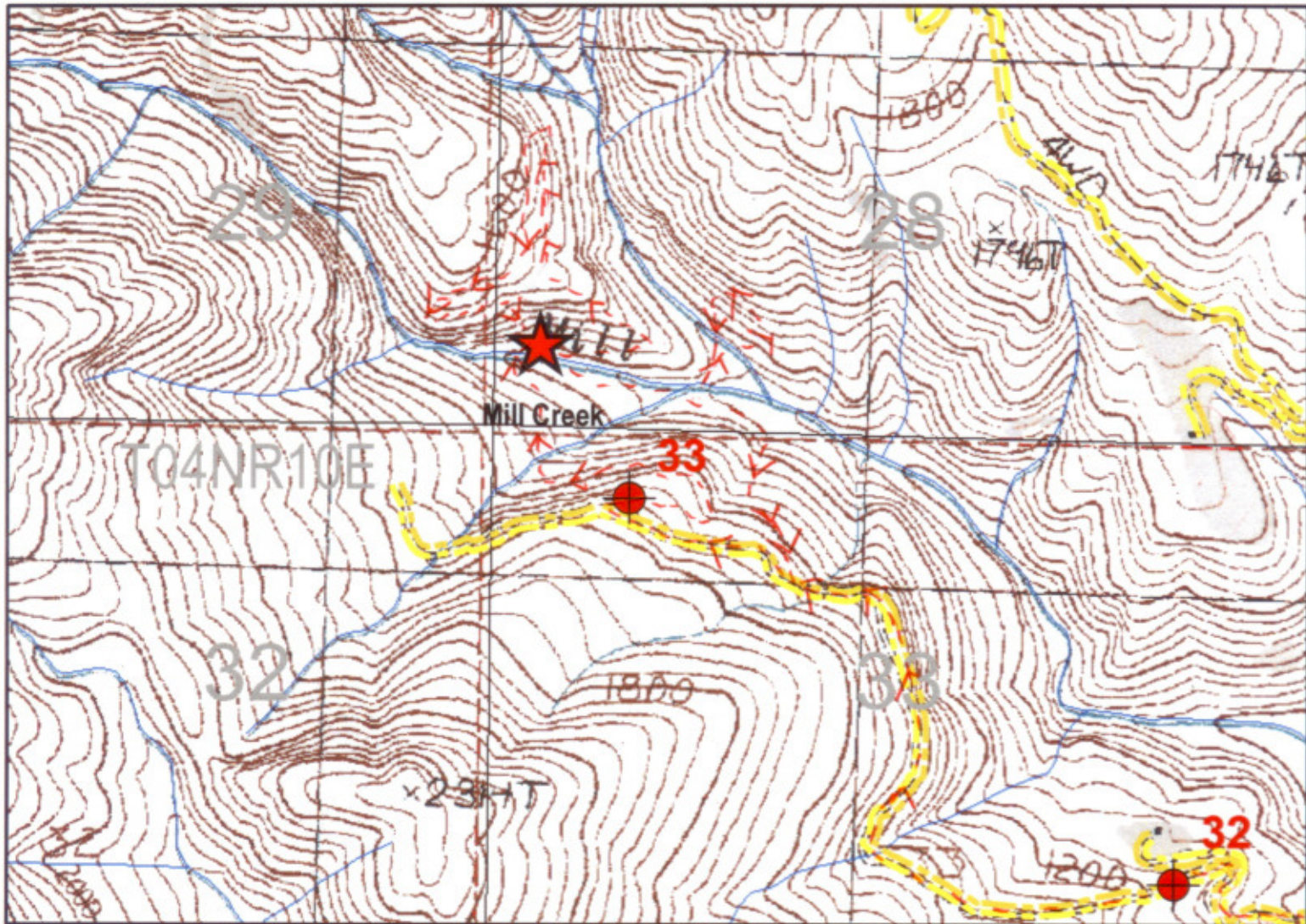
**Wind Codes:** 0 = Calm (<1 mph) 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments: STA. 33/32 Requires Hiking Due to Decom. Road (Road is Accessible by ATV).  
390: R/R to 390 MAY need more clearing due to some hanging small DBH TREES.





TWN: 4W RNG: WE Sec: 26 1/4 Sec: — 1/16 Sec: — Date: 5/24/2006 Obs: D. SAHL  
 Resp T: — Start T: 1335 End T: 1623 Wind: 0 Weather: PL Time(D/N): D Visit Type: α Resp Type: N

# Mice out: — # Mice taken: —  
 # Adults/Sub: Males (spp.): — Females (spp.): — Pair Status: — Sex Unk: — # Juveniles: —  
 # Fledglings: — Nest: Status — Nest Loc — Num —

Male: Obs Type: — Age: — Tip Color: — Tip Shape: —  
 USFWS #: — Leg(R/L): — Weights: —  
 Color Band - Primary Color: — Leg (R/L): — Pat: — Sec. Color: — Tab: —

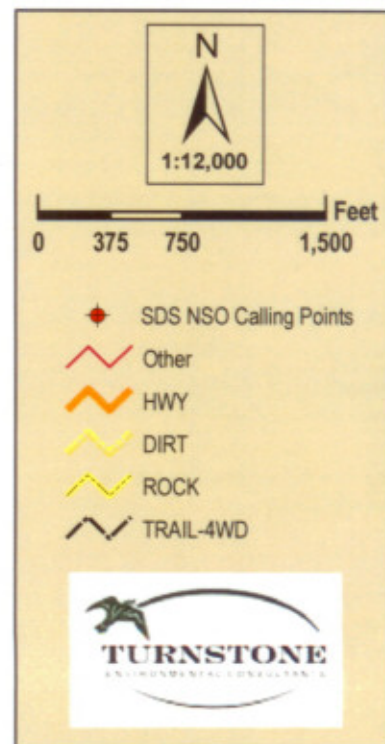
Female: Obs Type: — Age: — Tip Color: — Tip Shape: —  
 USFWS #: — Leg(R/L): — Weights: —  
 Color Band - Primary Color: — Leg (R/L): — Pat: — Sec. Color: — Tab: —

Y1: Obs Type: — Age: — Tip Color: — Tip Shape: —  
 USFWS #: — Leg(R/L): — Weights: —  
 Color Band - Primary Color: — Leg (R/L): — Pat: — Sec. Color: — Tab: —

Y2: Obs Type: — Age: — Tip Color: — Tip Shape: —  
 USFWS #: — Leg(R/L): — Weights: —  
 Color Band - Primary Color: — Leg (R/L): — Pat: — Sec. Color: — Tab: —

Observation Location UTM (nad83) Xcoord: — Ycoord: —

Please Provide Notes & Description of Events on Reverse





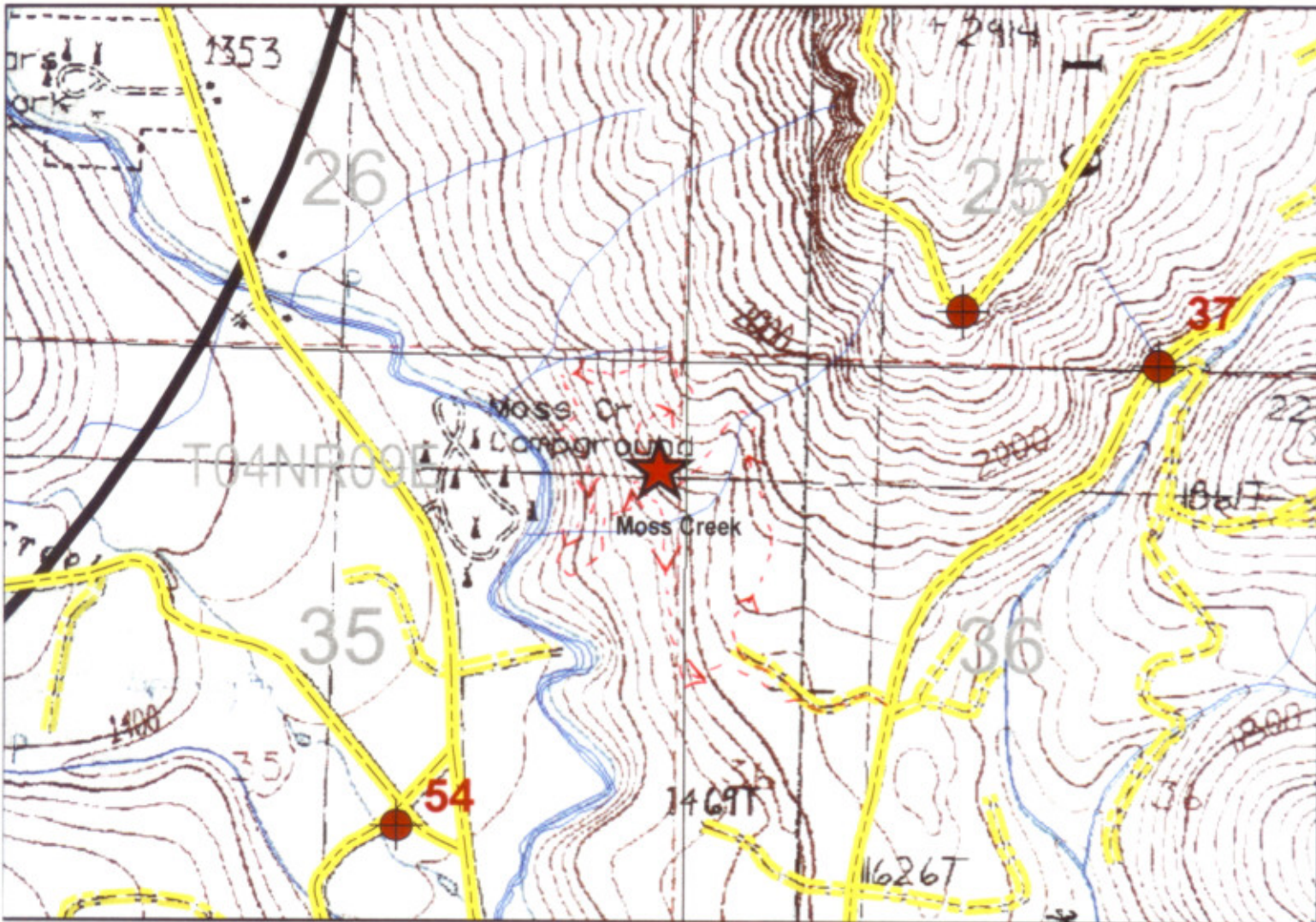
From field notes:

5/24/2008 Mill Creek NSO core Observer D. Sahl

1335: started hike into historic Mill creek core down overgrown SDS road. Road becomes undriveable quickly. Would be able to travel with 4 wheeler. Started broadcast calling with PA from the beginning of hike.

1427: dropped of roadbed to meander towards old nest tree/nest tree area. Meandered around stand looking for quality nesting habitat. Found several possible nest trees (large snags), cavities, continued to broadcast with PA and hoot flute, no NSO response.

1623: returned to trailhead (start of old road), no response from any species of owl.



TWN: 4D RNG: 9E Sec: 35 1/4 Sec:    1/16 Sec:    Date: 5/25/2006 Obs: D. SAHL  
 Resp T:    Start T: 1230 End T: 1450 Wind: 1 Weather: CL Time(D/N): D Visit Type: OC Resp Type: N

# Mice out:    # Mice taken:     
 # Adults/Sub: Males (spp.):    Females (spp.):    Pair Status:    Sex Unk:    # Juveniles:     
 # Fledglings:    Nest: Status    Nest Loc    Num   

Male: Obs Type:    Age:    Tip Color:    Tip Shape:     
 JSFWS #:    Leg(R/L):    Weights:     
 Color Band - Primary Color:    Leg (R/L):    Pat:    Sec. Color:    Tab:   

Female: Obs Type:    Age:    Tip Color:    Tip Shape:     
 JSFWS #:    Leg(R/L):    Weights:     
 Color Band - Primary Color:    Leg (R/L):    Pat:    Sec. Color:    Tab:   

Y1: Obs Type:    Age:    Tip Color:    Tip Shape:     
 JSFWS #:    Leg(R/L):    Weights:     
 Color Band - Primary Color:    Leg (R/L):    Pat:    Sec. Color:    Tab:   

Y2: Obs Type:    Age:    Tip Color:    Tip Shape:     
 JSFWS #:    Leg(R/L):    Weights:     
 Color Band - Primary Color:    Leg (R/L):    Pat:    Sec. Color:    Tab:   

Observation Location UTM (nad83) Xcoord:    Ycoord:   

Please Provide Notes & Description of Events on Reverse

SEE COMMENTS ON REVERSE

1:12,000

0 360 720 1,440 Feet

- ◆ SDS NSO Calling Points
- ~ Other
- ~ HWY
- ~ DIRT
- ~ ROCK
- ~ TRAIL-4WD
- Route HIKED

**TURNSTONE**



From field notes:

5/25/2008 Moss Creek NSO core Observer D. Sahl

1230: started hike into historic Moss Creek core down overgrown road off of the mainline road. Was broadcasting with a PA while hiking in a meandering fashion looking for potential NSO nesting habitat/structures Little nesting habitat until you get near the historic nest tree area. Several nice large trees and one great broken topped remnant that may have been an old nest tree. Should be noted that a USFS campground is just downslope and on the other side of the creek from the historic nest tree area. Campground had campers in it at the time of the survey.

1435: PA battery died

1450: returned to trailhead (start of old road), no response from any species of owls.

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SPS Lumber

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: Saddleback Mt. Project

Crew: D. SAHL

Month: 06 Day: 10, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph),

3 = Gentle breeze (8-12 mph),

4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear, FG = Fog,

PC = Partly Cloudy,

OC = Overcast,

DR = Drizzle,

RN = Rain, SN = Snow

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final			Town	Range	Sect	%		
56	N	2005	2021	1	OC	B	U*	A	STVA	W	2008	2021	360	20	4N	9E	24	SW		
74		2036	2046	0	OC	B	U*	A	STVA	W	2041	2046	220	40	4N	9E	23	SW		
54		2055	2105	0	OC	N														
75		2109	2119	1	OC	N														
76		2120	2130	1	OC	N														
77		2133	2143	1	OC	N														
85		2148	2158	2	OC	N														
55		2205	2215	3	OC	N														
56		2219	2229	1	OC	N														
89		2233	2243	2	OC	N														
57		2255	2305	1	OC	N														
52		2311	2321	0	OC	N														
38		2340	2350	1	OC	N														
37		2354	0004	1	OC	N														
36		0007	0017	3	OC	N														
28		0022	0032	3	OC	N														
72		0036	0046	2	OC	N														
83		0051	0101	3	OC															

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-Strix owls

Comments: unk bird 32  
\* 86/71 Likely Female/whistle only/ Probably some birds @ both sites (likely a STVA pair)  
\* 55 is in a large clearcut / little to no habitat near station.

## Page 2 of 2 (including maps)

Visit # 2

Month: 06 Day: 10, 2008

Block/Area ID: \_\_\_\_\_

4+ =Unsuitable (13+ mph)

RN = Rain, SN = Snow

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments:



# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SDS LUMBER

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: SADDLEBACK Mt. Project

Crew: D. SAHL

Month: 06 Day: 11, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),  
Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy,

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph), 4+ = Unsuitable (13+ mph)  
OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
21		2040	2050	2-3	PL	N														
22		2052	2102	2	PL	N														
19		2108	2116	1	PL	N														
6		2123	2133	1	PL	N														
5		2139	2149	2-4	PL	N														
3		2206	2216	1	PL	N														
47		2219	2229	2	PL	N														
4		2231	2241	1	PL	N														
2		2243	2253	2	PL	N														
9		2303	2313	2-3	PL	N														
70		2316	2326	1-2	PL	N														
23		2332	2342	1	PL	N														
19		2353	0003	3	PL	N														
7		0014	0024	3-	PL	N														
16		0105	0115	3	PL	N														
69		0124	0134	2	PL	N														
110		0137	0147	1	CL	N														
11		0150	0200	3	CL	N														
10		0204	0214	3-4	CL	N														
12		0222	0232	2	CL	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments: #21 poor habitat / power line Row  
#7 poor habitat / Entire ridge has been clearcut / very windy  
\* Wind was gusty at times but not usually sustained at over a minute code of 3



# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SJS LUMBER

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: SADDLE BACK MT. PROJECT

Crew: J. SAHL

Month: 06 Day: 15, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph),

3 = Gentle breeze (8-12 mph),

4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear, FG = Fog,

PC = Partly Cloudy,

OC = Overcast,

DR = Drizzle,

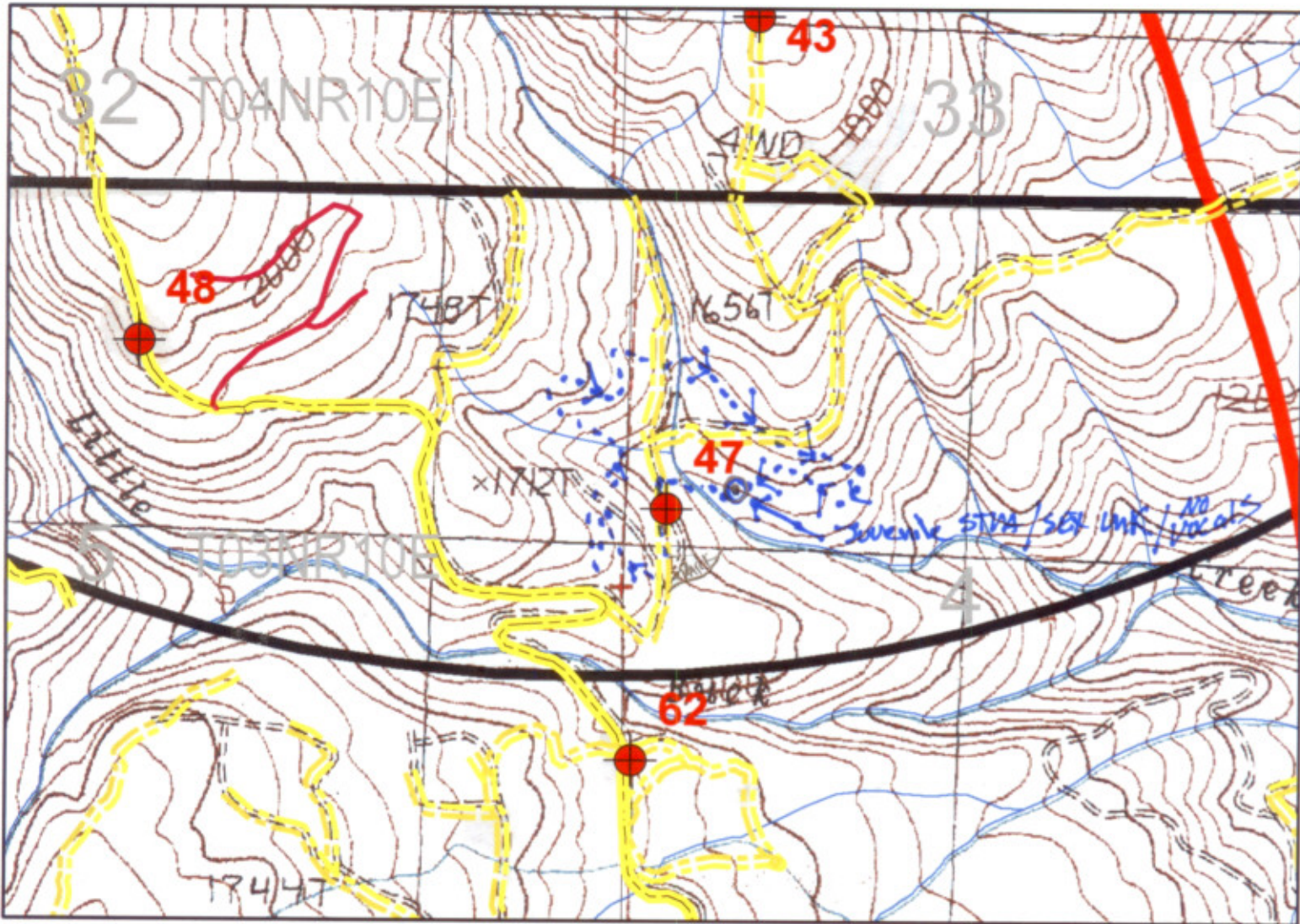
RN = Rain, SN = Snow

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	%		
14		2100	2110	1	CL	N														
63		2114	2124	0	CL	N														
66		2128	2136	1	CL	N														
62		2143	2153	1	CL	N														
47		2200	2215	1	CL	A	U	J	UNK	JB	2203	2215	270	150	3N	10E	4	NW		
48.5		2223	2233	2	CL	N														
48		2236	2246	3	CL	N														
41		2250	2300	3	CL	N														
40		2303	2313	2	CL	N														
34		2309	2319	2	CL	N														
35	Y	2336	2346	2	CL	N														
39		0004	0014	3	CL	N														
71		0032	0044	1	CL	N														
13		0050	0100	2	CL	N														
67		0109	0119	2	CL	N														
60		0123	0133	2-3	CL	N														
46		0201	0211	3	CL	N														
51		0226	0236	3	CL	N														
8		0303	0313	3+	CL	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species: Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-Strix owls

Comments: Almost a full moon on a clear night / Great SJS Conditions  
 47: Begging Juv./Unknown spp. / could not locate in dark / sounded stationary / may not have fledged yet / will  
 return tomorrow during daylight and attempt to relocate and ID. (STVA Juvenile contact on 6/16)  
 48.5: Extra sta. Due to fly over over of large Bird while driving lay, no response / likely same Bird as #47,  
 likely a juvenile of some spp.





TWN: 3N RNG: 10E Sec: 4 1/4 Sec: NW 1/16 Sec: SW Date: 06/16/09 Obs: D. SAHL  
 Resp T: 1910 Start T: 1635 End T: 1830 Wind: 1 Weather: CL Time(D/N): D Visit Type: Follow-up Resp Type: B

# Mice out: 0 # Mice taken: 1  
 # Adults/Sub: Males (spp.): \_\_\_\_\_ Females (spp.): \_\_\_\_\_ Pair Status: \_\_\_\_\_ Sex Unk: \_\_\_\_\_ # Juveniles: 1  
 # Fledglings: \_\_\_\_\_ Nest: Status \_\_\_\_\_ Nest Loc \_\_\_\_\_ Num \_\_\_\_\_ STVA

Male: Obs Type: \_\_\_\_\_ Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_  
 USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
 Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_ Tab: \_\_\_\_\_

Female: Obs Type: \_\_\_\_\_ Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_  
 USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
 Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_ Tab: \_\_\_\_\_

Y1: Obs Type: B Age: ? Tip Color: \_\_\_\_\_ Tip Shape: SQUARE  
 USFWS #: NO BAND Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
 Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_ Tab: \_\_\_\_\_

Y2: Obs Type: \_\_\_\_\_ Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_  
 USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
 Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_ Tab: \_\_\_\_\_

Observation Location UTM (nad83) Xcoord: 611440 Ycoord: 507021

Please Provide Notes & Description of Events on Reverse

1:12,000

- ◆ SDS NSO Calling Points
- ~ Other
- ~ HWY
- ~ DIRT
- ~ ROCK
- ~ TRAIL-4WD

**TURNSTONE**  
 ENVIRONMENTAL CONNECTION



6/16/2008 Day follow-up of CNK Juvenile DGS  
@ Station # 47

1635 Went back to Sta # 47 and Hiked around stand  
Broadcasting + observing in area that CNK. Juvenile was  
heard begging the night before.

