

Pre-Operations Report

Operation Name: Green Tweener
County: Marion
Management Basin: Green Basin

Table 1. Operation Areas, Types and Acres

Area	Type of Operation	Gross Acres	Net Acres
I	PC-M	68	62
II	PC-M	127	123
Total		225	207

I. PHYSICAL DESCRIPTION OF OPERATION AREA:

The operation is located within a temperate climate area. Typically the fall and winter seasons are wet. This area receives approximately 70 to 90 inches of rainfall per year. The operation is located within the *Tsuga heterophylla* Zone (Natural Vegetation of Oregon and Washington, Franklin & Dyrness, 1973).

The landforms are moderate to very steep headwaters of Little Sardine Creek and several tributaries to Sardine Creek and the North Santiam River. The aspects are varying in Area I with a ridge starting at the north end and moving south toward the center of the unit. Area II generally faces to the west and southwest. Elevations in Area I range from approximately 2600 feet to 3200 feet. Area II elevations vary from 2700 feet to 3500 feet.

Four different soil series are found within the two sale areas: Henline, Goodlow, Nasty, and Pechuck. The Nasty soil series are found in the southern third of Area II. They developed from Miocene age andesite, and are moderately deep, well-drained, moderately fine-textured skeletal soils. These soils are granular very gravelly loams to extremely gravelly clay loams. Andesite bedrock occurs at a depth of 20 to 40 inches. Rock volume ranges from 40 percent in the topsoil to 80 percent in the substrata. The Henline soil series are found in the northern part of Area II and in the southern part of Area I. The Henline series are similar to Nasty soils but have a slightly coarser texture and usually occur at higher elevations.

Goodlow soils are found along the northeast edge of Area II and in the southeast and northern half of Area I. The Goodlow series consists of deep, well-drained, medium-textured colluvial soils developing from Miocene age andesite. These soils are very dark to dark brown sandy to gravelly loams in the A and B

horizons. The weakly structured C horizons or bedrock occur at 40 inches. Rock volume ranges from 10 to 40 percent in the solum. Pechuck is the fourth soil series found on the northeast edge of Area II and the southeast edge of Area I. They usually occur at higher elevations than the Goodlow soils. The Pechuck soils are deep, well-drained, moderately fine-textured colluvial soils that developed from Miocene age andesite. In general, these soils are gravelly loam to gravelly clay loam with varying amounts of rock from 10 percent in the A horizon to 80 percent in the C Horizon. They lie over Andesite bedrock which is at a depth generally greater than 50 inches.

II. CURRENT STAND CONDITION:

This basin is dominated by 50-year old Douglas-fir stands that regenerated after the Sardine Creek fire. The commercial thinning and fertilization operations conducted during the past 10 years have been very successful in developing UDS stand structure that will develop into LYR structure in time.

Area I is located within a 50 year old stand currently classified as Understory (UDS). This stand was precommercially thinned in 1975 and fertilized in 1978, 1993 and 2004. The overstory consists of Douglas-fir with some scattered western hemlock. The understory consists of vine maple, rhododendron, Oregon grape, huckleberry, salal, bear grass, ferns, Douglas-fir, and western hemlock. In decay classes 3 through 5 there are 2 snags in the 15-23 inch category. There are 200 cubic feet per acre of sound down wood all less than 24 inches. In decay classes 3 through 5 there are 4 pieces totaling 700 cubic feet larger than 24 inches and 1,800 cubic feet per acre of down wood 24 inches and smaller. (SLI 2004)

Area II is located within a 50 year old stand also currently classified as UDS. This stand was fertilized in 1978 and 1993. The overstory consists of Douglas-fir with some scattered western hemlock. The understory consists of vine maple, Oregon grape, bear grass, ferns, salal, Douglas-fir, and western hemlock. In decay classes 3 through 5 there is 1 snag per acre in the 15-23 inch category and 1 per acre that is 24 inches and larger. There are 120 cubic feet per acre of sound down wood all less than 24 inches. In decay classes 3 through 5 there are 10 pieces totaling 1,500 cubic feet larger than 24 inches and 1,580 cubic feet per acre of down wood 24 inches and smaller. (SLI 2004)

Table 2. Stand Inventory Information

Area	Prescription	Stand ID ¹	Species	Age	DBH	BA	TPA	SDI	Acres ²
I	PC-M	12474	DF	50	13	201	210	55	74
		Target ³			17	120	79	30	
II	PC-M	12469	DF	50	13	199	216	55	151
		Target ³			14	135	122	35	