1910 Located Juvenile STUA, Bird was very skittish and  
would not vocalize. Bird would fly from tree to tree  
when I would approach. Followed the Bird around  
for ~ 20 minutes Continue to broadcast and attempt to  
look for a leg band or another STUA or other STRIX.

1930 Left Site, Young STUA was a very Good flier and Can  
likely hunt on it's own. Unable to Determine Sex of bird  
due to it not vocalizing at all. No Bands observed.  
Pair of adult STUA'S have been observed/documentated  
~ 9.5 miles to the NE of where this Juvenile  
STUA was observed.

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SDS Lumber

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: Saddle back Mt. Project

Crew: D. SAHL

Month: 06 Day: 16, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuited (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	%	NAD83-GPS data only	
32	X	2005	2015	Ø	CL	N														
33	AW	2055	2105	Ø	CL	N														
44	ATV	2115	2135	Ø	CL	B	U	A	STVA	A/CO*	2124	2124	350	40	4N	10E	33	SE		
45	ATV	2137	2155	Ø	CL	A	U	A	STVA	A/Ø	2133	2133	070	200	4N	10E	33	SE		
43	ATV	2206	2216	Ø	CL	N														
47		2225	2235	Ø	CL	N														
59		2301	2311	2	CL	N														
60		2314	2324	2	CL	N														
49		2330	2340	2	CL	N														
50		0011	0021	3	CL	N														
59		0033	0043	3	CL	N														
81		0136	0146	2	CL	N														
30		0152	0202	3	CL	N														
24		0205	0215	2	CL	N														
80		0225	0235	2-3	CL	N														
25		0241	0251	3+	CL	N														
82		0311	0321	1	CL	N														
31		0342	0352	1	CL	N														
83		0402	0412	Ø	CL	N														
88		0414	0424	Ø	CL	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species: Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments: 44: only got 2 brief agitated screams then a STVA FLEW thru and down Road/Unable to Relocate or get the bird to Respond again.  
45: Likely the same bird as # 44/to brief to get a positive determination on sex of Bird.  
80: Bobcat observed on RD. Just before Sta. # 80  
83/88/84: CREEK IS fairly loud by these Pts.



## Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 2

Crew: V. SAHL

Month: 06 Day: 16, 2008

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

Page    of    (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 3

Crew: DANA N. MCCOSKEY

Month: 07 Day: 27, 2008

Block/Area ID:

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph).

4+ =Unsuitable (13+ mph)

PC = Partly Cloudy.

OC = Overcast.

DR = Drizzle.

RN = Rain, SN = Snow

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments:

⑩ 10 = called at gate

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SDS COMBER

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: Saddleback Mt. Project

Crew: DANA MCCOSKEY

Month: 07 Day: 28, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph),

4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear, FG = Fog,

PC = Partly Cloudy,

OC = Overcast,

DR = Drizzle,

RN = Rain, SN = Snow

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End	Code	Code						Initial	Final			Town	Range	Sect	1/4		
31		2011	2021	1	CL	N														
82		2032	2042	0	CL	A	M	A	STVA	8	2041	2042	110	600						
81		2054	2104	0	CL	N														
30		2112	2122	1	CL	N														
24		2128	2138	1	CL	N														
80		2148	2158	2	CL	N														
25		2207	2217	1	CL	N														
79		2227	2237	0	CL	N														
78		2252	2302	3	CL	N														
26		2314	2324	2	CL	N														
27		2327	2337	0	CL	N														
73		2341	2351	1	CL	N														
72		2354	0004	2	CL	N														
28		0006	0016	2	CL	N														
36		0020	0030	2	CL	N														
1:37		0031	0041	2	CL	N														
52		0052	0102	1	CL	N														
51		0108	0118	0	CL	N														
56		0122	0132	1	CL	N														
46		0143	0153	0	CL	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SDS LUMBER

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: Saddleback Mt. Project

Crew: DANA N. MCCOSKEY

Month: 07 Day: 29, 2008

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph),

4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear, FG = Fog,

PC = Partly Cloudy,

OC = Overcast,

DR = Drizzle,

RN = Rain, SN = Snow

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
38	X	2002	2012	1	OC	N														
74		2047	2057	1	OC	N														
86		2105	2115	1	RN	N														
85		2127	2137	1	DR	N														
54		2140	2150	1	DR	N														
75		2156	2206	1	DR	N														
76		2207	2217	1	DR	N														
77		2223	2233	1	RN	N														
*55		2241	2251	2	DR	N														
57		2256	2306	1	DR	N														
87		2311	2321	1	RN	N														
4		2323	2333	1	DR	N														
2		2336	2346	1	RN	N														
70		2350	0000	1	DR	N														
12		0003	0013	1	RN	N														
16		0014	0024	1	RN	N														
11	X	0028	0038	2	DR	N														
69		0043	0053	1	DR	N														
68		0056	0106	1	OC	N														
23		0109	0119	1	DR	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-Strix owls

Comments:

\*55 = called on main road (not private drive)

\*38 = old nest core hike



## Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 3

Crew: DANA N. MCCOSKEY

Month: 07 Day: 29, 2008

Block/Area ID: \_\_\_\_\_

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph).

4+ =Unsuitable (13+ mph)

PC = Partly Cloudy.

OC = Overcast.

DR = Drizzle.

RN = Rain, SN = Snow

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SDS Lumber

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: Saddleback Mt. Project

Crew: DANA N. MCCOY

Month: 07 Day: 30, 2008

Tape ☒ Voice ☐ Flute ☐ Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph),

4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear, FG = Fog,

PC = Partly Cloudy,

OC = Overcast,

DR = Drizzle,

RN = Rain, SN = Snow

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
33	X	2001	2011	0	CL	N														
32	X	2032	2042	0	CL	N														
44		2051	2101	0	CL	N														
45		2106	2116	0	CL	N														
43		2135	2145	0	CL	N														
84		2218	2228	1	CL	N														
88		2231	2241	0	CL	N														
83		2242	2252	0	CL	N														
71		2313	2323	1	CL	N														
13		2327	2337	0	CL	N														
67		2343	2353	2	CL	N														
49		0004	0014	2	CL	N														
59		0016	0026	2	CL	N														
60		0034	0044	2	CL	N														
58		0055	0105	2	CL	N														
50	X	0111	0121	2	CL	N														
17		0153	0203	1	CL	N														
6		0206	0216	1	CL	N														
7		0220	0230	1	CL	N														
5		0233	0243	1	CL	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments:

Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 3

Crew: DANA N. MCCOSKEY

Month: 07 Day: 30, 2008

~~Tape~~ ~~Voice~~ ~~Flute~~ Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

**Wind Codes:** 0 = Calm (<1 mph), 1 = Light air (1-3 mph),

2 = Light breeze (4-7 mph).

3 = Gentle breeze (8-12 mph).

4+ =Unsuitable (13+ mph)

**Weather Codes:** CL = Clear, FG = Fog,

PC = Partly Cloudy.

OC = Overcast.

DR = Drizzle.

RN = Rain, SN = Snow

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-*Strix* owls

Comments:

## **APPENDIX C - NORTHERN GOSHAWK SURVEY FORMS**





Month: June Day: 23, 2008 Visit #

%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

(ph)

RN = Rain. SN = Snow

[illegible]

**Det\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format

Comments:

Period: Nestling / Fledgling

**Calls Used:** Alarm / Wail / Begging

Survey Year: 1<sup>st</sup> 2<sup>nd</sup>

Survey Time: Start 0253 End 1604  
Intensive Nest Search Time: Start -- End --  
Temperature (°F): Begin 55 End 80

Turnstone Environmental Consultants  
Goshawk Survey Form

Page / of / (including maps)

Survey Area/Project Area: SDS / Hood River Crew: WLB Month: June Day: 24, 2008 Visit # 1

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes: 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection	Detection		Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY	
		Begin	End					Code	Location			Code	Location			Initial	Final	Town			Range
	61	0753	0757	2	CL	0															
	62	0804	0808	2	CL	0															
	63	0817	0821	2	CL	0															
	64	0828	0832	2	CL	0															
	65	0857	0901	2	CL	0															
	66	0914	0918	2	CL	0															
	67	0928	0932	2	CL	0															
	68	1023	1027	2	CL	0															
	69	1038	1042	2	CL	0															
	695	1055	1059	2	CL	0															
12-8-12	636	1115	1120	3	CL	0				U	A	RTHA	1115	1140	56	150m	3N	9E	7	SW	5m N of 638
	637	1156	1200	2	CL	0															
	638	1219	1223	2	CL	0															
	683	1228	1242	2	CL	0															
	631	1300	1304	2	CL	0															
	634	1327	1331	2	CL	0															
	627	1345	1349	1	CL	10															
	626	1407	1411	3	CL	10															
	628	1426	1430	2	CL	5															
	625	1526	1530	3	CL	5															
	621	1600	1604	2	CL	0															

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.

Comments:

Period: Nestling / Fledgling Calls Used: Alarm / Wail / Begging

Survey Year: 13 2nd

Survey Time: Start 0601 End 1653  
Intensive Nest Search Time: Start — End —  
Temperature (°F): Begin 54 End 71

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Goshawk Survey Form

Page / of / (including maps)

Survey Area/Project Area: SDS / Head River

Crow: WLB

Month: June Day: 25, 2008 Visit # 1

Survey Method: (Broadcast Acoustical) Intensive Search, or Dawn Acoustical, Other:

Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes:

1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
CL = Clear, FG = Fog,

PC = Partly Cloudy, OC = Overcast,

DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind Code	Weather Code	Cloud Cover	Detection		Age	Species	Contact Time		Bearing (Azimuth)	Dist (meters)	Location			UTMX	UTMY
		Begin	End				Code	Location			Initial	Final			Town	Range	Sect		
	G22	0801	0805	1	PC	40													
	G22	0814	0818	1	CL	0													
	G21	0846	0850	1	CL	10													
	G23	0911	0915	1	CL	0													
	G19	0958	1002	1	CL	0													
	G13	1029	1033	3	PC	30													
	G11	1050	1054	1	CL	0													
	G8	1120	1134	1	CL	0													
	G8	1137	1141	1	CL	0													
	G10	1156	1200	1	CL	0													
	G9	1220	1224	1	CL	10													
	G18	1333	1337	2	PC	30													
	G16	1355	1359	3	PC	50													
	G15	1412	1416	2	PC	50													
	G15	1429	1433	3	PC	50													
	G14	1442	1446	3	PC	50													
	G14	1455	1459	2	PC	50													
	G13	1510	1514	2	PC	50													
	G17	1529	1533	2	PC	40													
	G61	1623	1627	3	PC	30													
	G67	1636	1640	4	CL	10													
	G68	1649	1653	4	CL	10													

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format

Comments:

Period: (Nesting) / Fledgling

Calls Used: (Alarm) / Wail / Begging

Survey Year: 1<sup>st</sup> 2<sup>nd</sup>

# Turnstone Environmental Consultants

## Goshawk Survey Form

Page 1 of 1 (including maps)

Survey Time: Start 0853 End 1634  
 Intensive Nest Search Time: Start --- End ---  
 Temperature (°F): Begin 52 End 68

Survey Area/Project Area: SOS / Head River Crew: WLB Month: June Day: 26, 2008 Visit # 1

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: --- Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes: 1 = Light breeze (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
 Weather Codes: CL = Clear, FG = Fog, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End				Code	Location			Initial	Final			Town	Range	Sect		
632	0853	1901	2	PC	50														
633	0914	0928	4	PC	60														
634	0918	0952	2	PC	60														
635	1209	1213	1	CL	10														
636	1033	1037	2	PC	40														
637	1058	1102	4	PC	40														
638	1115	1119	4	PC	60														
639	1155	1159	4	PC	80														
640	1239	1243	2	PC	80														
641	1301	1305	2	PC	70														
642	1317	1321	3	PC	70														
643	1335	1339	2	PC	80														
644	1347	1351	2	PC	70														
645	1405	1409	2	PC	40														
646	1424	1428	2	PC	50														
647	1442	1446	2	PC	60														
648	1501	1505	2	PC	90														
649	1513	1517	3	PC	90														
650	1529	1533	3	PC	90														
651	1541	1545	3	PC	90														
652	1550	1554	3	PC	90														
653	1601	1605	3	PC	90														
654	1610	1614	3	PC	90														
655	1620	1624	4	PC	90														
656	1630	1634	4	PC	90														

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.  
 Comments:

Period: Nesting / Fledgling / Alarm / Wail / Bagging

Survey Year: 15 2<sup>nd</sup>



# Turnstone Environmental Consultants

## Goshawk Survey Form

Page 1 of 1 (including maps)

Survey Time: Start 0700 End 1700  
 Intensive Nest Search Time: Start 0700 End 1700  
 Temperature (°F): Begin 63 End 80

Survey Area/Project Area: SOS / Head River Crew: WLB Month: June Day: 27, 2008 Visit # 1

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes: 1 = Light air (>1 mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
 Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End				Code	Location			Initial	Final			Town	Range	Sect		
	99	0740	0744	1	CL	1													
	98	0801	0805	1	CL	1													
	97	0821	0825	1	CL	1													
	96	0845	0849	1	CL	1													
	95	0905	0909	1	CL	1													
	94	0925	0929	1	CL	1													
	93	0943	0947	1	CL	1													
	92	1008	1012	1	CL	1													
	91	1034	1038	1	CL	1													
	90	1107	1111	2	CL	1													
	89	1118	1122	1	CL	1													
	88	1135	1139	1	CL	1													
	87	1206	1210	2	CL	1													
	86	1314	1318	2	CL	1													
	85	1321	1325	1	CL	1													
	84	1319	1323	2	CL	1													
	83	1345	1349	1	CL	1													
	82	1445	1449	1	CL	1													
	81	1506	1510	1	CL	1													
	80	1540	1544	2	CL	1													
	79	1554	1558	2	CL	1													
	78	1610	1614	2	CL	1													
	77	1622	1626	2	CL	1													
	76	1655	1659	2	CL	1													
	75	1705	1709	2	CL	1													

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.

Comments:

Period: Nesting / Fledging Calls Used: Alarm / Wail / Begging

Survey Year: 14 <sup>2nd</sup>

Cloud Cover (midpoint of survey): 1 = <5%; 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

**Wind Codes:** 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)

**Weather Codes:** CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

[illegible]

**Det\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format.

Comments:

Period: ~~Nesting~~ / Fledgling      Calls Used: ~~Alarm~~ / Wail / Begging

Survey Year:  2<sup>nd</sup>

Survey Time: Start 0900 End 1453

# Turnstone Environmental Consultants

Page 1 of 1 (including maps)

Intensive Nest Search Time: Start 0900 End 1453

## Goshawk Survey Form

Temperature (°F): Begin 72 End 84

Survey Area/Project Area: Hood River / SDS

Crew: W. Beard

Month: 17

Day: 16

Year: 2008

Visit # 1

Survey Method: Broadcast Acoustical, Intensive Search, or Dawn Acoustical, Other: Cloud Cover (midpoint of survey) (1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%)

Wind Codes:

1 = Light air (<1 mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)

Weather Codes:

CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det. ID	ST#	Sta. Time		Wind Code	Weather Code	Cloud Cover	Detection		Sex	Age	Species	Contact Time		Bearing (Azimuth)	Dist (meters)	Location			UTMX	UTMY
		Begin	End				Code	Location				Initial	Final			Town	Range	Sect		
920	0536	0900		2	CL	1														
921	0919	0923		2	CL	1														
924	0956	1000		2	CL	1														
919	1008	1012		3	CL	1														
920	1022	1026		2	CL	1														
923	1036	1040		2	CL	1														
939	1054	1058		2	CL	1														
925	1115	1119		1	CL	1														
926	1145	1149		2	CL	1														
927	1210	1214		2	CL	1			U	COHA		1154	1152	186	30	3N	10E	6	5070029	
928	1226	1230		3	CL	1														
929	1241	1245		3	CL	1														
923	1341	1345		3	CL	1														
940	1436	1440		2	CL	1														
941	1449	1453		3	CL	1														

Det. ID: unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.

Comments:

Period: Nesting / Fledgling Calls Used: Alarm Wail / Begging

Survey Year: 1st 2nd

Survey Area/Project Area: Head Kite / SDS Crew: W. Brand Month: 7 Day: 28, 2008 Visit # 112

Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%.

**Wind Codes:** 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)

**Weather Codes:** CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

**RN = Rain, SN = Snow**

[illegible]

**Det.\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format.

**Comments:**

Period: ~~Nesting~~ / ~~Fledging~~  
Calls Used: Alarm / ~~Wail~~ / ~~Begging~~

**Survey Year:** 1<sup>st</sup> 2<sup>nd</sup>



Survey Time: Start 1736 End 1739  
Intensive Nest Search Time: Start --- End ---  
Temperature (°F): Begin 64 End 62

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Goshawk Survey Form

Page 1 of 1 (including maps)

Survey Area/Project Area: Head River S.D.S. Crew: W. Beard Month: 7 Day: 30, 2008 Visit # 2

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: --- Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes: 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End				Code	Location			Initial	Final			Town	Range	Sect		
	556	1436	1440	3	CL	1													
	555	1449	1453	4	CL	1													
	554	1506	1510	3	CL	1													
	505	1518	1522	3	CL	1													
	502	1530	1534	4	CL	1													
	532	1544	1548	3	CL	1													
	538	1559	1603	2	CL	1													
	508	1620	1624	4	CL	1													
	511	1636	1640	2	CL	1													
	562	1648	1652	2	CL	1													
	563	1700	1704	2	CL	1													
	566	1712	1716	2	CL	1													
	567	1722	1726	2	CL	1													
0730201	569	1735	1739	2	CL	1			U A	RTTA	1724	1724	80	30	3N	10E	7	NE	5068154

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.

Comments:

Period: Nestling Fledgling Calls Used: Alarm Wail Begging ---

Survey Year: 1<sup>st</sup> 2<sup>nd</sup>

Survey Time: Start 0739 End 1407

Intensive Nest Search Time: Start      End       
Temperature (°F): Begin 50 End 74

# Turnstone Environmental Consultants

## Goshawk Survey Form

Page 1 of 1 (including maps)

Survey Area/Project Area: Head River / SPS

Crew: W. Beard

Month: 7

Day: 31, 2008

Visit # 12

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other     

Cloud Cover (midpoint of survey): (1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%)

Wind Codes:

1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
CL = Clear, FG = Fog,

PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det. ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Sex	Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End	Code	Code	Cover	Code	Location				Initial	Final	(Azimuth)	(meters)	Town	Range	Sect		
	679	0739	0743	1	CL	1														
	683	0801	0805	1	CL	1														
	682	0816	0820	1	CL	1														
	681	0829	0833	2	CL	1														
	684	0852	0856	1	CL	1														
	699	0914	0918	1	CL	1														
	698	0937	0941	1	CL	1														
	696	1002	1006	1	CL	1														
	695	1017	1021	1	CL	1														
07310801	694	1043	1047	3	CL	1			LA	U	TUUV	1018	1018	230	70	3N	10E	5	506045	506046
	686	1116	1119	1	CL	1														
	685	1126	1130	2	CL	1														
	680	1142	1146	2	CL	1														
	678	1212	1216	3	CL	1														
07310802				3	CL	1			U	U	TUUV	1213	1213	240	100	3N	10E	8	506045	506048
	677	1216	1230	3	CL	1														
	676	1240	1244	2	CL	1														
	674	1251	1256	3	CL	1														
	675	1307	1311	3	CL	1														
	670	1324	1328	2	CL	1														
	665	1333	1337	2	CL	1														
	664	1351	1355	2	CL	1														
	664	1403	1407	2	CL	1														

Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format

Comments:

Period: Nesting ☒ Fledgling ☐ Alarm ☐ Mail ☐ Begging ☐

Survey Year: 2008

Survey Area/Project Area: Hood River SPS Crew: W. Beard Month: 8 Day: 1 2008 Visit # 2

Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

**Wind Codes:** 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)

**Weather Codes:** CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

**RN = Rain, SN = Snow**

[illegible]

**Det.\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format.

**Comments:**

Period: Nestling / ~~Feeding~~ / ~~Wait~~ / Begging

Survey Year:  1<sup>st</sup> 2<sup>nd</sup>

# Turnstone Environmental Consultants

## Goshawk Survey Form

Survey Time: Start 0920 End 1735  
 Intensive Nest Search Time: Start - End -  
 Temperature (°F): Begin 68 End 87

Survey Area/Project Area: Head River / SDS Crew: W. Beard Month: 8 Day: 4, 2008 Visit # 2

Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: - Cloud Cover (midpoint of survey): 1 = <5% 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Wind Codes: 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
 Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Sex	Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End	Code	Code	Cover	Code	Location				Initial	Final			Town	Range	Sect		
	685	0920	0924	1	CL	1														
	626	0946	0950	1	CL	1														
	627	1002	1006	1	CL	1														
	629	1017	1021	1	CL	1														
	631	1037	1041	1	CL	1														
	632	1054	1059	1	CL	1														
	631	1113	1117	1	CL	1														
	630	1127	1131	1	CL	1														
	630	1230	1234	2	CL	1														
	621	1248	1252	2	CL	1														
	623	1307	1309	2	CL	1														
	625	1317	1331	1	CL	1														
	622	1338	1342	1	CL	1														
0804 0601	657	1428	1432	2	CL	1			11	A	RTM	1410	1410	350	100	3N	9E	18	NW	0609 0977
	658	1443	1447	2	CL	1														
	659	1455	1459	2	CL	1														
	63	1555	1559	2	CL	1														
	64	1619	1623	1	CL	1														
	65	1643	1647	2	CL	1														
	66	1647	1651	2	CL	1														
	67	1658	1702	2	CL	1														
	62	1721	1725	2	CL	1														
	61	1731	1735	2	CL	1														

Det\_ID: unique detection identifier; date and sequential det. # for the day. (061208-1, 061208-2, ect) Time: Military format  
 Comments:

Period: Nesting (Fledgling) Call Used: Alarm (Wah) Begging (Begging)

Survey Year: 15 2<sup>nd</sup>



Survey Time: Start 0858 End 1722

Turnstone Environmental Consultants

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Intensive Nest Search Time: Start 0858 End 1722  
Temperature (°F): Begin 76 End 86

Goshawk Survey Form

Survey Area/Project Area: Hood River 1505

Crew: W. Beard

Month: 8 Day: 5, 2008 Visit # 2

Survey Method: (Broadcast Acoustical) Intensive Search, or Dawn Acoustical, Other: Cloud Cover (midpoint of survey): 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

Wind Codes:

1 = Light air (<1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)  
CL = Clear, FG = Fog,

Weather Codes:

PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

Det_ID	ST#	Sta. Time		Wind	Weather	Cloud	Detection		Age	Species	Contact Time		Bearing	Dist	Location			UTMX	UTMY
		Begin	End				Code	Location			Initial	Final			Town	Range	Sect		
	519	0858	0902	3	CL	1													
	518	0920	0924	1	CL	1													
	516	0937	0941	2	CL	1													
	515	0950	0954	1	CL	1													
	515	1004	1008	1	CL	1													
	515	1018	1022	1	CL	1													
	514	1037	1041	1	CL	1													
	513	1050	1056	1	CL	1													
	517	1111	1115	2	CL	1													
	511	1132	1137	2	CL	1													
	518	1151	1155	2	CL	1													
	515	1205	1209	2	CL	1													
	510	1220	1224	2	CL	1													
	519	1240	1246	2	CL	1													
	510			2	CL	1			U 11	SSHA	1259	1259	300	110	9E	13	SE	0609934	5065919
	510	1333	1337	1	CL	1			U 11	TUVU	1404	1404	60	200	3N	10E	NW	0609901	5066517
	511	1448	1452	1	CL	1													
	512	1501	1505	1	CL	1													
	515	1518	1522	2	CL	1													
	510	1522	1537	2	CL	1													
	507	1550	1554	1	CL	1													
	501	1604	1608	1	CL	1													
	506	1610	1614	1	CL	1													
	505	1629	1643	1	CL	1													

Det\_ID: unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format  
Comments:

6105 1646 1650 1654

Period: Nesting (Flocking)

Call Used: Alarm (Wing Clapping)

Survey Year: 2008

Survey Area/Project Area: Hardyville SAS Crew: W. Board Month: 8 Day: 6, 2008 Visit # 2

**Cloud Cover (midpoint of survey):** 1 = <5%, 2 = 5-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

**Wind Codes:** 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (>12 mph)

**Weather Codes:** CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

[illegible]

**Det.\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format

**Comments:**

Period: Nesting / ~~Predating~~  
Calls Used: Alarm / ~~Wail~~ / ~~Begging~~

Survey Year:  2<sup>nd</sup>

Page    of    (including maps)Page    of    (including maps)

2, 2008 Visit # 2

%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Rain, SN = Snow

[illegible]

Cells Used: A1229 / WEHI 231 B220.10

## Appendix D - Western Gray Squirrel Survey Forms





## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A1, A3, A7 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 5,6,7,8 County: Skamania  
T 4N R 10E S 31 County: Skamania

Date(s) Surveyed: 10/14/2008

Start/Stop time(s): 0847-Start/1635-Stop

Surveyor Names and Affiliations: Devin Sahl (TECI)

### Contact Name, Address, & Phone:

TECI  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

All polygons surveyed were composed of mixed conifer/hardwoods, primarily PSME with some scattered THPL/TSHE. The majority of the overstory PSME appears to be >25 years of age, with some scattered remnant PSME >70 years. A few small patches of Quercus SPP (likely Quercus Garryana), were observed within the boundaries of the A3 polygon. The trees were not > than 15ft. in height and growing in a few steep, rocky, open areas with a westerly aspect. In Polygons A3 and A7 there were numerous ACMA present, especially towards the toe of the slope. Slopes within the polygon boundaries vary between ~0% to 85%. The aspect of each polygon also varies. The A1 polygon has a southern aspect, A3 has a predominantly western aspect and several insised drainages. The A7 polygon has a variety of aspects, primarily eastern and northern. Water was present in seasonally intermittent streams in polygon A3 on the north end and in A7 in a broader drainage that runs through the center of the polygon. Both contained some water at time of survey, streambanks indicate that the water level increases significantly during the wet season. No areas of standing water were observed in any of the polygons.

No Western Gray squirrels, or thier nest structures were observed during the survey. Several bird nests were observed and numerous douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A4, A5, A10 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 5,6,7,8 County: Skamania

Date(s) Surveyed: 10/14/2008

Start/Stop time(s): 0845-Start/1635-Stop

Surveyor Names and Affiliations: John Kolozar (TECI)

### Contact Name, Address, & Phone:

TECI

Turnstone Environmental Consultants Inc.

18000 NW Lucy Reeder Rd Portland, OR 97231

503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site:

Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

All polygons surveyed were composed of mixed conifer/hardwoods, primarily *PSME* with some scattered *THPL/TSHE*. The majority of the overstory *PSME* appears to be >25 years of age, with some scattered remnant *PSME* >70 years. No patches of *Quercus* SPP. were observed within the boundaries of the A4, A5 or A10 polygons. In all the Polygons there were *ACMA* and *ACCI* present within the polygons. Slopes within the polygon boundaries vary between ~0% to 45%. The aspect of each polygon also varies. The A4 polygon has a southwest aspect, A5 has a predominantly eastern aspect. The A10 polygon was fairly flat and had a subtle northern aspect. No standing water or active drainages were observed in the polygons.

No Western Gray squirrels, or thier nest structures were observed during the survey. Several bird nests were observed and numerous douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A2, A6, A9 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 5,6,8 County: Skamania  
T 4N R 10E S 31 County: Skamania

Date(s) Surveyed: 10/14/2008

Start/Stop time(s): 0832-Start/1635-Stop

Surveyor Names and Affiliations: John Kolozar (TECI)

### Contact Name, Address, & Phone:

TECI  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

All polygons surveyed were composed of mixed conifer/hardwoods, primarily *PSME* with some scattered *THPL/TSHE*. The majority of the overstory *PSME* appears to be >25 years of age, with some scattered remnant *PSME* >70 years. No patches of *Quercus* spp. were observed within the boundaries of the A2, A6 or A9 polygons. In all the Polygons there were *ACMA* present. Slopes within the polygon boundaries vary between ~0% to 45%. The aspect of each polygon also varies. The A2 polygon has a southern aspect, A6 has a predominantly southwestern aspect and an active drainage. The A9 polygon was fairly flat and had a slight northeastern aspect. Water was present in seasonally intermittent stream and a small roundish pond (~30 feet across at time of survey) in polygon A6. Water in the pond appeared to be present year round. Both contained some water at time of survey, streambanks indicate that the water level increases significantly during the wet season.

No Western Gray squirrels, or their nest structures were observed during the survey. Several bird nests were observed and numerous Douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A12,A13 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 7 County: Skamania

Date(s) Surveyed: 10/15/2008

Start/Stop time(s): 1206-Start/1500-Stop

Surveyor Names and Affiliations: Devin Sahl (TECI)

### Contact Name, Address, & Phone:

TECI

Turnstone Environmental Consultants Inc.

18000 NW Lucy Reeder Rd Portland, OR 97231

503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

The A12 and A13 polygons were composed of mixed conifer/hardwoods, primarily PSME with some scattered THPL/TSHE. The majority of the overstory in the stands in these polygons was PSME and appears to be mixed age, most was >20 years of age with a few older remnant trees present. No patches of Quercus SPP. were observed within the boundaries of the polygons. There was some ACMA and ACCI present within the polygons. Both polygons are very flat with slopes within the polygon boundaries vary between ~0% to 5%. Both polygons had very marginal potential WGS habitat. There were no drainages or areas of standing water present within the polygons.

No Western Gray squirrels, or thier nest structures were observed during the survey. Several bird nests were observed and numerous douglas squirrels were heard and a few were observed.



## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A14 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 7 County: Skamania

Date(s) Surveyed: 10/15/2008

Start/Stop time(s): 0827-Start/1445-Stop

Surveyor Names and Affiliations: Darren Bolen (TECI)

### Contact Name, Address, & Phone:

TECI  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

The A14 polygon was composed of mixed conifer/hardwoods, primarily PSME with some scattered THPL/TSHE. The majority of the overstory PSME appears to be >25 years of age, stand appeared to be even aged. No patches of Quercus SPP. were observed within the boundaries of the polygon. There was some ACMA and ACCI present within the polygon. Slopes within the polygon boundaries vary between ~0% to 60%. The A14 polygon has a westerly aspect and one seasonal drainage. The drainage was dry at the time of the survey. No standing water or active drainages were observed at the time of survey.

No Western Gray squirrels, or thier nest structures were observed during the survey. Several bird nests were observed and numerous douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A15 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 18 County: Skamania

Date(s) Surveyed: 10/15/2008

Start/Stop time(s): 1220-Start/1410-Stop

Surveyor Names and Affiliations: John Kolozar (TECI)

### Contact Name, Address, & Phone:

TECI  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

The A15 polygon was composed of mixed conifer/hardwoods, primarily PSME with some scattered THPL/TSHE. The majority of the overstory PSME appears to be >25 years of age, stand appeared to be even aged. No patches of Quercus SPP. were observed within the boundaries of the polygon. There was some ACMA and ACCI present within the polygon. Slopes within the polygon boundaries vary between ~20% to 80%. The A15 polygon has a westerly aspect and two seasonal drainages. Both of the drainages were dry at the time of the survey. No standing water or active drainages were observed at the time of survey.

No Western Gray squirrels, or their nest structures were observed during the survey. Several bird nests were observed and numerous Douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons:A11,A17,A18 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 7 County: Skamania

T 3N R 9E S 13 County: Skamania

Date(s) Surveyed: 10/15/2008

Start/Stop time(s): 0827-Start/1445-Stop

Surveyor Names and Affiliations: Devin Sahl (TECI), Darren Bolen (TECI), John Kolozar (TECI)

### Contact Name, Address, & Phone:

TECI

Turnstone Environmental Consultants Inc.

18000 NW Lucy Reeder Rd Portland, OR 97231

503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

These polygons were lumped together because they were visited by three surveyors simultaneously on the same day. The A11, A17 and A18 polygons were composed of mixed conifer/hardwoods, primarily PSME with some scattered THPL/TSHE. The majority of the overstory in the stands in these polygons was PSME and appears to be mixed age, most was >20 years of age. No patches of Quercus SPP. were observed within the boundaries of the polygons. There was some ACMA and ACCI present within the polygons. Slopes within the polygon boundaries vary between ~0% to 60%. The A11 polygon has multiple pieces all of which contained very marginal potential WGS habitat. There are two seasonal drainages within the area of the polygons and both were dry at the time of the survey. The A17 and A18 polygons were on the extreme southern end of the project area. A18 has a northwestern aspect on a fairly steep slope and a seasonal drainage that was dry at the time of the survey. The A17 polygon had a south and southeast exposure and no significant drainages. It had trees older than the other 2 polygons in the overstory and a few remnant PSME present that were greater than 70yrs of age. The A17 polygon is adjacent to the C1 polygon that had a seasonal stream present in it that had several pools of water present but no f

No Western Gray squirrels, or thier nest structures were observed during the survey. Several bird nests were observed and numerous douglas squirrels were heard and a few were observed.

## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygons: B1,B2,B3,B4,B5,B6,B7,B8 (See Map)

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS):	T	3N	R	9E	S	13	County:	Skamania
	T	3N	R	10E	S	5,6,8	County:	Skamania
	T	4N	R	10E	S	31,32	County:	Skamania
Date(s) Surveyed:	11/18/2008							
Start/Stop time(s):	0920-Start/1545-Stop							

Surveyor Names and Affiliations: Devin Sahl (TECI), Darren Bolen (TECI)

### Contact Name, Address, & Phone:

TECI  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site:

Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 to access SDS and WDNR lands.

This set of "B" polygons was surveyed after the "A" polygons due to alterations in the alingment of the proposed turbine strings.

### Description of Habitat at Site:

Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

All polygons surveyed were composed of mixed conifer/hardwoods, primarily *PSME* with some scattered *THPL/TSHE*. The majority of the overstory *PSME* appears to be >25 years of age, with some scattered remnant *PSME* >70 years. No *Quercus* spp. were observed within the boundaries of the polygons surveyed. In Polygons B3, B4 and B5 there were numerous *ACMA* present. Slopes within the polygon boundaries vary between ~0% to 70%. The aspect of each polygon also varies. Water is present in seasonally intermittent streams in polygons B4 and B5. The intermittent stream in B5 was active at time of survey, the intermittent stream in B4 was not.

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No Western Gray squirrels, or thier nest structures were observed during the survey. One potential nest structure was examined from the ground and determined to have potential to be a douglas squirrel nest. The structure was quite small and constructed ~25 feet up in a small *ACMA*. The structure appeared to be a small ball (less than 14" in diameter) constructed primarily of lichen, twigs and a few *ACMA* leaves. Several douglas squirrel cone middens were located in the immediate vicinity. while exploring the immediate area of the nest looking for other possible nest structures, the surveyor observed 3 distinct douglas squirrel individuals.



## WESTERN GRAY SQUIRREL SURVEY - COVER SHEET

Use one cover sheet per stand surveyed. Attach the map(s) on which you mark squirrel nests and show the transect(s) or area(s) surveyed. For each map, attach one Map Label and one or more Western Gray Squirrel Survey Data Sheets. If you see or hear a western gray squirrel please fill out a wildlife observation form and attach.

### Mark Water Sources and Survey Transect or Survey Polygon on Attached Map.

Name of Area Surveyed: Polygon: C1

(Use a generic geographic name like "Yahne Canyon". Add the timber sale name/number if available.)

Location (TRS): T 3N R 10E S 18 County: Skamania

Date(s) Surveyed: 10/9/2008

Start/Stop time(s): 0930-Start/1645-Stop

Surveyor Names and Affiliations: Devin Sahl

### Contact Name, Address, & Phone:

Devin Sahl  
Turnstone Environmental Consultants Inc.  
18000 NW Lucy Reeder Rd Portland, OR 97231  
503-621-9613

### Directions to Site: Be specific enough to allow someone unfamiliar with the site to find it.

From the Jct. of Cook Underwood Rd. and Knapp Rd. Go NW on Knapp Rd. for ~0.1 miles to Scoggins Rd., Turn right onto Scoggins Rd. and ~100 yards to Jct. with private drive on left (Signed as CG 2930). Proceed up CG 2930 for ~2.8 miles to powerline ROW. Turn Left onto the powerline ROW road and proceed ~100 yards to unmarked spur on Left. Continue down Spur road ~0.25 to just before it's end and park. You are parked just outside the NE corner of the polygon.

### Description of Habitat at Site: Include approximate age/size (dbh) of stand, dominant overstory species, percent oak in stand, slope position and aspect, and distance to nearest water.

Polygon is a stand of mixed conifer/hardwood, primarily *PSME* with some scattered *THPL/TSHE*. The polygon encompasses both sides of a small intermittent stream. The majority of the overstory *PSME* appears to be >50 years of age, with some scattered remnant *PSME* >70 years. No *Quercus* spp. were observed within the boundaries of the polygon but may be present just outside the boundary at the transition to agricultural land (fruit orchard). Slopes within the polygon boundary vary between ~0% to 60% depending on location. The aspect is predominantly SE facing on the western portion of the tract and SSW facing on the eastern portion of the tract, with the intermittent stream being the divider between. Water is present in a seasonally intermittent stream that runs through the middle of the polygon. The stream was predominantly dry at the time of the survey except for a few small puddles and some water in a maintained penstock that supplies water to landowners downslope. A small, shallow pond was present backed-up behind a non-maintained irrigation structure just outside the SE corner of the polygon. The irrigation structure is designed to impound water from the seasonally intermittent stream. It is possible that the irrigation structure would hold some amount of water year round that would be available for wildlife.

No Western Gray squirrels were observed during the survey of this polygon. One potential nest structure was examined from the ground and determined to have potential to be a western gray squirrel nest structure. A subsequent visit to the site 7 days after this visit determined that the structure was a broom type growth emanating from the bole of the *PSME*. The structure was examined by climbing an adjacent tree and determined to not be a squirrel nest. Several Douglas squirrels were heard and observed within the boundaries of the polygon during the time of the survey and on subsequent visits.

**C-7**

**Final Report: Results of Northern Spotted Owl, Northern Goshawk, Western Gray Squirrel Surveys Conducted for the Saddleback Wind Energy Project. Prepared for SDS Lumber.**

**Turnstone Environmental Consultants, Inc. 2009**

# 2009 Final Report

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## *Results of Northern Spotted Owl, Western Gray Squirrel and Northern Goshawk Surveys Conducted for the Whistling Ridge Wind Energy Project*

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Prepared for:

**SDS Lumber Company**

Prepared by:



Turnstone Environmental Consultants, Inc.  
18000 NW Lucy Reeder Rd.  
Portland, Oregon 97231

October, 2009

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## 1. PROJECT OVERVIEW

SDS Lumber Company (SDS) retained the services of Turnstone Environmental Consultants, Inc. (Turnstone) to perform Northern spotted owl (spotted owl), Western gray squirrel (gray squirrel) and Northern goshawk (goshawk) surveys in potential habitat for the Whistling Ridge Wind Energy Project formally known as the Saddleback Wind Energy Project, located in Skamania County, Washington. Survey information will be used to assess the presence, occupancy and reproductive status of spotted owl, gray squirrel and goshawk individuals and populations within areas of proposed wind energy development.

The physiographic range of spotted owl, gray squirrel and goshawk populations are potentially located within the forestlands of the Whistling Ridge Wind Energy Project. As part of the process to avoid “take” of any state or federally listed species, landowners must conduct surveys to determine the presence of listed species, prior to conducting any management activities.

This report summarizes the Wildlife surveys that were conducted in both 2008 and 2009 at the Whistling Ridge Wind Energy Project. All Wildlife surveys were conducted using the best information available during this time period. Turnstone staff followed strict adherence to protocol guidelines and habitat requirements to obtain full compliance with agency requirements and recommendations. All potential habitat and buffers were determined based on the sighting of the proposed wind turbine locations. In late October of 2008, the final proposed turbine alignment was released and the locations of the turbines were slightly altered from their original location. Turnstone re-analyzed the new alignment, confirming all additional buffers were covered and that the adherence to protocols for all species surveyed were sufficient. The survey implications of the adjustments to the proposed turbine locations will be discussed in further detail in the *survey locations* sections for each of the respective species surveyed.





## 2. NORTHERN SPOTTED OWL

Under the federal Endangered Species Act of 1973, the Northern spotted owl (*Strix occidentalis caurina*) was listed in 1990 as "threatened" by the United States Fish and Wildlife Service. The Washington Fish and Wildlife commission listed the Northern spotted owl as a state endangered species in 1988 (Buchanan and Swedeen, 2004). Both federal and state agencies determined that the spotted owl is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its existing range. The northern spotted owl's range extends from Washington State to Northern California. A recently revised USFWS species recovery plan is in effect for the northern spotted owl (USFWS 2008).

### 2.1. Suitable Habitat

In Washington, spotted owls inhabit the Eastern and Western Cascades, Western Lowlands, and Olympic Peninsula Provinces. Within these regions, the spotted owl has specific habitat requirements for nesting, roosting, foraging and dispersal. The species utilizes forests with multi-layered canopies and a high incidence of large trees for nesting and roosting. Fragmented habitats may be used for dispersal and foraging. Spotted owls nest primarily in large tree cavities and on broken tops of large trees. Spotted owls have also been reported as nesting on clumps of mistletoe, on large branches, in abandoned stick nests of Northern goshawks, and in cavities on embankments and rock faces (LaHaye 1999).

For the purposes of this project, potentially suitable spotted owl habitat was determined to be coniferous stands with average tree DBH (diameter at breast height) greater than 12 inches and canopy closure of 60% or greater. These standards for suitable spotted owl habitat were based on the availability of forest stand classification GIS data from SDS. By using GIS data that was readily available, initial spotted owl survey areas could be efficiently determined in the office and verified in the field when setting up the survey stations.

The 12" average DBH and 60% canopy closure standards could be considered conservative as compared to the nesting and roosting habitat characteristics that are



discussed in the 2008 USFWS recovery plan. This plan states, “Features that support nesting and roosting typically include a moderate to high canopy closure (60 to 90 percent); a multilayered, multi-species canopy with large overstory trees (with diameter at breast height [dbh] of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas *et al.* 1990).” These types of habitats are typically not present over large areas on managed commercial forest lands. Recently cut areas or young conifer plantations that did not meet the minimum average DBH or canopy closure parameters were excluded from the survey effort. The resulting designated survey areas did contain varying types of habitat that could potentially be used by spotted owls.

## **2.2. Survey Locations**

Turnstone conducted spotted owl surveys within and adjacent to properties managed by SDS and cooperating adjacent landowners. Surveys were conducted in all potentially suitable habitat within the 1.8 mile spotted owl provincial home range radius of the proposed project area. To determine the potential spotted owl survey areas, the proposed turbine alignments were buffered out to a 1.8 mile radius. This created a large polygon of potential survey area that included 14,901 acres. This initial query of potential habitat that fell within the provincial range was not contiguous, it resembled a patchwork of stands that met the survey threshold and would require spotted owl surveys.

The delineated potential survey area polygon intersected two owl activity centers where spotted owls historically lived. A designated spotted owl activity center in this geographical region of Washington is equal to a circle with a 1.8 mile radius. The two spotted owl activity centers are located primarily on public lands north of the project area. The nest cores of these activity centers reside on public land managed by the Washington Department of Natural Resources (WDNR) and the U.S. Forest Service (USFS).



The activity centers intersect (1.8 mile radius provincial range) the northern reach of the proposed wind turbine survey area polygon. The Mill Creek activity center (MSNO# 0991) was located and designated in 1992 and was last considered to have spotted owls present in 2000. The Moss Creek activity center (MSNO#1003) was located and established in 1994 and was last considered to have spotted owls present in 2002. Table 4, in the results section of this document, represents the survey summaries for these activity centers for 1994 thru 2009. These two activity centers are adjacent to one another and overlap by approximately 15%. Because of the close proximity of the spotted owl activity centers all suitable habitat within a 1.8 mile buffer of the nest site was surveyed. This increased the potential survey area to 7,222 acres. Much of this habitat was a patchwork of timber stands that contained potentially suitable and non-suitable habitat.

The final proposed turbine alignment released in late October of 2008 did not affect the survey coverage area for spotted owls during the 2008 survey season. The additional turbines were located to the north end of the project area where surveys were already being conducted in the Mill and Moss Creek activity centers.

**Table 1. Township and Range information for northern spotted owl survey areas.**

Legal Descriptions for Spotted Owl Survey Areas		
Township	Range	Section*
3N	9E	1,2,11,12,12,14,23,24,25
3N	10E	4-6,7-9,16-18,19,20,30
4N	9E	23,24,25,26,27,34,35,36
4N	10E	19-22, 27-30,31-34

\*some sections only had portions of their respective area covered for NSO survey in 2008-2009

### 2.3. Survey Methods

Potential northern spotted owl habitat was surveyed in 2008 and 2009 in accordance with the 1992, revised version of *“Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls”*. This survey protocol is endorsed by the U.S. Fish and Wildlife Service. Under this protocol, Turnstone initiated the 2-year



survey effort in early May of 2008 and completed the second year of spotted owl surveys in August of 2009. Under the two year survey methodology, a minimum of 3 protocol visits must be performed for 2 consecutive years in order to determine probable presence/absence of the spotted owl.