1 The source of stand inventory information is SLI from 2004 for trees 8 inches or greater DBH.

2 The acres are based on GIS and include roads, streams buffers, reserve areas, etc.

3 The Target identifies expected stand characteristics (DBH, BA, TPA and SDI) after harvesting has been completed.

III. DESIRED FUTURE CONDITION/VISION:

The DFC for Area I is Layered (LYR). Douglas-fir mixed with a few western hemlock and hardwoods will comprise the overstory of the stand. Layers beneath the main canopy will be comprised of hemlock, red cedar, and various hardwoods and brush species. Scattered openings with noble fir, vine maple, sword fern, salal, rhododendron, and various herbs/forbs will occupy about 20% of the area. Bear grass will be a fairly common species in this area both in the understory and in openings.

The DFC for Area II is for a non-complex stand with Understory (UDS) structure. Douglas-fir and scattered western hemlock will occupy the overstory. The understory will contain vine maple, Oregon grape, bear grass, ferns, and salal. Golden chinkapin and other hardwood species will be present in the understory and in small isolated clumps.

Table 3. Stand Structure Information

Area	Stand ID	Current	Post Harvest ¹	Desired Future	Acres
I	12474	UDS	UDS	LYR	74
II	12469	UDS	UDS	UDS	151

1 The stand is expected to develop into this condition in the five to ten years after this operation is completed.

IV. PROPOSED MANAGEMENT PRESCRIPTION:

The primary objective for the proposed operation in Area I is to develop the layered nature of the stand. This will be accomplished by thinning out the overstory to allow sunlight to stimulate the understory vegetation. The operation will also augment the down wood component with cull logs and logging debris. The primary objective for the proposed operation in Area II is to enhance stand volume production and value by improving the form and vigor of the residual trees and capturing stand mortality.

The management prescription for Area I is:

- Thin all Douglas-fir trees greater than 8 inches DBH to: basal area of 120; TPA 79; ave. DBH 17 inches; and SDI 30%.
- Reserve all hardwoods, understory hemlock, noble fir, and western red cedar from cutting. (These trees will not count toward the SDI 30% Douglas-fir target listed above.)
- Maintain existing down wood and snags that do not pose a safety hazard.
- Snags and down wood will not be added at this entry because tree sizes are too small and limit the utility and duration of the structural benefit.

In the years to come, this stand will receive a series of operations designed to continue enhancement of layering through recruitment of down wood and snags, creation of horizontal diversity through alternative thinning prescriptions, addition of understory cohorts, and promotion of continued growth of the overstory with periodic thinning and fertilization

The proposed management prescription for Area II is:

- Thin all trees greater than 8 inches DBH to: basal area of 135; TPA 122; ave. DBH 14 inches; and SDI 35%.
- Maintain existing snags which do not pose a safety hazard and down wood.

In the years to come, this stand will receive a series of operations designed to maximize volume and value, and promote stand health and vigor. It is expected that the stand structure will shift between CSC and UDS as the cutting cycles are implemented over time. Structural development to something more complex is not anticipated. This balance between CSC and UDS will persist over time until the stand is harvested.

V. ESTIMATED TIMBER AND REVENUE INFORMATION:

Table 4. Timber and Revenue

Ownership		Sale Type	
BOF	CSL	Cash	Recovery
100%	0%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Planned Quarter:		1	

	Conifer	Hardwood	Total
Net Volume (MBF)	1,600	0	1,600
Stumpage Value (\$/MBF)	\$250	0	
Estimated Gross Value	\$400,000	0	\$400,000
		Project Costs:	35,865
		Estimated Net Value:	\$364,135

VI. HARVESTING AND ACCESS CONSIDERATIONS:

Access – The sale has good access via Highway 22 to the Niagara Main line road to the sale boundary. The Niagara Main line has a pit run base surface with a small amount of crushed rock on top. The running surface has been improved by decades of spot rocking. A surface upgrade using 1"-0 crushed rock over 6 miles of the Niagara road is scheduled for the summer of 2008. The surface upgrade is part of another timber sale. The Niagara Mainline has been difficult to grade into a well drained shape without a sufficient crushed rock surfacing. The 4" lift of crushed rock on this road will provide a surface that can be maintained efficiently with a grader.

Six new spur roads will need to be constructed to facilitate cable logging landings. All of these spurs roads are necessary to access significant slope breaks on the hillside to make efficient landing locations.