Prior to initiating field surveys, Turnstone biologists analyzed the project area using topographic maps, aerial photography and stand classification data to determine suitable habitat for potential broadcast calling station placement. Calling stations were placed in differing topographies across the survey area of potential habitat. When possible, broadcast calling stations were placed along ridges and prominent points to maximize coverage and increase the probability of hearing distant owl responses. Broadcast calling stations and survey routes were situated to achieve complete coverage of the potential survey area, preferably with coverage from more than one calling point. Stations were spaced approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  mile apart where access was possible and permitted. Broadcast calling stations were surveyed at night when owls are more active and are thought to be more responsive to standard survey techniques (USDI 1992). Per protocol guidelines, Turnstone biologists used a minimum of ten-minute calling periods at each designated broadcast calling station. Amplified PA systems were the primary means used to broadcast both male and female spotted owl vocalizations that included four-note contact calls and various agitated calls. Voice hooting and “hoot flutes” were occasionally used to supplement the Amplified PA systems and were also used when conducting daytime visits to historic nest cores. Turnstone conducted surveys between March 15th and August 31<sup>st</sup> during each survey year, as stipulated by the protocol.

During the first round of broadcast calling in the 2008 survey season, an additional day visit was made to each of the two spotted owl nest core activity centers north of the project area, (Mill Crk, and Moss Crk.). During the 2009 survey season, three additional day visits were made to each of the two spotted owl nest core activity centers.

After consulting with WDFW staff, additional day visits were added in 2009. The intent of these day visits was to further verify if spotted owls were “quietly” occupying the historic spotted owl nest cores but not responding during night surveys. The three day visits conducted by Turnstone staff were made in addition to the three required night surveys outlined in the survey protocol guidelines. These visits involved hiking into the



historic nest core areas and conducting an intensive survey of the area using meandering survey transects in areas of suitable habitat. Turnstone staff attempted to elicit responses from spotted owls using various means while conducting these surveys. Surveys near the nest cores would typically start out with subtle voice or hoot flute calling and then proceed into more aggressive and louder calling using amplified PA systems when no responses or observations occurred. The visits varied in length but typically lasted from two to six hours.

Both the Mill and Moss Creek nest cores are also being surveyed as part of a long term demography study conducted by the Washington Department of Natural Resources on lands within the Klickitat Habitat Conservation Plan Planning Unit. The study was initiated in 2001 and was slated to run for five years. In 2007, a new three year contract was signed to extend the survey effort for another three years. The fieldwork for the project is carried out by staff from the National Council for Air and Stream Improvement (NCASI). Each year NCASI performs a minimum of three visits and as many as 10 survey visits a year to the spotted owl nest cores. These visits involve both day calling the historic nest cores and night calling in the same areas. Survey summary details of the survey results for each of these spotted owl cores can be reviewed in Table 4 of this document.

During the 2008 and 2009 survey seasons, Turnstone biologists recorded all owl species encountered and the sightings of or responses by, potential spotted owl predators. This included barred owls, great horned owls, northern goshawks and other raptor species. There is some evidence that the presence of these species may affect northern spotted owl responses.

### **3. Western Gray Squirrel**

The western gray squirrel (*Sciurus griseus*) was listed as a “threatened” species by the Washington Fish and Wildlife Commission in 1993. In November of 2007, the State of Washington adopted a species recovery plan for the Western Gray Squirrel which is currently in effect.





In January of 2001, a petition was filed with the United States Fish and Wildlife Service to list the Washington State population of the western gray squirrel as a distinct population segment (DPS) in an effort to secure protection for the species under the Endangered Species Act of 1973 (ESA). The petition underwent a 12 month review with a ruling announced on May 30, 2003. This ruling stated the petition action was not warranted because the Washington population of the Western Gray Squirrel is not a DPS therefore, no protection under the ESA would be granted (Federal Register, 2003). There is currently no federal protection for the western gray squirrel.

The physiographic range and habitat requirements of the western gray squirrel are located within the forestlands of the Whistling Ridge Wind Energy Project.

### **3.1. Suitable Habitat**

Western gray squirrels are arboreal (adapted for living in trees) and, although they forage on the ground, they rarely stray far from trees. They use tree canopies for escape, cover and nesting. Western gray squirrels can move rapidly and cover long distances among tree canopies when canopy conditions permit. A contiguous tree canopy that allows arboreal travel for at least 198 feet (60 meters) around the nest is an important feature of western gray squirrel habitat (Ryan and Carey 1995a). Western gray squirrels are active throughout the day but are most active in the morning. Western gray squirrels are most active in August and September, they are less visible in June and July (Ryan and Carey 1995a) while collecting and storing food for winter.

In Washington the western gray squirrel distribution has been reduced to three geographically isolated western gray squirrel populations: the “Puget Trough” population now centered in Thurston and Pierce counties in the Puget Sound region; the “South Cascades” population in extreme eastern Skamania County and Klickitat and Yakima counties; and the “North Cascades” population in Chelan and Okanogan counties.

In Washington, and elsewhere within the gray squirrels range, the principal food is acorns, although the seeds of Douglas-fir and other conifers are also eaten (Dalquest 1948). While pine nuts and acorns are considered essential foods for storing body fat



and conditioning western gray squirrels for winter, green vegetation, seeds and nuts of trees and shrubs, fleshy fruits, mushrooms and other foods are also consumed. Hypogeous fungi (underground fungi such as truffles) comprise a large portion of the western gray squirrel diet (WDW 1993; Carraway and Verts 1994; Ryan and Carey 1995a).

For the purposes of this project, potentially suitable western gray squirrel habitat was defined as any coniferous, deciduous or mixed stands of trees that have an average diameter at breast height (DBH) of at least 10 inches or greater. This criterion was used to ensure a conservative approach in determining survey areas.

### **3.2. Survey Locations**

Turnstone conducted 2 rounds of western gray squirrel nest surveys within the project area. Approximately 738 acres of potentially suitable habitat within the project area were surveyed in the fall of 2008. The survey area was adjusted slightly in 2009 removing 46 acres from the overall survey effort. This area turned out to be outside the established buffers. In the Spring of 2009, a total 692 acres were surveyed for western gray squirrels.

Within the project area, potential gray squirrel survey areas were selected by identifying appropriate stand inventories using GIS analysis and ground-truthing. The initial GIS analysis was used to efficiently determine areas of potentially suitable squirrel habitat prior to conducting the field visits. Ground-truthing was used to validate and finalize the initial GIS analysis while setting up the squirrel survey area blocks.

Western gray squirrel nest surveys were completed in any areas where project activities would remove or structurally modify forest stands. To determine survey areas the proposed wind turbine string was buffered out 150 feet (150 foot radius) to establish a work zone. Then an additional 500 feet of buffer was added, to encompass any areas that may be altered due to obstructions (tall trees) within wind corridors of the proposed turbines. Finally, an additional 400 feet was added as an unaltered habitat buffer. Adding all buffers created a 1,050 foot radius around the turbine string to be surveyed.



Including all buffers the entire survey area of possible habitat was nearly 1,361 acres. Within this area 738 acres were determined to be potentially suitable western gray squirrel habitat in 2008 and 692 acres in 2009. The remaining area within the overall buffer was not surveyed and determined to be non-habitat.

The survey area was broken up into smaller discrete units to facilitate an efficient and systematic survey effort by Turnstone biologists. The discrete units were referred to as polygons and each polygon was given a unique identifier. A map of the western gray squirrel survey area polygons is located in Appendix A.

The final proposed turbine alignment released in late October of 2008 did change the survey coverage for western gray squirrels. The changes made in the final turbine alignment did add additional habitat. These stands were a patchwork of small isolated forests that needed an additional survey. The survey window to conduct western gray squirrel surveys was still open when the new areas were identified. An additional field visit was conducted in early November using the same survey methodology as the first round of squirrel surveys in 2008.

### **3.3. Survey Methods**

Surveys were conducted according to the guidelines in the WDFW report, *“Surveys for western gray squirrel nests on sites harvested under approved forest practice guidelines: analysis of nest use and operator compliance”* (Haegen, Van Leuven, and Anderson 2004). Turnstone biologist also worked with WDFW staff biologists to configure the best survey methodology for the area.

Turnstone biologists performed a general search for western gray squirrels and their nests in the fall of 2008 and the spring of 2009. Walk-through surveys using meandering transects were conducted in all conifer, deciduous, and mixed composition stands within the designated survey area that met the minimum DBH threshold of 10 inches. Surveyors identified all species of squirrels, evidence of squirrel activity and squirrel nests while walking transects. Transects were oriented to parallel the topographic features of the survey polygons when possible to facilitate safe and efficient travel on foot. All transects were laid out systematically in GIS to ensure that they were evenly



spaced and located close enough together so that no habitat areas were excluded from the survey effort. Surveyors would use the plotted transects as general guidelines for a route of travel. The survey was conducted using an intuitive meander of the survey area. Surveyors would deviate from the designated transect to investigate areas of potential habitat or the evidence of squirrel sign.

## **4. NORTHERN GOSHAWK**

The northern goshawk (*Accipiter gentiles*) is classified as a “species of concern” by the U.S. Fish and Wildlife Service and as a “listed candidate” for a state sensitive, threatened, or endangered species by the Washington Fish and Wildlife Commission. The physiographic range and habitat requirements of the northern goshawk can be found within the forest lands of the Whistling Ridge Wind Energy Project.

### **4.1. Suitable Habitat**

Northern goshawks inhabit a wide variety of forest habitats, including true fir (red fir, white fir, and subalpine fir), mixed conifer, lodgepole pine, ponderosa pine, Jeffrey pine, montane riparian deciduous forest and Douglas fir. Occasionally, goshawks nest in coastal redwood and mixed hardwood forests. Goshawk nest sites are associated with patches of forest that are larger and denser than the surrounding landscape. However, home ranges often consist of a wide range of forest age classes and conditions. Numerous habitat studies and modeling efforts have found nest sites to be associated with similar factors, including proximity to water or meadow habitat, forest openings, level terrain or “benches” of gentle slope, northerly aspects and patches of larger, denser trees, but these factors vary widely (Woodbridge 2006).

### **4.2. Survey Locations**

During the 2008 and 2009 northern goshawk survey windows, Turnstone staff conducted northern goshawk surveys within properties managed by SDS Lumber Co. and on lands managed by WDNR. These surveys covered approximately 1,493 acres of potential goshawk habitat. The objective of our survey effort was to determine the presence of northern goshawks.



The potential survey area for the northern goshawk was determined by protocol parameters, consultation with biologists from the WDFW, and GIS analysis. Survey protocol methodology was outlined in the United States Forest Service document, “*Northern Goshawk Inventory and Monitoring Technical Guide, July 2006.*” Table 2 depicts the legal descriptions of the where the goshawk survey areas occurred.

**Table 2. Township and Range information for northern goshawk survey areas.**

<b>Legal Descriptions for Goshawk Survey Areas</b>		
<b>Township</b>	<b>Range</b>	<b>Section</b>
4N	9E	1, 36
4N	10E	31,32
3N	9E	12,13,24
3N	10E	5,6,7,8,18,19

To determine the area that would require goshawk surveys, a GIS analysis was conducted following the protocol parameters and best available data. The proposed wind turbine right of way was buffered out 150 feet to establish a work area that would likely be permanently disturbed. Then an additional 2,624 feet (800 meters), per protocol recommendations, was added to 50ft buffer to establish an area that was considered the potential northern goshawk survey area. Within this area, GIS data was analyzed to identify conifer stands that may contain suitable habitat structure based on an age class of greater than 25 years and average tree DBH of at least 12 inches.

The resulting suitable habitat areas, or polygons, were then overlaid on current aerial photography (2006), to eliminate any recently harvested stands. This exercise created an initial survey area of 3,013 acres of potential habitat. Of this area approximately 1,100 acres were determined to be forested and contain the habitat characteristics needed to support goshawks. Initial calling points and survey transects were then established in GIS to adequately cover the 1,100 acres of potential goshawk habitat that would require survey.





In order to adequately survey the approximately 1,100 acres of potential goshawk habitat, Turnstone biologists conducted field reconnaissance in areas of all potential habitat that was delineated out in GIS. After ground-truthing the area 136 calling points were set. The areas to be surveyed had irregular shapes and establishing standardized transect strings was not feasible. Survey areas were covered with individual calling points that were placed within the potential goshawk habitat. The objective was to place stations within 150 meters of all potential habitat and to not place stations more than 200 meters apart.

The final proposed turbine alignment was released in late October of 2008. This re-alignment affected the survey coverage to the north of the project site. The changes made in the alignment created an additional 367 acres in the buffered area of potential habitat. The survey window to conduct northern goshawk surveys during the 2008 breeding season had closed making it impossible to survey the additional habitat intersected by the re-alignment. Because the new area was small, Turnstone biologists chose a different survey methodology in the 2009 northern goshawk survey window. The “Intensive Search Survey” methodology was chosen and initiated in summer of 2009. The details of this survey methodology are outlined in the USFS document, “*Northern Goshawk Inventory and Monitoring Technical Guide, July 2006.*” This methodology was selected because it could be initiated and completed in a single survey season. Under this rigorous approach, the new survey areas would receive two successive survey visits using a more intense survey methodology in order to determine potential goshawk presence.

During the 2009 survey effort, approximately 34 acres of non-habitat was eliminated from the original 367 acres. An additional 56 acres was added adjacent to the area because of its potential habitat qualities making the total approximately 389 acres of potential habitat. These areas were surveyed using the intensive search methodology while approximately 1,100 acres were surveyed for the second year using the broadcast acoustic methodology.



### 4.3. Survey Methods

Two different survey methodologies were used during the 2008 and 2009 goshawk survey windows. In 2008 and 2009, two rounds of the “Broadcast Acoustic” surveys were conducted. In 2009 two rounds of the “Intensive Search” survey methodology was conducted where the turbine alignment was extended to the north.

The “broadcast acoustical” survey methodology requires 2 visits to the survey area within a breeding season. The first site visit occurs in the ‘nestling period’, where adult alarm calls are broadcast at the designated calling points. During the second site visit, in the ‘fledgling period’, wail and fledgling begging calls are broadcast at the same survey points.

At each station, goshawk calls are broadcast with a portable amplified PA system for ten second periods. Turnstone biologists pause for thirty seconds to listen for goshawk responses, immediately following the broadcast calls. The sequence of broadcasting and listening for responses was repeated two more times, rotating 120 degrees from the last broadcast. The three-call sequence was repeated again, so that each direction received two sets of broadcast calls. During foot travel between broadcast points, the surveyors stayed alert observing and listening for potential goshawks. Surveyors also documented observations of other raptor species when encountered.

Survey periods begin ½ hour before sunrise and conclude ½ hour before sunset, as specified by protocol. If there was a goshawk detected in the project area, then a search for an active nest would ensue, following the ‘intensive search’ protocol. Locating an active nest is recommended immediately following any goshawk detections. Turnstone also recorded all other incidental raptor species observed during site visits on the field data forms, which are included in *Appendix C*.

The second methodology used in 2009 was the “Intensive Search Survey” methodology. This approach requires one or more visits to the survey area in a breeding season to determine goshawk occupancy. Turnstone biologists chose two site visits in 2009 to reach a high level of assurance that they were not missing goshawks. This survey method combines an intensive visual search with the methods of the “broadcast



acoustic” protocol. The visual search involves multiple surveyors looking for any possible goshawk sign, which could include: nests (active or abandoned), whitewash, prey remains, plucking posts, or molted feathers. Goshawk calls are broadcast while conducting the visual search as recommended in the guidelines in the “broadcast acoustic” protocol.

To be most effective the survey requires the use of multiple observers simultaneously walking the stands. All intensive search surveys conducted used a minimum of three simultaneous observers and sometimes four when necessary to adequately cover the area. Survey transects were established to cover the entire 389 acre site. These transects were overlaid on topographic base maps and aerial photographs in GIS. Start points and end points of the survey transects were then derived and loaded into GPS units to be used as reference tools in the field while conducting the surveys. GPS units also served as a reliable method to mark and map any goshawk observations.

Turnstone biologists began their survey effort later in the nesting period in an attempt to cause fewer disturbances to potential nesting goshawks. Surveys were conducted walking parallel transects in unison with multiple observers looking for goshawk sign and broadcasting goshawk calls. Survey transects were established approximately 20-30 meters apart depending on the terrain and the amount of understory vegetation present. The observer walking the middle transect would broadcast goshawk calls approximately every 250 meters apart along the transect. Observers traveled at a slow pace to increase the level of safety and to give ample time to scan the area for any potential goshawk or goshawk sign. On every third set of transects, all three observers would broadcast goshawk calls, using the same broadcasting procedure recommended in the “broadcast acoustic” survey protocol.

All goshawk sign encountered was analyzed and scrutinized in the field by a team of biologists. Any potential goshawk sign encountered would elicit an intensive search of the area by all biologists. The intensive search would cover an area of at least a 300 meter radius from the goshawk sign observed. All raptor feathers encountered were reviewed in the field and collected in case they needed further review in the lab. The “intensive search survey” methodology is time-consuming and physically demanding of



the biologists. The results however, give us a very high likelihood of detecting the presence of goshawks.

## **5. Survey Results**

### **5.1. Northern Spotted Owl**

Turnstone conducted two consecutive years of spotted owl surveys in 2008 and 2009 with a minimum of three site visits per calling station on and adjacent to SDS properties, (*Appendix A*). Two spotted owl activity centers located on public lands (WDNR, USFS) to the north of the project area were also surveyed. The Mill Creek (MSNO#: 0991) and Moss Creek (MSNO#: 1003) cores are located in Township 4N and Range 10E section 28 and Township 4N and Range 9E section 35, respectively. A total of 80 calling stations were established and surveyed in 2008 and 2009 with no northern spotted owl responses or observations. Seven supplemental stations were added in 2009 adjacent to areas that were determined to have potential habitat. There were no observations or detections of spotted owls at any of the 87 established calling stations in 2008 or 2009.

In 2008, Turnstone conducted an additional day visit to the two Moss and Mill Creek nest cores where spotted owls historically lived. No spotted owl observations or responses were recorded. In 2009, Turnstone added three additional day visits in addition to the required night visits to each nest core with no spotted owl observations or responses.

Tables 3A and 3B summarize all of the Turnstone survey response/observation results for the survey efforts in the 2008 and 2009 survey seasons. A map depicting the locations of the calling stations and locations of all barred owl responses/observations is available for review in Appendix A of this document.



**Table 3A. Survey Summary Results for 2008.**

Visit #	Dates	# of Stations	Northern Spotted Owl Response	Comments
1	21-May	12	None	No owl responses
1	22-May	20	None	No owl responses
1	24-May	18	None	Barred owls & M/F pair near stations #45 & #82
1	25-May	22	None	Barred owls, likely pair; near stations #74 & #86
1	26-May	8	None	No owl responses
2	10-Jun	22	None	Barred owls (2) from station #74, Barred owls, likely pair from station #86
2	11-Jun	20	None	No owl responses
2	15-Jun	17	None	No owl responses
2	16-Jun	21	None	Barred owl from stations #44 & #45, Unknown begging Juvenile from station #47 (confirmed as barred owl on day visit)
3	27-Jul	15	None	No owl responses
3	28-Jul	20	None	Barred owl from Station #82
3	29-Jul	24	None	No owl responses
3	30-Jul	22	None	No owl responses

**Table 3B. Survey Summary Results for 2009.**

Visit #	Dates	# of Stations	Northern Spotted Owl Response	Comments
1	5/11/09	22	None	N. Pygmy owl from station #46
1	5/12/09	20	None	N. Pygmy owl from station #63, N. Saw-Whet from station #75
1	5/13/09	23	None	Barred owl from station #37 & #72, N. Pygmy owl from station #38
1	5/14/09	22	None	Barred owl from station #43, N. Saw-Whet from station #82
*2	06/17/09	45	None	Barred owl from station #7 & M/F pair station #28



Visit #	Dates	# of Stations	Northern Spotted Owl Response	Comments
*2	06/18/09	42	None	Barred owl from station #5,#37,#48,#85,#86,32A & M/F pair station #74, N. Pygmy owl from station #77
3	07/21/09	21	None	Barred owl from station #72
3	07/22/09	24	None	N. Pygmy owl from station #11
3	07/23/09	22	None	Barred owl from station #48A, N. Pygmy owl from station #39
3	07/24/09	20	None	No owl responses

\* =two observers conducted surveys concurrently on these nights.

Table 4A outlines the results of the northern spotted owl surveys at each of the two nest cores that intersect the project area. Results were derived from data collected by the WDNR southeast Washington NSO demography study and NACASI. The data shows no spotted owl detections in the Mill Creek core since the 2000 breeding season. The Moss Creek core has not had a spotted owl detected since the 2002 breeding season. Table 4B shows the results of the Turnstone survey effort at the two activity centers for the 2003, 2004, 2008 and 2009 survey seasons. Both cores show an increased presence of barred owls detected while conducting surveys for spotted owls.



**Table 4A. Spotted Owl Nest Core Survey Details and Results from WDNR and NACASI Data Sources**

Year	Mill Creek Spotted Owl Nest Core Survey Results		Moss Creek Spotted Owl Nest Core Survey Results	
	STOC	STVA	STOC	STVA
2009	No response	Pair	No response	Male and Unk. STVA observed
2008	No response	Pair	No response	Male observed
2007	No response	None observed	No response	Male observed
2006	No response	Pair	No response	Male observed
2005	No response	Male	No response	Pair observed
2004	No response	Pair observed	No response	Pair with juvenile observed
2003	No response	None observed	No response <sup>1</sup>	No response <sup>1</sup>
2002	No response	Male observed	Male observed	Pair with juvenile observed
2001	No response	None observed	No response	Pair observed
2000	Non-nesting pair observed	None observed	Reproducing pair with 1 juvenile	None observed
1999	Female observed	None observed	Reproducing pair with 1 juvenile	None observed
1998	Non-nesting pair observed	Female observed	Reproducing pair with 2 juveniles	None observed
1997	Non-nesting pair observed	None observed	No response	None observed
1996	Reproducing pair with 2 juveniles	Unknown	Reproducing pair with 3 juveniles	Unknown
1995	No response	Unknown	Reproducing pair with 2 juveniles	Unknown
1994	Reproducing pair with 2 juveniles	Unknown	Reproducing pair with 2 juveniles	Unknown

<sup>1</sup> =an unknown Strix was detected at Moss Creek in 2003



**Table 4B. Spotted Owl Activity Center Survey Details and Results From Turnstone Environmental Consultants**

Year	Mill Creek Spotted Owl Activity Center Results*		Moss Creek Spotted Owl Activity Center Results*	
	Spotted Owl	Barred Owl	Spotted Owl	Barred Owl
2009	No response	Male observed	No response	Pair observed
2008	No response	Male & Female observed	No response	Pair observed
2004	No response	Present <sup>1</sup>	No response	Present <sup>1</sup>
2003	No response	Present <sup>1</sup>	No response	No response

\* =Activity Center constitutes the entire 1.8 mile provincial range

<sup>1</sup> =Surveyor unable to determine sex of barred owl detected

## 5.2. Western Gray Squirrel

Western gray squirrel nest surveys were conducted in the fall of 2008 and again in the spring of 2009. These surveys constituted two complete rounds of survey covering all potential habitat within the survey polygons. The objective of this survey effort was to determine western gray squirrel use and/or sign of historical use on any potential habitat within the project buffers. A systematic nest search occurred on 26 polygons at the proposed energy project and 400 ft buffers into adjacent undisturbed suitable squirrel habitat (per WDFW protocol guidelines). No western gray squirrels or western gray squirrel nest structures were observed during the three site visits that occurred over two years.

**Table 5A. 2008 Western Gray Squirrel Survey Areas and Results**

<b>Survey Polygon Visited</b>	<b>Date</b>	<b>Surveyor</b>	<b>Notes</b>
A1, A3, A7	10/14/2008	D. Sahl	No nests or WGS observed
A4, A5, A10	10/14/2008	J.Kolozar	No nests or WGS observed
A2, A6, A9	10/14/2008	J.Kolozar	No nests or WGS observed
A12, A13	10/15/2008	D.Sahl	No nests or WGS observed
A14	10/15/2008	D. Bolen	No nests or WGS observed
A15	10/15/2008	J. Kolozar	No nests or WGS observed
A11, A17, A18	10/15/2008	D. Sahl, D. Bolen, J. Kolozar	No nests or WGS observed
B1-B8	11/18/2008	D.Sahl, D. Bolen	No nests or WGS observed
C1	10/9/2008	D. Sahl	No nests or WGS observed

**Table 5B. 2009 Western Gray Squirrel Survey Areas and Results**

<b>Survey Polygon Visited</b>	<b>Date</b>	<b>Surveyor</b>	<b>Notes</b>
A5, B5	3/12/09	D. Bolen	No nests or WGS observed
A6, B4	3/12/09	W. Perkins	No nests or WGS observed
A9, A10	3/10/09	D. Sahl, D. Bolen, W. Perkins	No nests or WGS observed
A12, A13, A14	3/10/09	D.Sahl, W. Perkins	No nests or WGS observed
A15	3/10/09	D.Bolen	No nests or WGS observed
A1, A2, B1, B2	3/11/09	D.Sahl	No nests or WGS observed
A3	3/11/09	D. Bolen	No nests or WGS observed



Survey Polygon Visited	Date	Surveyor	Notes
A4, A11	3/11/09	W. Perkins	No nests or WGS observed
A7	3/12/09	D. Sahl	No nests or WGS observed
A17, A18, B6, B7, C1	3/10/09	D. Sahl, D. Bolen, W. Perkins	No nests or WGS observed
B3	3/12/09	D. Sahl, D. Bolen, W. Perkins	No nests or WGS observed

### 5.3. Northern Goshawk

Turnstone conducted protocol northern goshawk surveys on SDS properties during the 2008 and 2009 goshawk survey windows. The survey protocol methodology used was the “broadcast acoustical survey” and “Intensive search survey” methodology, outlined in the protocol; *“Northern Goshawk Inventory and Monitoring Technical Guide, USFS, July 2006.”* Calling stations were strategically placed throughout the survey area in all suitable habitat within 2,624 feet (800 meters) of the turbine right of way. Turnstone completed two protocol site visits at 136 calling stations, using the “broadcast acoustic survey”, during the 2008 and 2009 goshawk survey seasons. One site visit was conducted during the nestling period and the second during the fledgling period as recommended in the protocol. No northern goshawk responses were documented during either of the two site visits in either the 2008 or 2009 survey seasons. Survey dates for the “broadcast acoustic” surveys and incidental raptor observations are summarized in Table 6A and 6B.

**Table 6A. Northern Goshawk Broadcast Acoustic Survey Results Summary 2008.**

Visit #	# of Stations	Date	N. Goshawk Response	Other Raptors Observed
1	14	6/23	None	OSPR (1) near station 46 RTHA (1) near station 46
1	21	6/24	None	RTHA (1) near station 36
1	22	6/25	None	None observed
1	25	6/26	None	None observed
1	25	6/27	None	None observed
1	11	7/15	None	TUVU (1) near station 62





Visit #	# of Stations	Date	N. Goshawk Response	Other Raptors Observed
1	15	7/16	None	COHA (1) near station 26
1	3	7/28	None	None observed
2	7	7/28	None	None observed
2	14	7/30	None	RTHA (1) near station 67
2	22	7/31	None	TUVU (1) near station 95 TUVU (1) near station 78
2	16	8/01	None	None observed
2	23	8/04	None	RTHA (1) near station 22
2	25	8/05	None	SSHA (1) near station 9 TUVU (8) near station 12
2	19	8/06	None	None observed
2	10	8/07	None	None observed
COHA = Cooper's hawk ( <i>Accipiter cooperii</i> ) OSPR = Osprey ( <i>Pandion haliaetus</i> ) RTHA = Red-tailed hawk ( <i>Buteo jamaicensis</i> ) SSHA = Sharp-shinned hawk ( <i>Accipiter striatus</i> ) TUVU = Turkey vulture ( <i>Cathartes aura</i> )				

**Table 6B. Northern Goshawk Broadcast Acoustic Survey Results Summary 2009**

Visit #	# of Stations	Date	N. Goshawk Response	Other Raptors Observed
1	11	06/24/09	None	BAEA (1) near station 57
1	34	06/25/09	None	RTHA (2) near station 124 & 127
1	40	06/26/09	None	TUVU (2) near station 28 & 36, Unk. Owl (likely pygmy or saw-whet) at station G13
1	40	06/29/09	None	TUVU (3) near station 68 & 90 & 91
1	11	06/30/09	None	RTHA (1) near station 60.5
2	33	07/09/09	None	None observed
2	46	07/10/09	None	TUVU (1) near station 73
2	27	07/15/09	None	TUVU (2) near station 48 & 46
2	30	07/16/09	None	None observed
BAEA = Bald Eagle ( <i>Haliaeetus leucocephalus</i> ) COHA = Cooper's hawk ( <i>Accipiter cooperii</i> ) OSPR = Osprey ( <i>Pandion haliaetus</i> ) RTHA = Red-tailed hawk ( <i>Buteo jamaicensis</i> ) SSHA = Sharp-shinned hawk ( <i>Accipiter striatus</i> ) TUVU = Turkey vulture ( <i>Cathartes aura</i> )				

Changes in the proposed alignment of the project area intersected additional goshawk habitat in October of 2008. These changes occurred after the goshawk survey window in 2008. In 2009, additional goshawk habitat was surveyed using a different survey methodology. The “Intensive search survey” methodology was used to survey approximately 389 acres in 2009. This survey effort involved two rounds of survey effort using a minimum of three biologists simultaneously. No northern goshawk responses or goshawk sign was documented during either of the two site visits.

Survey dates for the “intensive search survey” and incidental raptor observations are summarized in Table 6C. Maps of the survey areas for northern goshawks in 2008 and 2009 are available for review in Appendix A. Copies of the field data sheets for the 2009 survey effort are available for review in Appendix C.

**Table 6C. Northern Goshawk Intensive Search Survey Results Summary 2009**

Visit #	# of Stations	Date	N. Goshawk Response	Other Raptors Observed
1	C24-1	07/13/09	None	STVA (1) seen only, no audio response
1	A48	07/15/09	None	SSHA (1) heard only
2	B33	07/28/09	None	RTHA (1) seen only
2	C49	07/29/09	None	SSHA (1) seen and heard, plucking post observed near bird location
RTHA = Red-tailed hawk ( <i>Buteo jamaicensis</i> ) SSHA = Sharp-shinned hawk ( <i>Accipiter striatus</i> ) STVA= Barred Owl ( <i>Strix varia</i> )				

## 6. CONCLUSION

### 6.1. Northern Spotted Owl

During the 2008 and 2009 Northern spotted owl survey seasons, Turnstone conducted six site visits to each of the established spotted owl calling points. A total of 80 calling stations were established and surveyed in 2008 and 2009. Seven supplemental stations were added in 2009 adjacent to areas that were determined to have potential habitat. There were no observations or detections of spotted owls at any of the calling stations in



2008 or 2009. Turnstone also conducted an additional day visit to both nest cores (Mill Creek, Moss Creek) in 2008. In 2009 three additional day visits up and beyond the required three night visits were conducted. These visits were spread strategically throughout the nesting season in an attempt to see or hear spotted owls. The survey effort covered potentially suitable northern spotted owl habitat within the approximately 22,123 acres of survey area. Turnstone recorded no northern spotted owl observations or responses during any of the 10 site visits.

## **6.2. Western Gray Squirrel**

During the 2008 and 2009 western gray squirrel survey windows, Turnstone biologists conducted nest searches on 26 different polygons of potential western gray squirrel habitat. The first round of surveys occurred in the fall of 2008 with the second round soon to follow the spring of 2009. Approximately 738 acres of potential western gray squirrel habitat was surveyed in 2008 and 692 acres were surveyed in 2009. Turnstone biologists did not observe any Western gray squirrels or their nest structures during two site visits.

It should be noted that very few oak trees, a prime source of food for gray squirrels, were observed in the project area. . The few that were observed within the western gray squirrel survey area boundaries were small (less than 20 feet tall), stunted, and growing in openings on exposed rocky slopes in shallow soils. Sources of year round water are also important to populations of western gray squirrels. There were few observed year round water sources with the exception of a few drainages and one wetland area.

## **6.3. Northern Goshawk**

Turnstone conducted protocol northern goshawk surveys on SDS properties during the 2008 and 2009 goshawk survey windows. The survey protocol methodology used was the “broadcast acoustical survey” and “Intensive search survey” methodology, outlined in the protocol; “*Northern Goshawk Inventory and Monitoring Technical Guide, USFS, July 2006.*” Turnstone completed two protocol site visits at 136 calling stations, using the “broadcast acoustic survey”, during the 2008 and 2009 goshawk survey seasons. One



site visit was conducted during the nestling period and the second during the fledgling period as recommended in the protocol. No northern goshawk responses were documented during either of the two site visits.

The “Intensive search survey” methodology was used to survey approximately 389 acres on SDS and WDNR property. This survey effort involved two rounds of survey using three to four biologists simultaneously. No northern goshawk observations, responses or goshawk sign was documented during either of these two site visits.



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## Appendix A – Maps

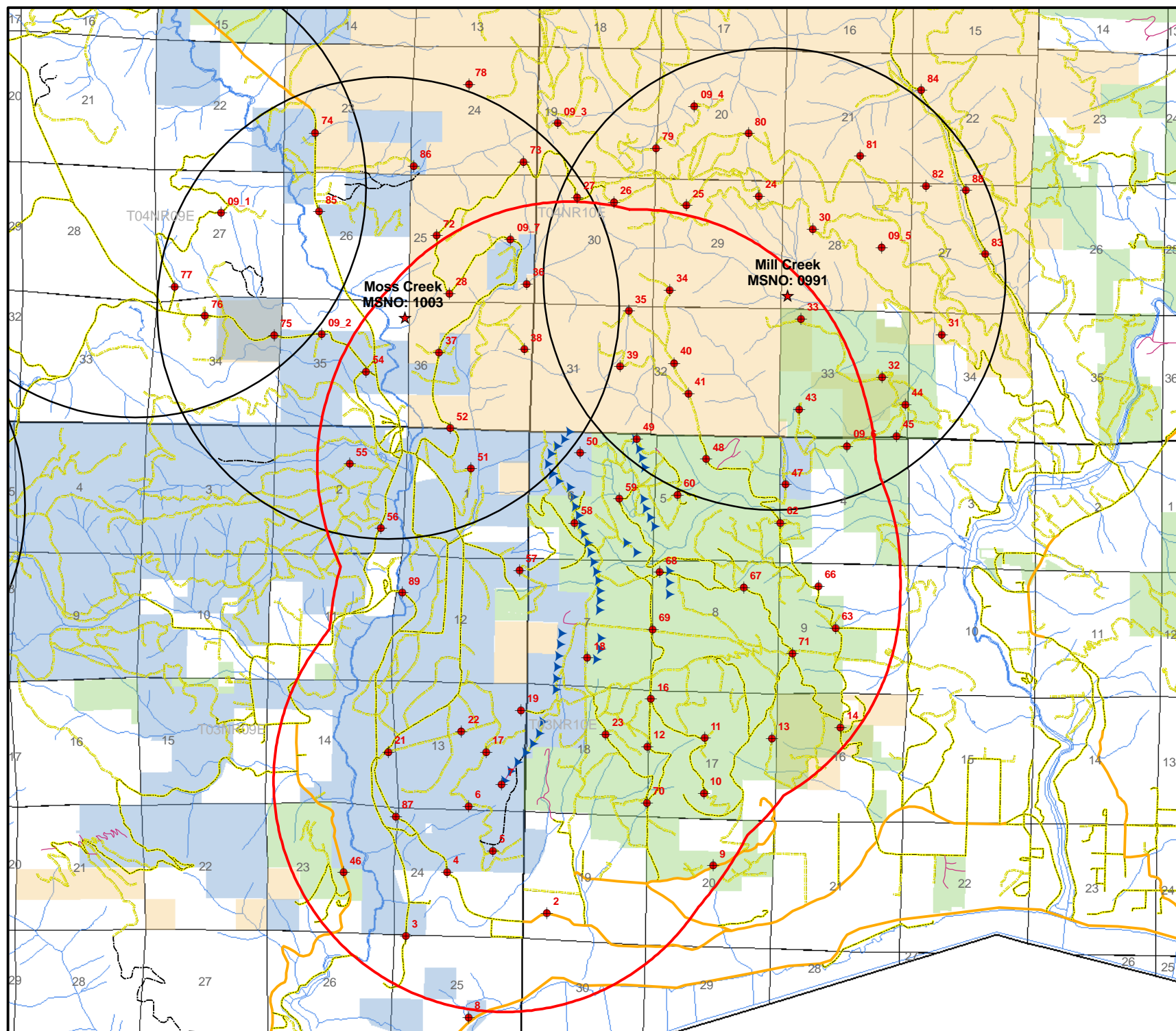


# Whistling Ridge NSO Survey 2008/2009 Spotted Owl Calling Points

## Legend

-  NSO Calling Points
-  Historic NSO Nests
-  Proposed Turbine Locations
-  Project Area (1.8 mile)
-  Historic NSO Nest Provincial Range
-  Other
-  HWY
-  DIRT
-  ROCK
-  TRAIL-4WD
-  SDS Ownership
-  BLC Ownership
-  DNR Ownership

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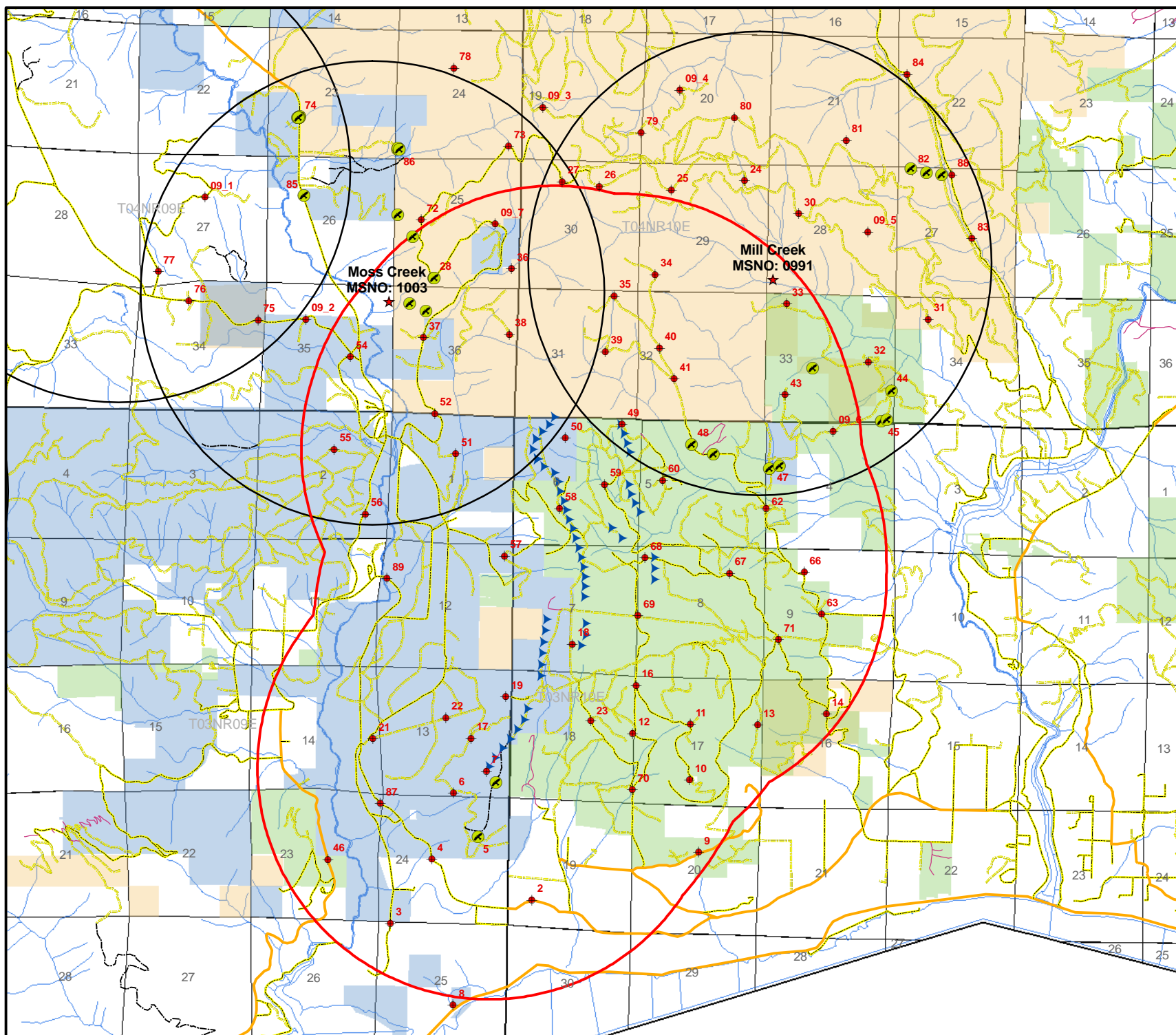


# Whistling Ridge NSO Survey 2008/2009 Barred Owl Detections

## Legend

-  SDS 2008/2009 Barred Owl Detections
-  NSO Calling Points
-  Proposed Turbine Locations
-  Historic NSO Nests
-  Other
-  HWY
-  DIRT
-  ROCK
-  TRAIL-4WD
-  Project Area (1.8 mile)
-  Historic NSO Nest Provincial Range
-  SDS Ownership
-  BLC Ownership
-  DNR Ownership








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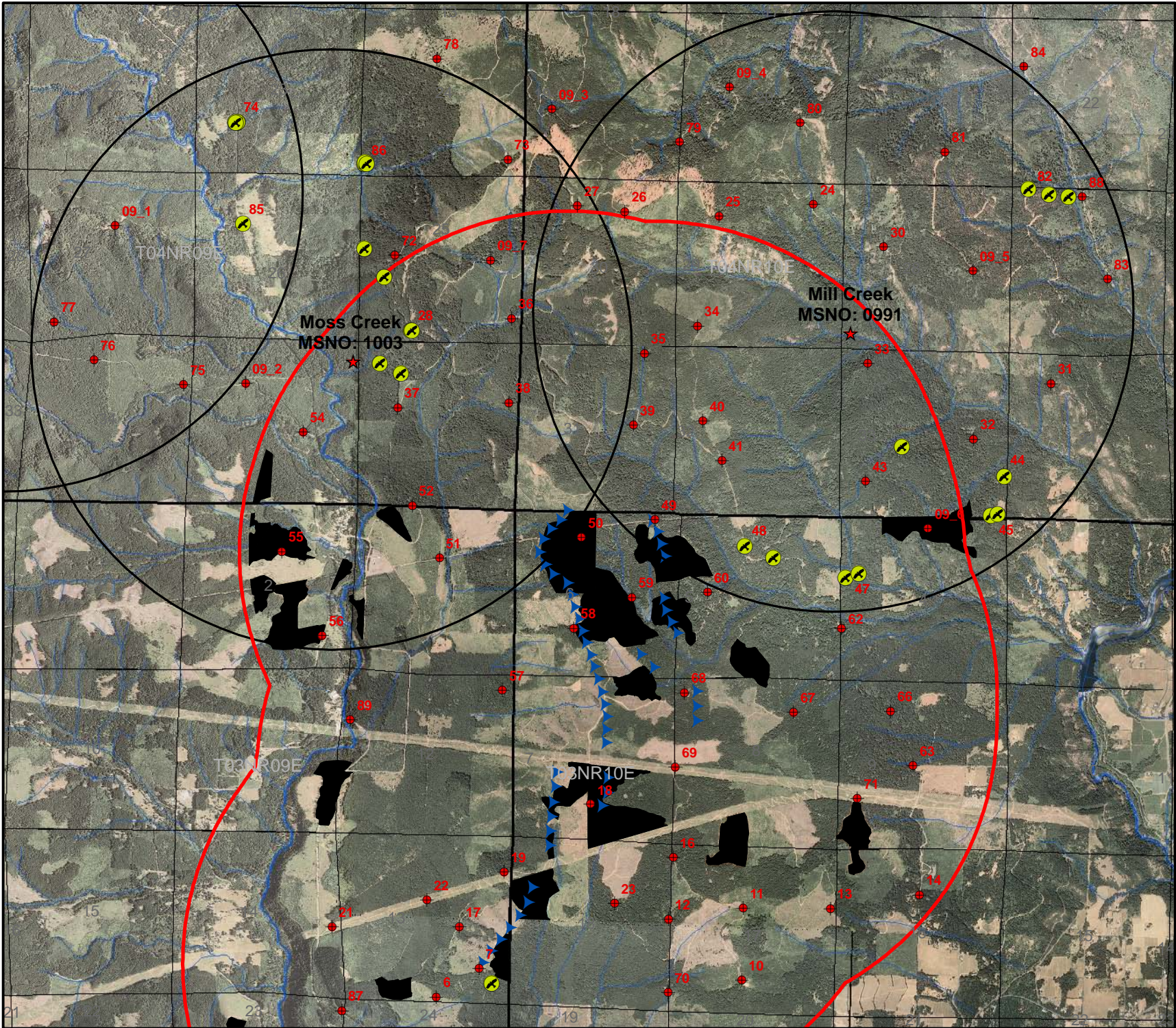




**Whistling Ridge  
NSO Survey  
2008/2009  
Barred Owl  
Detections**  
Aerial Photo  
North Half

**Legend**

-  SDS 2008/2009 Barred Owl Detections
-  NSO Calling Points
-  Historic NSO Nests
-  Proposed Turbine Locations
-  Project Area (1.8 mile)
-  Historic NSO Nest Provincial Range
-  Recent SDS Harvet (since 2006)