<u>Road</u>	<u>Length</u>	<u>Road</u>	<u>Length</u>
Spur 1	500 ft	Spur 4	1650 ft
Spur 2	225 ft	Spur 5	1565 ft
Spur 3	1100 ft	Spur 6	1150 ft

Total new construction 6,190 ft or 1.17 miles,

All new spur roads except #6 will be surfaced with pit run rock to facilitate cable yarding and hauling during wet weather. Pit run rock is available from local sources on the N 30 road. Spur 6 will not be rocked because it accesses only 5 acres of ground that can be yarded. This smaller area can be logged in a short amount of time during dryer weather; the road will then be blocked and vacated. The other new roads will remain open for future management opportunities. No proposed roads will cross high landslide hazard locations or type F streams.

Logging – Area I is a mix of cable and ground yarding systems. The upper half of the area is on side-slopes less than 35%. Ground logging will provide the most economical type of logging on the gentle slopes. The lower half or southern half of the unit is on steeper slopes, mostly greater than 40%, and will need to be cable logged to prevent excessive compaction and disturbance to the ground.

Area II is located on predominately steep ground, in the 45 to 65% range, that will require cable yarding systems. A road along the upper edge of the unit allows for cable yarding landings for uphill yarding. One road about 1150 ft long will be needed to access two or three landings along the slope break on the North end of the unit. Down hill logging was considered to eliminate one spur road but our experience has shown that downhill logging in some circumstances can create more disturbance than building a spur road. The existing access is along the bottom, the area may be too steep to cat log and it will be difficult if not impossible to down hill cable log to existing roads. It may be possible to extend the road along the top of the area boundary but preliminary reconnaissance

indicates the extra road construction would not be warranted for the small amount of ground accessed.

Projects

Road construction, preliminary estimates are as follows.

- 1. Construct 5,040 ft of spur road w/pit run surfacing \$30,240
 - 2. Construct 1,050 ft of spur road no pit run surfacing \$ 2,625
 - 3. Msc. road brushing as needed , est. 3 miles \$ 3,000
- Total cost \$35,865

Table 5. Transportation Management Summary (Miles)

Activity	Mainline	Collector	Rocked Spur	Dirt Spur
Construct	0	0	.95	.22
Improve	0	0	0	0
Maintain	0	5.6	0	0
Close/Block	0	0	0	.22
Vacate	0	0	0	0

VII. AQUATIC RESOURCES AND WATER QUALITY:

There are no streams containing listed fish within the operation. There are 5 small non-fish bearing (Type N) streams located within the operation and one adjacent to the west side of Area I. The overstory vegetation along these streams consists of Douglas-fir, western hemlock and red alder. The understory vegetation consists of vine maple, Oregon grape and ferns. The operation drains into Little Sardine Creek, unnamed tributaries to the North Santiam River, and Sardine Creek.

Riparian Management Areas (RMAs) will be established immediately adjacent to streams within the operation area for the purpose of protecting aquatic and riparian resources and maintaining the functions and ecological processes of the streams. A buffer of at least 25 feet horizontal distance will be posted on either side of these streams.

VIII. WILDLIFE AND T&E SPECIES CONSIDERATIONS:

This operation was surveyed for Northern Spotted Owls during the 2004, 2005, and 2006 survey seasons with responses in each year, all attributed the owls from the Drop Off activity site. In 2007 the operation area was again surveyed, this time with no responses. Area II is located within the Drop Off Northern Spotted Owl Site. A biological assessment (BA) has been completed by an ODF biologist. The BA concluded that this sale poses a low risk to the continued viability of the Drop-Off NSO site.

The operation area was checked against District knowledge for any listed plant location. The operation area was also checked against the Oregon Natural Heritage Program's database of known listed plant locations. No listed plant records were identified within the operation area.

IX. SLOPE STABILITY AND GEOTECHNICAL ISSUES:

This assessment is based on analysis of USGS 1:24,000 topographic maps.

There are high landslide hazard locations scattered throughout the sale, but primarily within Area II. The sale drains into Little Sardine Creek, unnamed tributaries to the North Fork of the Santiam River, and Sardine Creek. The risk of landslides delivering directly from the sale to Little Sardine Creek is moderate, to the unnamed tributaries to the North Santiam River is low to moderate, and to Sardine Creek is low. The sale appears to be located on a large, deep-seated landslide landform.

The geotechnical specialist will be consulted if evidence of recent landslide activity is identified during sale layout.

X. RECREATION RESOURCES:

While there are no developed recreational resources within the operation, this area is popular for hunting, sight-seeing, hiking, and special forest product harvesting

XI. CULTURAL RESOURCES:

The district cultural resource inventory and pre-operation reconnaissance revealed no visible cultural resource features or artifacts. If discovery is made, the cultural resource will be protected and field staff will consult with the Cultural Resource Specialist in Salem.