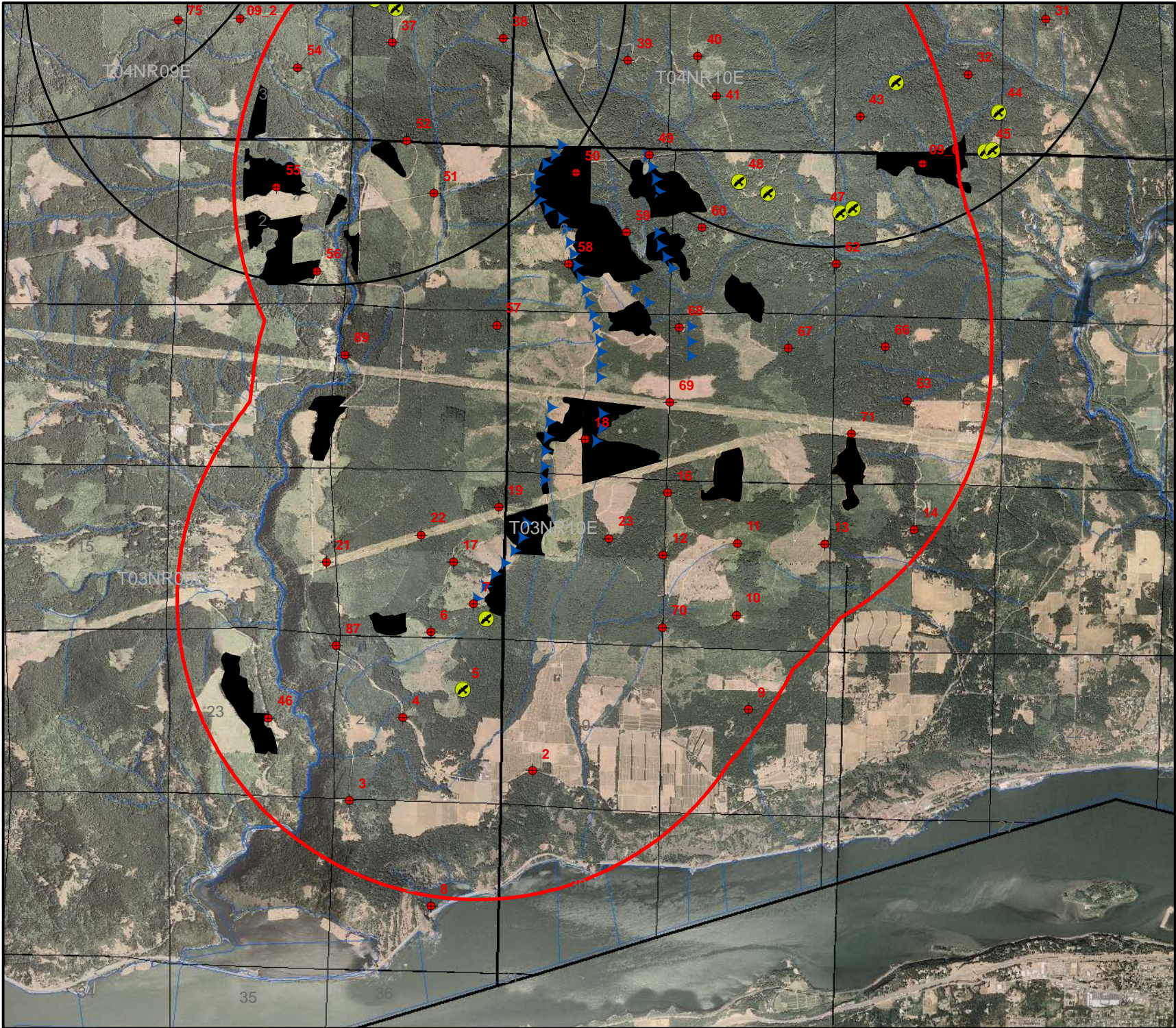
2006 NAIP Aerial Photo



# Whistling Ridge NSO Survey 2008/2009 Barred Owl Detections Aerial Photo South Half

## Legend












-  SDS 2008/2009 Barred Owl Detections
-  NSO Calling Points
-  Historic NSO Nests
-  Proposed Turbine Locations
-  Project Area (1.8 mile)
-  Historic NSO Nest Provincial Range
-  Recent SDS Harvet (since 2006)



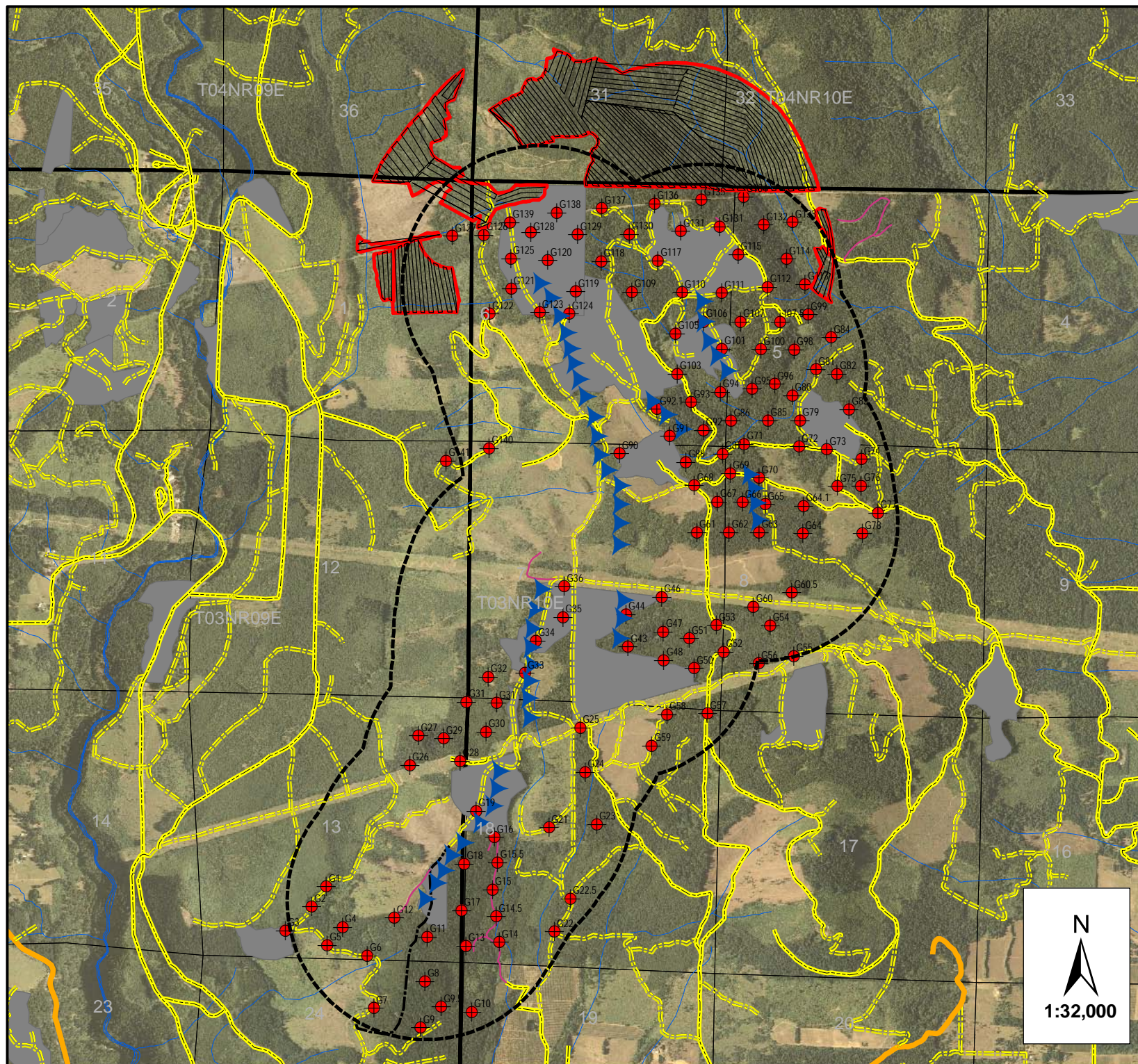
2006 NAIP Aerial Photo



# Whistling Ridge Project Area 2008/2009 Northern Goshawk Survey Areas

-  Intensive Search Survey Transects
-  Intensive Search Survey Area
-  Broadcast Acoustic Survey Points
-  Broadcast Acoustic Potential Survey Area Boundary
-  Proposed Wind Turbine Locations
-  Recent Harvest Blocks
- ROADS**
-  Other
-  HWY
-  DIRT
-  ROCK
-  TRAIL-4WD

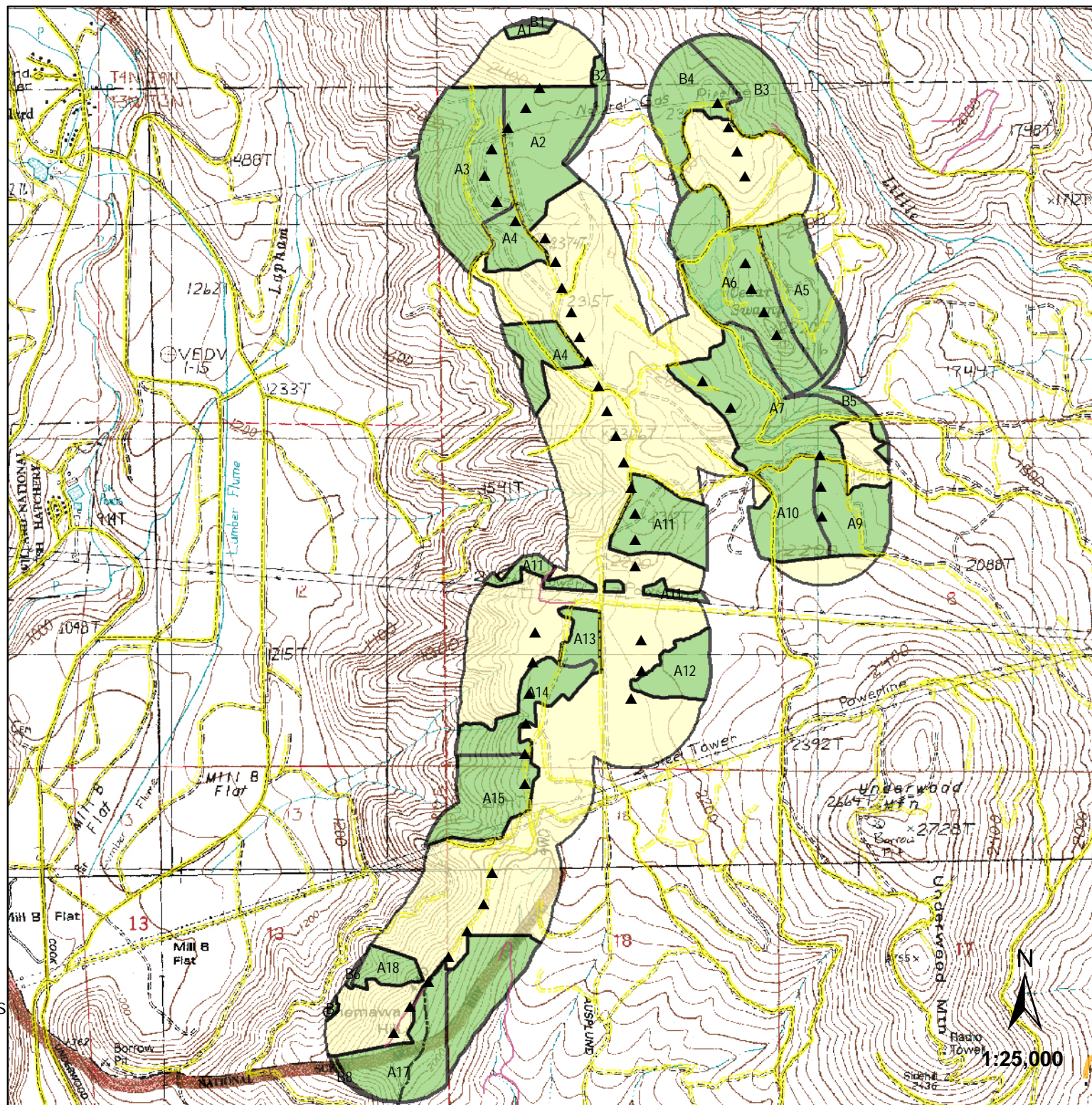
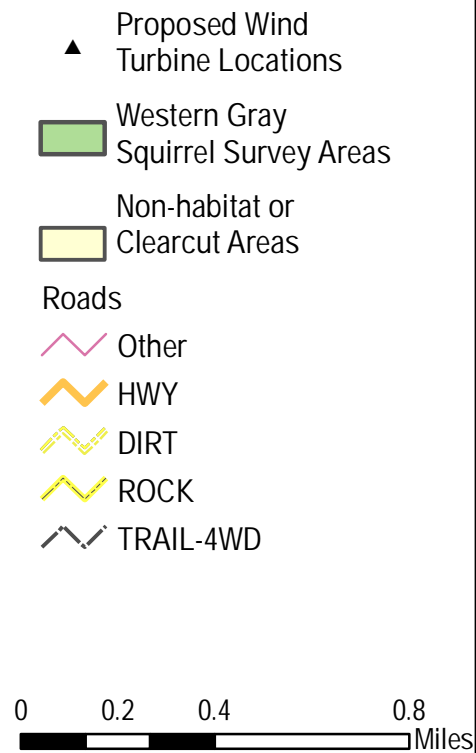
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# Whistling Ridge Project Area

## Western Gray Squirrel Survey Areas Overview Map



## Appendix B – Northern Spotted Owl Survey Forms





# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 1

Project Area: WALSHING RIDGE

Crew: Wade Perkins

Month: 5 Day: 11, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	1/4	NAD83-GPS data only	
2		2035	2045	2	OC	N														
4		2050	2100	2	OC	N														
3		2106	2116	2	OC	N														
87		2121	2131	2	OC	N														
21		2135	2145	2	OC	N														
89		2153	2203	2	OC	N														
46		2221	2231	2	OC	A	U	A	GLGN	Stan	2223	2231	75°	800ft	3N	10E	23	NE		
22		2257	2307	3	OC	N														
17		2312	2322	3	OC	N														
6	X	1820	1830	3	OC	N														
5	X	1858	1908	3	OC	N														
23		0009	0019	3	OC	N														
19		0030	0040	3	PC	N														
7		0046	0056	3	PC	N														
18		0104	0114	3	PC	N														
57		0128	0138	3	PC	N														
58		0147	0157	3	PC	N														
50		0203	0213	3	PC	N														
59		0217	0227	3	PC	N														
49		0235	0245	3	PC	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 1

Crew: Wade Perkins

Month: 5 Day: 11, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 1

Project Area: WHISTLING RIDGE

Crew: Wade Perkins

Month: 5 Day: 12, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	1/4	NAD83-GPS data only	
9		2025	2035	2	DR	N														
70		2044	2054	3	DR	N														
12		2059	2109	2	DR	N														
16		2113	2123	2	PC	N														
69		2128	2138	3	PC	N														
68		2142	2152	3	PC	N														
67		2158	2208	3	PC	N														
62		2214	2224	3	DR	N														
66		2231	2241	3	DR	N														
63		2245	2255	3	DR	A	U	U	GLGN	Stan	2247	2255	270°	500	3N	10E	9	NW		
71		2301	2311	3	DR	N														
14		2318	2328	3	PC	N														
13		2350	0000	3	PC	N														
10		0011	0021	3	PC	N														
11		0031	0041	3	PC	N														
56		0129	0139	2	DR	N														
55		0144	0154	1	DR	N														
54		0201	0211	2	DR	N														
09-2		0216	0226	2	PC	N														
75		0230	0240	2	PC	A	U	U	AEAC	Stan	0230	0236	170°	150	4N	10E	34	NE		

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SDS

Owl Site(s): Moss Creek

Visit # 1

Project Area: WAIBTLING RIDGE

Crew: Wade Perkins

Month: 5 Day: 13, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code					Type(s)	Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	¼	NAD83-GPS data only	
76		2036	2046	1	PC	N														
77		2051	2101	2	PC	N														
09-1		2111	2121	2	PC	N														
86	X	1905	1915	2	PC	N														
74		2133	2143	2	PC	N														
85		2147	2157	2	PC	N														
51		2209	2219	2	DR	N														
52		2224	2234	2	DR	N														
37		2238	2248	2	DR	A	U	A	STVA	8	2242	2248	340°	1500	4N	10E	6	NW		
38		2257	2307	2	PC	A	U	U	GLGN	Stan	2300	2307	20°	300	4N	10E	6	NE		
36		2313	2323	2	PC	N														
09-7		2328	2338	2	PC	N														
28		2342	2352	2	PC	N														
72		2357	0007	3	PC	A	U	A	STVA	A	2359	0006	210°	800A	4N	10E	25	SW		
73		0012	0022	3	PC	N														
27		0028	0038	3	PC	N														
26		0042	0052	3	PC	N														
09-3		0102	0112	3	PC	N														
78		0129	0139	3	PC	N														
79		0204	0214	3	PC	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

## Page 2 of 2 (including maps)

Visit # 1

Month: 5 Day: 13, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

**Comments:**



# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SDS

Owl Site(s): Mill Creek

Visit # 1

Project Area: WHISTLING RIDGE

Crew: Wade Perkins

Month: 5 Day: 14, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	¼	NAD83-GPS data only	
48		2052	2102	2	PC	N														
41		2107	2117	2	PC	N														
39		2123	2133	2	PC	N														
40		2139	2149	2	PC	N														
35		2158	2208	2	PC	N														
34		2214	2224	2	PC	N														
47		2246	2256	2	PC	N														
43	X	2315	2325	2	CL	A	U	A	STVA	8	2317	2320	10°	800	4N	10E	33	SW		
09-6		2350	0000	1	CL	N														
45		0007	0017	1	PC	N														
44	X	1805	1815	1	CL	N														
32	X	1836	1846	1	CL	N														
33	X	1921	1931	1	CL	N														
31		0038	0048	2	PC	N														
30		0059	0109	2	PC	N														
09-5		0117	0127	2	PC	N														
24		0139	0149	2	PC	N														
81		0206	0216	2	PC	N														
82		0223	0233	2	PC	A	U	U	AEAC	Stan	0226	0231	150°	500	4N	10E	27	NW		
83		0253	0303	3	PC	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

## Page 2 of 2 (including maps)

Visit # 1

Month: 5 Day: 14, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: WHISTLING RIDGE

Crew: DARREN BOLEY

Month: 06 Day: 17, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuited (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	%		
2		1950	2000	3	PC	NR														
4		2003	2013	3	PC	NR														
3		2017	2027	3	PC	NR														
		@ 2028 approached by man in truck asking questions who I was with (said he made them wildlife refuge)																		
87		2033	2043	2	PC	NR														
21		2046	2056	2	PC	NR														
22		2101	2111	3	PC	NR														
17		2117	2127	3	PC	NR														
19		2140	2150	3	PC	NR														
7		2159	2209	3	PC	A	U	A	STVA	8	2206	2209	130	600	03N	09E	13	SE		
18		2235	2245	3	PC	NR														
23		2250	2300	2	PC	NR														
70		2305	2315	2	CL	NR														
12		2319	2329	2	CL	NR														
16		2332	2342	2	CL	NR														
11		2348	2358	2	CL	NR														
10		0002	0012	2	CL	NR														
69		0035	0045	1	CL	NR														
68		0048	0058	1	CL	NR														
67		0102	0112	1	CL	NR														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile. Species: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments: BEAR ON ROAD BELOW STATION 7

Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 2

Crew: DARAN BOLEN

Month: 06 Day: 17, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barned Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, S = S Note call (STVA only), Stan = (standard) other non-*Strix* owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SPS

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: WHISTLING RIDGE

Crew: D. SATL

Month: 06 Day: 17, ~~2009~~ 2009

Tape/Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph), 2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph), 4+ = Unstable (13+ mph)  
Weather Codes: CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow

ST#	Miles	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location			
		Begin	End								Initial	Final			Town	Range	Section	%
44		2034	2044	0	PC	N												
✓ 88		2048	2100	0	PC	A	U	A	STVA	8	2051	2100	270	400				
83		2104	2114	0	PC	N												
31		2038	2048	2	PC	N												
82		2106	2116	1	PC	N												
09-5		2139	2148	3	PC	N												
30		2152	2202	2	CL	N												
41		2225	2225	1	CL	N												
24		2233	2243	1	CL	N												
40		2250	2300	3	CL	N												
25		2306	2316	1	CL	N												
79		2326	2336	1	CL	N												
09-4		2344	2354	3	CL	N												
09-3		0010	0020	1	CL	N												
78		0039	0049	3	CL	N												
26		0105	0115	2	CL	N												
27		0119	0129	3	CL	N												
73		0132	0142	3	CL	N												
22		0146	0156	2	CL	N												
✓ 28		0159	0213	1	CL	A	M	A	STVA	A/CO	0209	0212	180	50				

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile. Species: Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = other non-Strix owls

Comments: Some noise from back CRK. @ STA. #15 8/1/03

09-5: wind gusts of 3-4



Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 2

Crew: V. SAHL

Month: 06 Day: 17, ~~June~~ 2009

Block/Area ID: \_\_\_\_\_

2 = Light breeze (4-7 mph). 3 = Gentle breeze (8-12 mph).

4+ = Unsuitable (13+ mph)

PC = Partly Cloudy.

**OC = Overcast.**

DR = Drizzle.

RM = Rain. SN = Snow

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, S = S Note call (STVA only), Stan = other non-Strix owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 3 (including maps)

Survey Area: SDS  
Project Area: WHIT + LING RIDGE  
Tape Voice Flute Other: \_\_\_\_\_

Owl Site(s): \_\_\_\_\_ Visit # 2  
Crew: D. SAHL Month: Oct Day: 18, 2009  
Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	%		
32A	Y	1956	2010	1	PL	A	M	A	STVA	B, A	1956	2008	200	600						
33	Y	2027	2037	1	PL	N														
32	Y	2055	2105	1	PL	N														
44		2112	2122	1	PL	N														
45		2125	2135	2	PL	N														
09-6		2138	2148	3	PL	N														
43	Y	2206	2216	3	PL	N														
47		2229	2239	1	PL	N														
48		2244	2254	2	PL	A	U	A	STVA	A	2253	2254	256	40						
34		2305	2315	3	PL	N														
35		2324	2334	2	PL	N														
40		2346	2358	2	OC	N														
41		2353	0003	2	OC	N														
39		0008	0018	1	OC	N														
50		0049	0059	1	OC	N														
49		0103	0113	1	OC	N														
60		0134	0144	1	OC	N														
59	Y	0157	0207	2	OC	N														
63		0220	0230	1	DR	N														
66		0233	0243	1	DR	N														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments: 32A: Incidental station, called continuously on hike into Sta. 32/33 @ dusk, started hike @ 1922.  
45: Moved Sta. up Road due to new clear cut + BARK TRAP. (most adjacent habitat has been cut).  
48: BIRD IN TREE just off Road.  
\* Bird 3 is a male of where Sta. 32A was located

## Page 2 of 3 (including maps)

Visit # 2

Month: 06 Day: 18, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 2

Project Area: WHISTLING RIDGE

Crew: DARRIN ROLEN

Month: 06 Day: 18, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuited (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final			Town	Range	Sect	%		
5	X	1840	1850	3	PC	B	U	A	STVA	8, A	1842	1850	60	50	03 N	09 E	24	SE		
6	X	1903	1913	3	PC	NR														
57		1935	1945	2	PC	NR														
38		2010	2020	2	PC	NR														
37		2030	2040	2	PC	A	U	A	STVA	8	2036	2038	12	1000	04 N	09 E	36	NW		
52		2044	2054	2	PC	NR														
51		2104	2114	2	PC	NR														
54		2122	2132	1	PC	NR														
09-2		2135	2145	1	PC	NR														
75		2147	2157	1	PC	NR														
76		2159	2209	1	PC	NR														
77		2213	2223	1	PC	A	U	A	GLGN	STAN	2316	2322	230	500	04 N	09 E	27	SW		
09-1		2231	2241	1	PC	NR														
85		2300	2310	1	PC	B	U	A	STVA	B	2308	2310	90	20	04 N	09 E	26	NW		
74		2314	2324	1	PC	B	M	A	STVA	8	2321	2324	20	20	04 N	09 E	23	SW		
74		2314	2324	1	PC	B	F	A	STVA	8, A	2321	2324	20	20	04 N	09 E	23	SW		
86		2334	2344	1	PC	NR														
55		2355	0005	1	PC	NR														
56		0010	0020	1	PC	NR														
89		0025	0035	1	PC	NR														

Time: Military format (midnight is 0000). Resp. Codes: N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. Sex: M = male, F = female, U = unknown. Age: A = adult, S = subadult, J = juvenile Species. Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. Call Type(s): 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments: -HIKED STATIONS 5 & 6 WITH CHAINSAW, CLEARED ROAD FOR NEXT SURVEY.  
-09-1 NEEDS SMALL VEHICLE  
-CALLED ST TWICE DUE TO EARLY START

## Page 2 of 2 (including maps)

Visit # 2

Month: 06 Day: 18, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Banded Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl. OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

**Comments:**



# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: WHISTLING RIDGE

Crew: Wade Perkins

Month: 7 Day: 21, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: Moss Creek MSNO 100?

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp.	Sex	Age	Species	Call	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code	code				Type(s)	Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	¼	NAD83-GPS data only	
09-1		2038	2048	2	CI	N														
77		2053	2103	2	CI	N														
76		2107	2117	2	CI	N														
75		2121	2131	2	CI	N														
09-2		2134	2144	2	CI	N														
54		2149	2159	2	CI	N														
85		2206	2216	2	PC	N														
86		2227	2237	2	PC	N														
74		2247	2257	2	PC	N														
78		2319	2329	3	PC	N														
09-3		2336	2346	3	PC	N														
27		2353	0003	3	PC	N														
73		0008	0018	3	PC	N														
72		0025	0035	3	PC	A	U	A	STVA	A	0029	0035	280°	900ft	4N	9E	25	AW		
28		0039	0049	3	PC	N														
09-7		0055	0105	3	CI	N														
36		0112	0122	2	CI	N														
38		0132	0142	2	CI	N														
37		0151	0201	2	CI	N														
52		0205	0215	2	CI	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments:

## Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Crew: Wade Perkins

Block/Area ID: Moss Creek MSNO 1003

Weather Codes: **CL** = Clear **FG** = Fog **PC** = Partly Cloudy **OC** = Overcast **DR** = Drizzle **LR** = Light Rain **HR** = Heavy Rain (unsuitable) **SN** = Snow, **H** = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

WP  
Page ~~18~~ of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: WHISTLING RIDGE

Crew: Wade Perkins

Month: 7 Day: 22, 2009

Tape/Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)  
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
49		2032	2042	3	PC	N														
50		2047	2057	3	PC	N														
60		2101	2111	3	PC	N														
59		2116	2126	3	PC	N														
68		2132	2142	2	PC	N														
67		2146	2156	2	PC	N														
69		2203	2213	2	PC	N														
16		2217	2227	2	PC	N														
11		2231	2241	3	PC	A	U	U	GLGN	Stan	2234	2240	190°	600ft	3N	10E	17	NW		
10		2245	2255	3	PC	N														
18		2304	2314	3	PC	N														
19		2320	2330	3	PC	N														
7		2335	2345	3	PC	N														
23		2350	0000	3	PC	N														
12		0009	0019	3	PC	N														
70		0024	0034	3	PC	N														
9		0041	0051	3	PC	N														
13		0106	0116	2	PC	N														
71		0120	0130	2	PC	N														
14		0135	0145	2	PC	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = Strix-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-Strix owls

Comments:

## Page 2 of 2 (including maps)

Owl Site(s): \_\_\_\_\_

Visit # 3

Crew: Wade Perkins

Month: 7 Day: 22 . 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

**Comments:**

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 2 (including maps)

Survey Area: SOS

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: WHISTLING RIDGES

Crew: Wade Perkins

Month: 7 Day: 23, 2009

Tape Voice Flute Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph), 2 = Light breeze (4-7 mph), 3 = Gentle breeze (8-12 mph), 4+ = Unsuited (13+ mph)

Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind Code	Weather Code	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing (Azimuth)	Dist (feet)	Location				UTMX NAD83-GPS data only	UTMY
		Begin	End								Initial	Final			Town	Range	Sect	1/4		
55		2036	2046	3	PC	N														
56		2051	2101	3	PC	N														
59		2106	2116	3	PC	N														
57		2127	2137	3	PC	N														
58		2144	2154	3	PC	N														
21		2214	2224	2	PC	N														
22		2229	2239	2	PC	N														
17		2243	2253	2	PC	N														
6		2258	2308	2	PC	N														
5		2313	2323	2	PC	N														
87		2338	2348	2	PC	N														
4		2352	0002	2	PC	N														
3		0012	0022	2	PC	N														
2		0040	0050	2	CI	N														
46		0108	0118	2	CI	N														
8		0126	0136	2	CI	N														
48		0158	0208	2	CI	N														
41		0212	0222	2	CI	N														
39		0226	0236	2	CI	A	U	U	GLGN	Stan	0229	0236	220°	2000	4N	10E	31	SE		
40		0242	0252	2	CI	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** **Codes:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

STVA visual 0155 flying off road before STA 48  
Unknown sex - Unknown age



## Page 2 of 2 (including maps)

Visit # 3

Month: 7 Day: 23, 2009

Block/Area ID: \_\_\_\_\_

**Weather Codes:** CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow H = Hail

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** Codes: STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments:

# Turnstone Environmental Consultants NSO Survey Form

Page 1 of 1 (including maps)

Survey Area: SDS

Owl Site(s): \_\_\_\_\_

Visit # 3

Project Area: WHISTLER RIDGE

Crew: D. SAHL

Month: 07 Day: 24, 2009

Tape/Voice/Flute/Other: \_\_\_\_\_

Block/Area ID: \_\_\_\_\_

Wind Codes: 0 = Calm (<1 mph), 1 = Light air (1-3 mph) 2 = Light breeze (4-7 mph) 3 = Gentle breeze (8-12 mph) 4+ = Unsuitable (13+ mph)

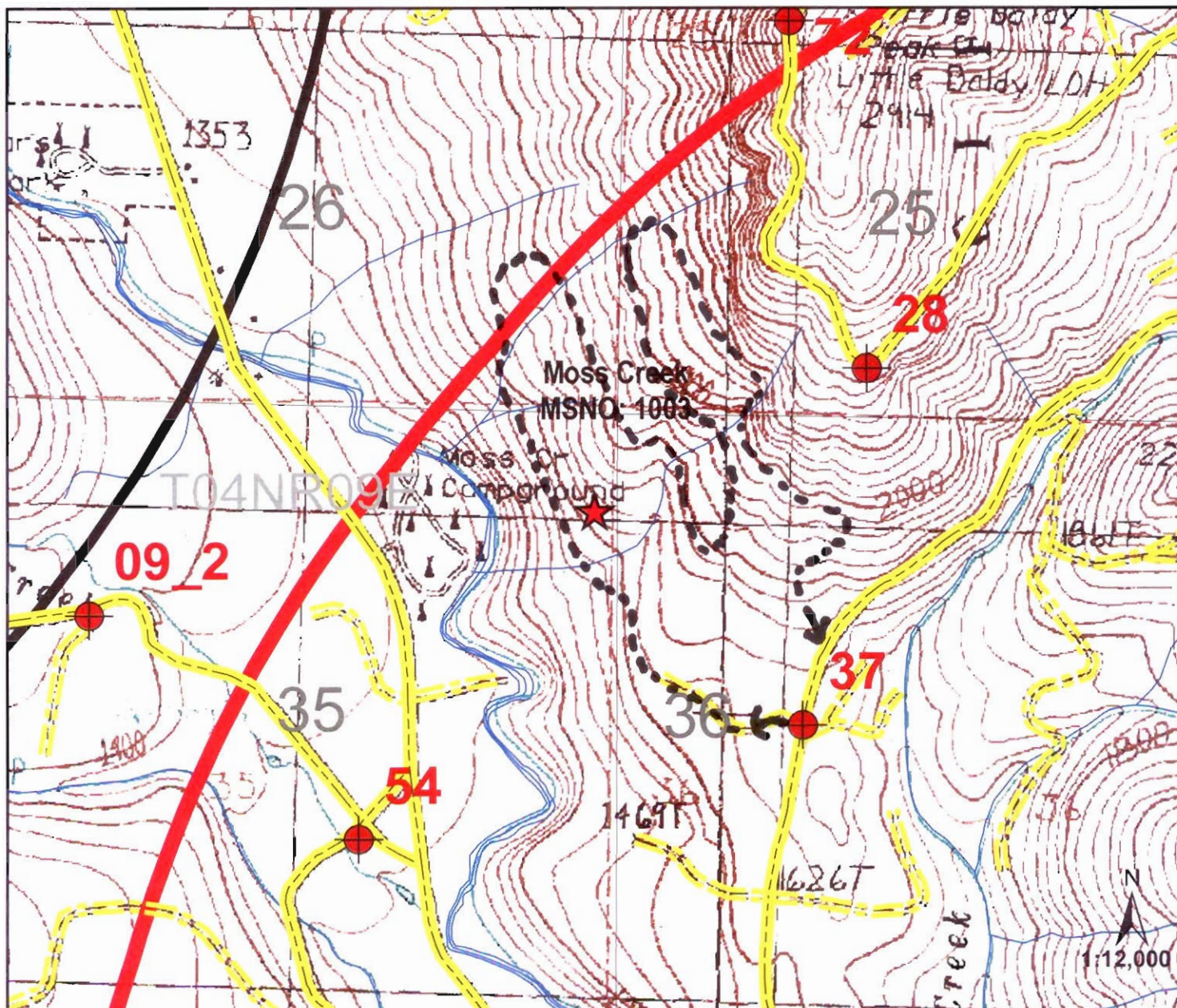
Weather Codes: CL = Clear FG = Fog PC = Partly Cloudy OC = Overcast, DR = Drizzle LR = Light Rain HR = Heavy Rain (unsuitable) SN = Snow, H = Hail

ST#	Hike	Time		Wind	Weather	Resp. code	Sex	Age	Species	Call Type(s)	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	Code						Initial	Final	(Azimuth)	(feet)	Town	Range	Sect	1/4	NAD83-GPS data only	
33		2021	2035	2	CL	N														
32		2100	2110	0	CL	N														
44		2122	2132	1	CL	N														
45		2136	2146	1	CL	N														
83		2203	2213	0	CL	N														
88		2216	2226	0	CL	N														
84		2230	2240	0	CL	N														
31		2255	2305	0	CL	N														
82		2317	2327	0	CL	N														
09-5		2336	2346	1	CL	N														
81		2355	0005	0	CL	N														
30		0014	0024	0	CL	N														
24		0028	0038	0	CL	N														
40		0051	0101	0	CL	N														
25		0113	0123	0	CL	N														
79		0129	0139	0	CL	N														
09-4		0148	0158	1	CL	N														
26		0209	0219	1	CL	N														
09-6		0255	0305	1	CL	N														
43	Y	0326	0336	2	CL	N														

**Time:** Military format (midnight is 0000). **Resp. Codes:** N = no owl response, A = audio response only, V = visual response only, B (or A, V) = both audio and visual response. **Sex:** M = male, F = female, U = unknown. **Age:** A = adult, S = subadult, J = juvenile **Species:** STOC = Northern Spotted Owl, STVA = Barred Owl, STRIX = *Strix*-species unknown, STNE = Great Gray Owl, BUVI = Great Horned Owl, AEAC = Northern Saw-whet Owl, OTKE = Western Screech Owl, GLGN = Northern Pygmy, TYAL = Barn Owl, OTFL = Flammulated Owl. **Call Type(s):** 4 = 4 Note Call (STOC Only), A = Agitated, B = Bark, CO = Contact Call, JB = Juvenile Begging, W = Whistle/Nest Call, 8 = 8 Note call (STVA only), Stan = (standard) other non-*Strix* owls

Comments: 43: Couple of Down Logs on RP.





TWN: 4N RNG: 9E Sec: 25, 26, 35, 36 1/4 Sec: — 1/16 Sec: — Date: 06/19/09 Obs: DARRIN BOLDEN

Resp T: — Start T: 1115 End T: 1420 Wind: 1 Weather: PC Time(D/N): D Visit Type: RO Resp Type: NR

# Mice out: — # Mice taken: —

# Adults/Sub: Males (spp.): — # Females (spp.): — Pair Status: — Sex Unk(spp): — # Juveniles: — # Fledglings: —

Nest: Status — Nest Loc — Nest# — Nest Location UTM (nad83) Xcoord: — Ycoord: —

Please Provide Visit Notes & Description of Events:

HIKED ROUTE DRAWN IN ON MAP NO RESPONSE.  
BROADCAST WITH PA, HOOT FLUTE. MAJORITY OF  
HABITAT LOCATED NEAR OLD NEST TREE.

----- ROUTE HIKED

NR = NO RESPONSE

ROADS	
	Other
	HWY
	DIRT
	ROCK
	TRAIL-4WD
	SDS NSO Calling Points
	Historic NSO Nests

Observation Location UTM (nad83) Xcoord: — Ycoord: — Record All Bird and Band Details on Reverse:

Date: 06/19/09 Observer: DARREN BOLDEN Page: 2 of 2

Male: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

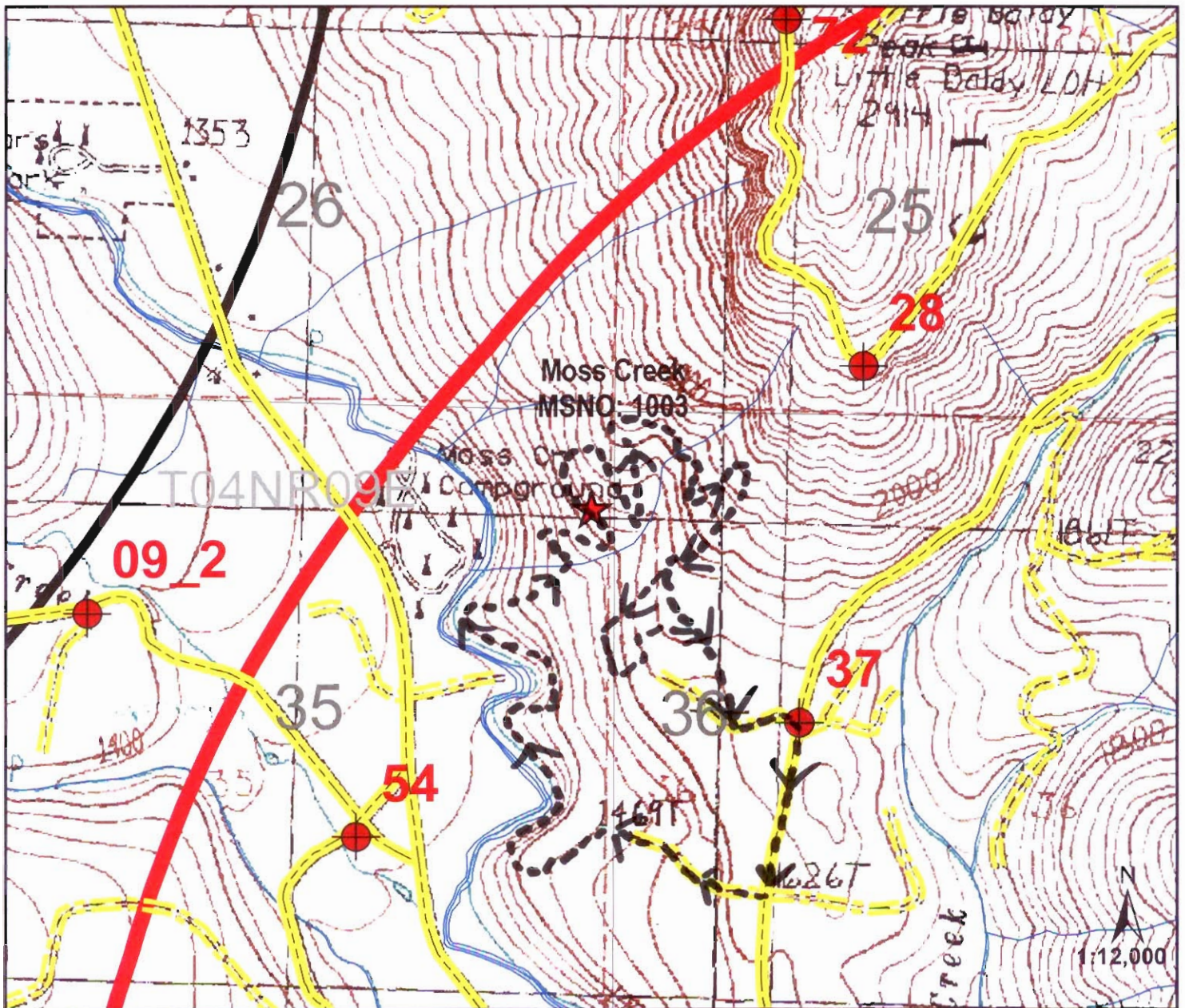
Y2: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

NO SPOT OBSERVED





TWN: 4N RNG: 9E Sec: 35/36 1/4 Sec: — 1/16 Sec: — Date: 7/22/09 Obs: D. SAHL / J. VOTOS

Resp T: — Start T: 1541 End T: 1858 Wind: 2 Weather: CL Time(D/N): D Visit Type: RO Resp Type: NR

# Mice out: — # Mice taken: —

# Adults/Sub: Males (spp.): — # Females (spp.): — Pair Status: — Sex Unk(spp): — # Juveniles: — # Fledglings: —

Nest: Status — Nest Loc — Nest# — Nest Location UTM (nad83) Xcoord: — Ycoord: —

**Please Provide Visit Notes & Description of Events:**

Hiked Route Drawn on Map. Two observers were used for this visit. Broadcast with voice, Hoot Flute and PA system. Majority of quality habitat is around old nest core. No spaw observed or detected.

--- ROUTE  
HIKED

ROADS	
	Other
	HWY
	DIRT
	ROCK
	TRAIL-4WD
	SDS NSO Calling Points
	Historic NSO Nests

Observation Location UTM (nad83) Xcoord: — Ycoord: — Record All Bird and Band Details on Reverse:



Date: 7/22/09 Observer: P. SAHL / J. VOTOS Page: 2 of 2

Male: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

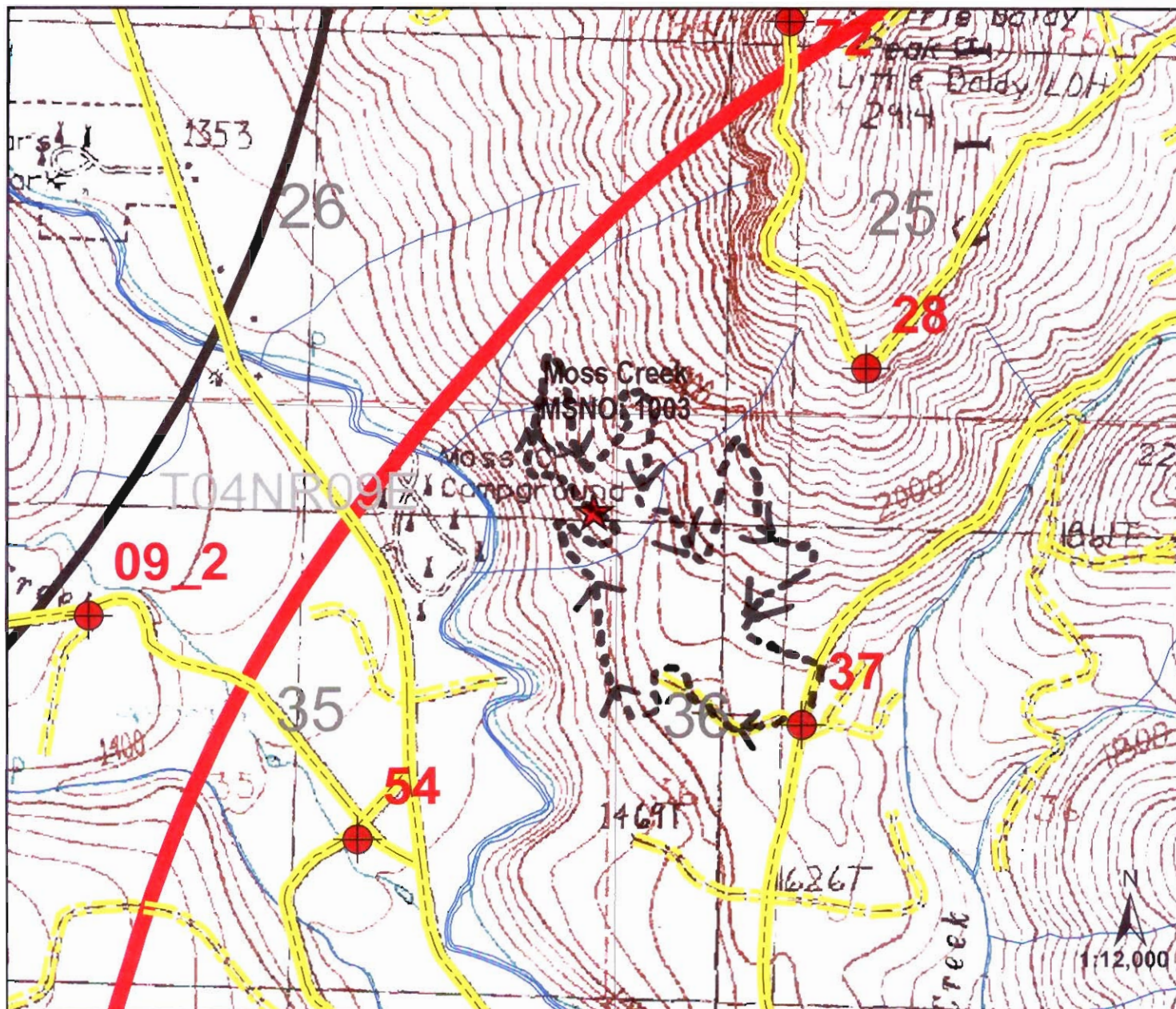
Y2: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

NO ISO Detected or OBSERVED during VBit





TWN: 4N RNG: 9E Sec: 25/26/35/36 1/4 Sec: — 1/16 Sec: — Date: 8/7/2009 Obs: D. SAHL

Resp T: — Start T: 1545 End T: 1900 Wind: 1 Weather: CL Time(D/N): D Visit Type: RO Resp Type: NR

# Mice out: — # Mice taken: —

# Adults/Sub: Males (spp.): — # Females (spp.): — Pair Status: — Sex Unk(spp): — # Juveniles: — # Fledglings: —

Nest: Status — Nest Loc — Nest# — Nest Location UTM (nad83) Xcoord: — Ycoord: —

Please Provide Visit Notes & Description of Events:

Hiked Route on Map. Broadcast calls w/ voice, PA and Host flute. Sharp shinned hawk heard in the area, south of old nest core. No NSO observed or Detected.

--- Route  
Hiked

ROADS	
	Other
	HWY
	DIRT
	ROCK
	TRAIL-4WD
	SDS NSO Calling Points
	Historic NSO Nests

Observation Location UTM (nad83) Xcoord: — Ycoord: — Record All Bird and Band Details on Reverse:



Date: 6/7/2009 Observer: D. SAHL Page: 2 of 2

Male: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

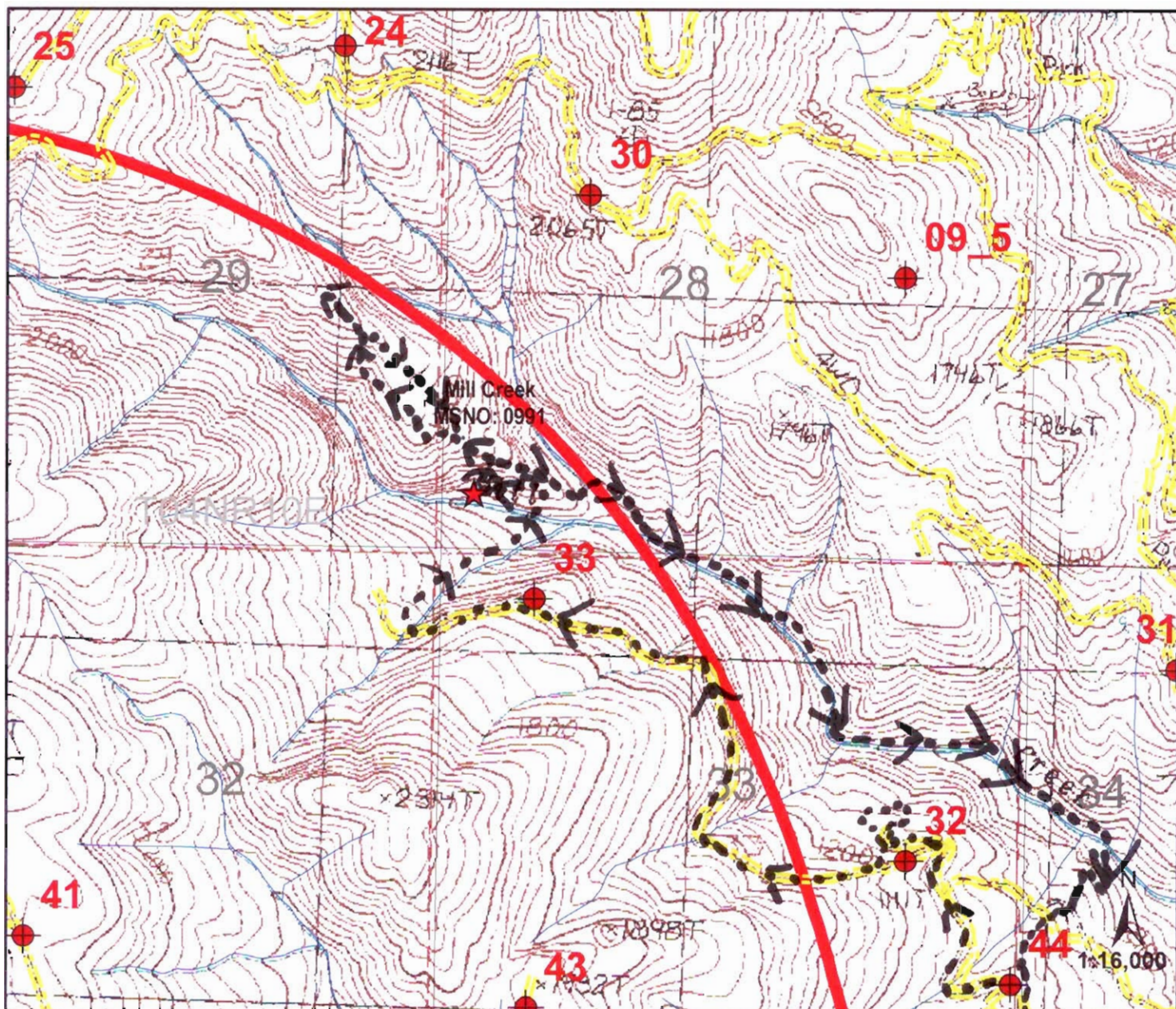
Y2: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

NO NSO OBSERVED or Detected During VISIT.





TWN: 4N RNG: 10E Sec: 31/32/33/1/4 Sec: — 1/16 Sec: — Date: 06/19/09 Obs: D. SAHL

Resp T: — Start T: 1100 End T: 1733 Wind: 1 Weather: PC Time(D/N): D Visit Type: RO Resp Type: NR

# Mice out: — # Mice taken: —

# Adults/Sub: Males (spp.): — # Females (spp.): — Pair Status: — Sex Unk(spp): — # Juveniles: — # Fledglings: —

Nest: Status — Nest Loc — Nest# — Nest Location UTM (nad83) Xcoord: — Ycoord: —

Please Provide Visit Notes & Description of Events: ----- = Route HIKED

HIKED Route Drawn on Map. Broadcast with Voice, Host Flute and PA system. Older forest type near historic nest core and further upstream from that area. would advise others to access old nest core from top down (follow Ridge to Decom RD.) Due to creek Route being slow.  
NO RESPONSE from NSO during visit!

ROADS	
	Other
	HWY
	DIRT
	ROCK
	TRAIL-4WD
	SDS NSO Calling Points
	Historic NSO Nests

Observation Location UTM (nad83) Xcoord: — Ycoord: — Record All Bird and Band Details on Reverse:



Date: 06/19/09 Observer: D. Sahl Page: 2 of 2

Male: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

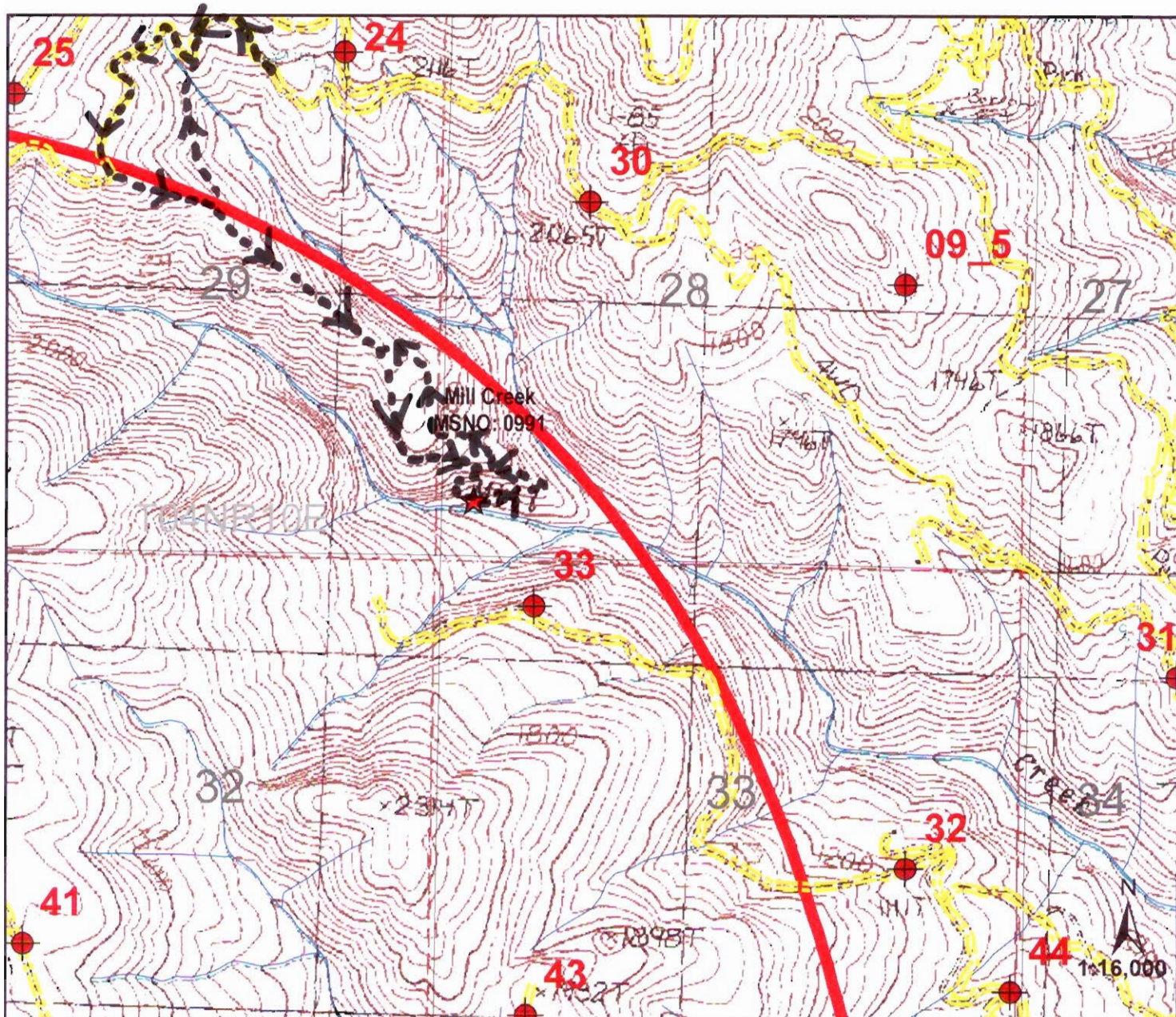
Y2: Obs Type: NONE OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

NO IGO OBSERVED OR DETECTED DURING VISIT.  
NR = NO RESPONSE





TWN: 4N RNG: 10E Sec: 29/29 1/4 Sec: — 1/16 Sec: — Date: 7/25/09 Obs: D. Sahl

Resp T: — Start T: 1100 End T: 1517 Wind: Ø Weather: CL Time(D/N): D Visit Type: RO Resp Type: N12

# Mice out: — # Mice taken: —

# Adults/Sub: Males (spp.): — # Females (spp.): — Pair Status: — Sex Unk(spp): — # Juveniles: — # Fledglings: —

Nest: Status — Nest Loc — Nest# — Nest Location UTM (nad83) Xcoord: — Ycoord: —

Please Provide Visit Notes & Description of Events:

Hiked route drawn on map. Broadcast NSO calls with Voice, Hoot Flute and PA system. Ridge Dam hike is significantly easier than going up Mill Creek. Majority of high quality habitat is near old nest cores and around the bottom of the drainage. No NSO detected or observed.

--- = Route Hiked

ROADS	
	Other
	HWY
	DIRT
	ROCK
	TRAIL-4WD
	SDS NSO Calling Points
	Historic NSO Nests

Observation Location UTM (nad83) Xcoord: — Ycoord: — Record All Bird and Band Details on Reverse:



Date: 07/25/2009 Observer: D. Sahl Page: 2 of 2

Male: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

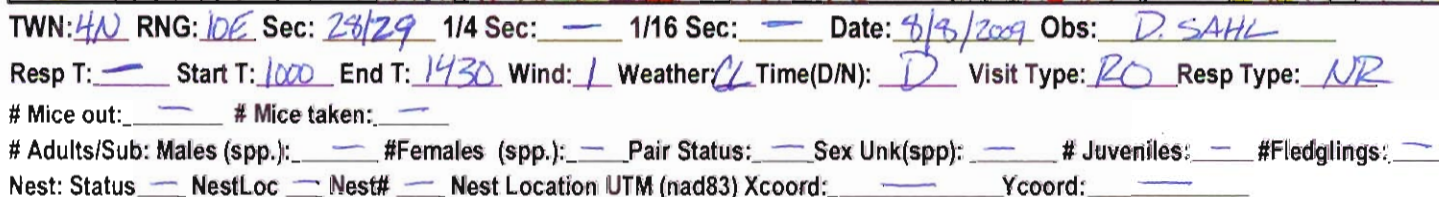
Y2: Obs Type: UN OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

No N50 Detected or OBSERVED Ringed Bt.  
Be aware a bald face hornet Nest on old Skid Rd. on  
Bridge Into the Mill Creek site.





HIKED Route on Map. Broadcast calls with PA/Voice/  
Hoot Flute. No Response from NSO, NO NSO OBSERVED.

---: Route  
HIKE

- Observation Location UTM (nad83) Xcoord: \_\_\_\_\_ Ycoord: \_\_\_\_\_ Record All Bird and Band Details on Reverse:



Date: 6/8/2009 Observer: D. Sawl Page: 2 of 2

Male: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Female: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: # Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y1: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Y2: Obs Type: NON OBSERVED Age: \_\_\_\_\_ Tip Color: \_\_\_\_\_ Tip Shape: \_\_\_\_\_

USFWS #: \_\_\_\_\_ Leg(R/L): \_\_\_\_\_ Weights: \_\_\_\_\_  
Color Band - Primary Color: \_\_\_\_\_ Leg (R/L): \_\_\_\_\_ Pat: \_\_\_\_\_ Sec. Color: \_\_\_\_\_  
Tab: \_\_\_\_\_

Additional notes:

No N50 Detected or OBSERVED during the VBIT.

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## Appendix C - Northern Goshawk Survey Forms



Survey Area/Project Area: SOS

**Turnstone Environmental Consultants**  
**Goshawk Survey Form**

Page    of    (including maps)

Crew: WLB Month: 6 Day: 24, 2009 Visit # 1

Period: Nestling / Fledgling Call(s) Used: Alarm Wail / Begging Survey Year: 1<sup>st</sup> 2<sup>nd</sup> Nest Search: Y / N (if yes attach Search Form) Nest Found: Y / N (if yes attach Nest Loc. Form)

**Survey Method:** Broadcast Acoustical, Intensive Search, or Dawn Acoustical, Other: \_\_\_\_\_ **Cloud Cover :** 1 = <5%; 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

**Wind Codes:** 1 = Light air (>1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 =Light Wind (8-12 mph), 5 =Wind (12-15 mph), 6 =Gusty (>15 mph)

**Weather Codes (WC):** CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow **Weather Intensity (WI):** 1=light, 2=moderate, 3=heavy

[illegible]

**Age:** (A)dult, (F)ledgling, (N)estling, (U)nkown **Sex:** (M)ale, (F)emale, (U)nkown **Det. Code:** (A)udio, (V)isual, (B)oth **Det. Location:** (AT) station, (BT) between stations  
**#=** number of goshawks or other raptor observed/detected **Det\_ID:** unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) **Time:** Military format.  
**Comments:**

NC = NO Contact

NC = No contact



Survey Time: Start 0800 End 1615

## Turnstone Environmental Consultants

Page 1 of 1 (including maps)Intensive Nest Search Time: Start — End —

## Goshawk Survey Form

Temperature (°F): Begin 55° End 59°Survey Area/Project Area: SDS Crew: WCB Month: 6 Day: 25, 2009 Visit # 1Period: Nestling / Fledgling Call(s) Used: Alarm / Wail / Begging Survey Year: 1<sup>st</sup> 2<sup>nd</sup> Nest Search: Y / N (if yes attach Search Form) Nest Found: Y / N (if yes attach Nest Loc. Form)Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: — Cloud Cover: 1 = <5%; 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Wind Codes: 1 = Light air (&gt;1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (12-15 mph), 6 = Gusty (&gt;15 mph)

Weather Codes (WC): CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow Weather Intensity (WI): 1=light, 2=moderate, 3=heavy

Det_ID	ST#	Sta. Time		Wind	Weather		Cloud	Detection	Detection	#	Sex	Age	Species	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	WC	WI	Cover	Code	Location					Initial	Final	(Azimuth)	(meters)	Town	Range	Sect	1/4	NAD83-GPS data only	
	6141	0952	1059	2	OC	1	6	NL															
	6140	1008	1015	2	OC	1	6																
	6122	1044	1050	3	OC	1	6																
	6127	1126	1132	3	OC	1	6	NL															
✓ 062509-15								V		1	U	A	RTHA	1126	1126	314	60	3N	10E	6	NW	10T 0608094	5070505
	6126	1158	1204	2	OC	1	6	NL															
	6139	1220	1226	3	OC	1	6																
	6138	1237	1243	3	OC	1	6																
	6137	1250	1256	3	OC	1	6																
	6130	1308	1314	2	OC	1	6																
	6129	1333	1339	2	OC	1	6																
	6118	1350	1356	2	PC	1	6																
	6119	1410	1416	2	PC	1	6																
	6124	1422	1428	3	PC	1	5	NL															
✓ 062509-25								V		1	U	U	RTHA	1424	1425	224	300	3N	10E	6	NW	10T 0608902	5070036
	6107	1545	1551	3	PC	1	5	NL															

Age: (A)dult, (F)ledgling, (N)estling, (U)known Sex: (M)ale, (F)emale, (U)known Det. Code: (A)udio, (V)isual, (B)oth Det. Location: (AT) station, (BT) between stations

# = number of goshawks or other raptor observed/detected Det\_ID: unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format

Comments:

Survey Time: Start 0745 End 1500

## Turnstone Environmental Consultants

Page 1 of 1 (including maps)

Intensive Nest Search Time: Start \_\_\_\_\_ End \_\_\_\_\_

## Goshawk Survey Form

Temperature (°F): Begin 52° End 60°Survey Area/Project Area: SOS Crew: TSG Month: June Day: 25, 2009 Visit # 1Period: Nestling / Fledgling Call(s) Used: Alarm / Wail / Begging Survey Year: 1<sup>st</sup> (2<sup>nd</sup>) Nest Search: Y / (N) (if yes attach Search Form) Nest Found: Y / (N) (if yes attach Nest Loc. Form)Survey Method: Broadcast Acoustical Intensive Search, or Dawn Acoustical, Other: \_\_\_\_\_ Cloud Cover: 1 = <5%; 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Wind Codes: 1 = Light air (&gt;1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (12-15 mph), 6 = Gusty (&gt;15 mph)

Weather Codes (WC): CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow Weather Intensity (WI): 1=light, 2=moderate, 3=heavy

Det_ID	ST#	Sta. Time		Wind	Weather		Cloud	Detection	Detection	#	Sex	Age	Species	Contact Time		Bearing	Dist	Location				UTMX	UTMY
		Begin	End	Code	WC	WI	Cover	Code	Location					Initial	Final	(Azimuth)	(meters)	Town	Range	Sect	%	NAD83-GPS data only	
	G105.5	0806	0814	3	OC	1	6	NC															
	G110	0820	0828	3	OC	1	6																
	G117	0834	0842	3	OC	1	6																
	G136	0848	0855	3	OC	1	6																
Dropped	G131	0909	0917	4	OC	1	6																
Dropped	G116	0927	0935	4	OC	1	6																
	G111	0942	0949	4	OC	1	6																
	G112	0954	1002	4	OC	1	6																
	G115	1011	1019	4	OC	1	6																
	G131.1	1029	1037	4	OC	1	6																
	G135	1052	1100	4	OC	1	6																
	G134	1114	1122	4	OC	1	6																
	G132	1133	1141	4	OC	1	6																
	G133	1157	1204	4	OC	1	6																
	G114	1217	1225	4	OC	1	6																
	G113	1236	1244	4	OC	1	6																
	G99	1300	1308	4	OC	1	6																
	G99.5	1320	1327	4	PC	1	5																
	G107	1338	1346	5	PC	1	5																
	G106	1355	1403	5	PC	1	5																
	G105	1416	1423	5	PC	1	5																
* Dropped	G102	1436	1444	5	PC	1	5																
	G103	1450	1457	5	PC	1	5																
	G107.5	1522	1529	4	PC	1	5	NC															

Age: (A)dult, (F)ledgling, (N)estling, (U)nkown Sex: (M)ale, (F)emale, (U)nkown Det. Code: (A)udio, (V)isual, (B)oth Det. Location: (AT) station, (BT) between stations

# = number of goshawks or other raptor observed/detected Det\_ID: unique detection identifier; date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format.

Comments:

\* Clearcut AREA

Survey Time: Start 0740 End 1715

# Turnstone Environmental Consultants

## Goshawk Survey Form

Page 1 of 1 (including maps)

Intensive Nest Search Time: Start \_\_\_\_\_ End \_\_\_\_\_

Temperature (°F): Begin 55 End 73Survey Area/Project Area: SDSCrew: TDGMonth: 06 Day: 26, 2009 Visit # 1Period: Nestling Fledgling Call(s) Used: Alarm / Wail / Begging Survey Year: 1<sup>st</sup> 2<sup>nd</sup> Nest Search: Y N (if yes attach Search Form) Nest Found: Y N (if yes attach Nest Loc. Form)Survey Method: Broadcast Acoustical, Intensive Search, or Dawn Acoustical, Other: \_\_\_\_\_ Cloud Cover: 1 = <5%; 2 = 5-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Wind Codes: 1 = Light air (&gt;1mph), 2 = Light breeze (1-3 mph), 3 = Gentle breeze (4-7 mph), 4 = Light Wind (8-12 mph), 5 = Wind (12-15 mph), 6 = Gusty (&gt;15 mph)

Weather Codes (WC): CL = Clear, FG = Fog, PC = Partly Cloudy, OC = Overcast, DR = Drizzle, RN = Rain, SN = Snow Weather Intensity (WI): 1=light, 2=moderate, 3=heavy

Det_ID	ST#	Sta. Time		Wind Code	Weather		Cloud Cover	Detection		#	Sex	Age	Species	Contact Time		Bearing (Azimuth)	Dist (meters)	Location				UTMX	UTMY
		Begin	End		WC	WI		Code	Location					Initial	Final			Town	Range	Sect	%		
	G1	0743	0751	2	CL	1	1	NC															
	G2	0754	0802	2	CL	1	1																
	G3	0809	0817	2	CL	1	1																
	G5	0828	0836	2	CL	1	1																
	G4	0846	0853	2	CL	1	1																
	G6	0909	0917	2	CL	1	1																
	G7	0934	0941	2	CL	1	1																
	G9	1001	1009	2	CL	1	1																
	G10	1026	1034	2	CL	1	1																
	G9.5	1047	1054	2	CL	1	1																
	G8	1107	1115	3	PC	1	2																
	G11	1125	1133	3	PC	1	2																
	G12	1148	1155	3	PC	1	2																
	G17	1235	1243	3	PC	1	2																
*	G13	1258	1306	3	PC	1	2	V	AT	1	U	U	URAP	1303	1303	90°	30	3N	10E	1B	SW	606462	506055
	G14	1326	1334	3	PC	1	2	NC															
	G14.5	1344	1352	3	PC	1	2																
	G15	1406	1414	3	PC	1	2																
	G22.5	1432	1441	3	PC	1	2																
	G22	1448	1455	3	PC	1	2																
	G24.1	1518	1526	3	PC	1	2	NC															

Age: (A)dult, (F)ledgling, (N)estling, (U)known Sex: (M)ale, (F)emale, (U)known Det. Code: (A)udio, (V)isual, (B)oth Det. Location: (AT) station, (BT) between stations

# = number of goshawks or other raptor observed/detected Det\_ID: unique detection identifier, date and sequential det. # for the day, (061208-1, 061208-2, ect) Time: Military format

Comments: \* smaller owl-like body shape. URAP FLEW out of large residual Doug fir to the East, I hiked after it but was unable to locate or elicit any audio responses. Did not resemble Goshawk Individual. possibly a Saw-whet or PILEY OWL.

NC = no contact