XII. SCENIC RESOURCES:

There are no scenic resources within the operation.

XIII. OTHER RESOURCE CONSIDERATIONS:

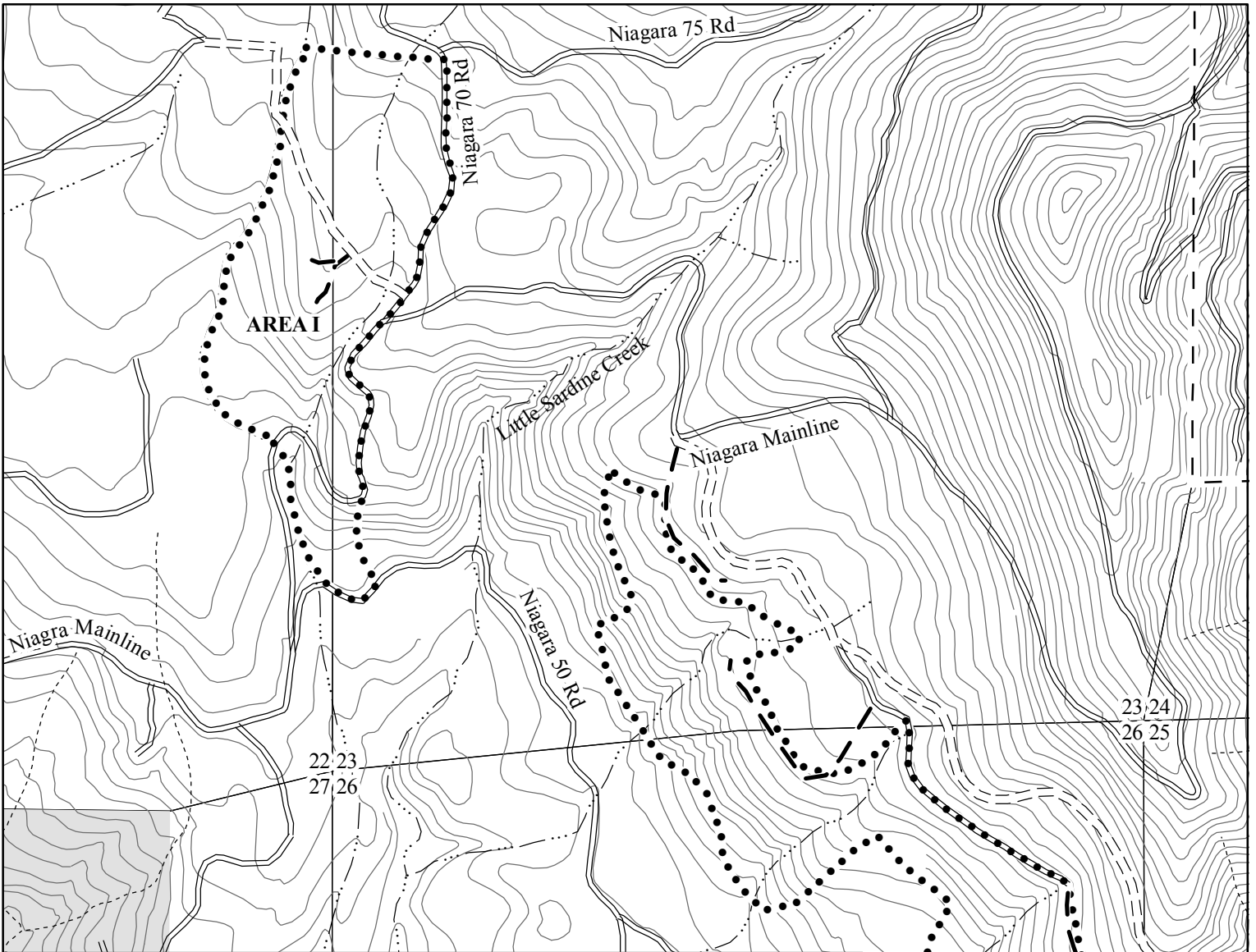
There is a two acre research plot located within Area I. This is a control plot for a joint study between ODF and OSU on Swiss Needle cast. No activities will occur within the plot. A Bonneville Power Administration (BPA) powerline right of way

is immediately adjacent to the proposed north timber sale boundary of Area I. The BPA will be notified of our proposed activity and their guidelines for logging activities on or near BPA rights-of-way will be followed.

XIV. LAND MANAGEMENT CLASSIFICATION SUMMARY:

Area I contains Focused Stewardship, Aquatic and Riparian Habitat for two perennial Type N streams. See Section VII, Aquatic Resources and Water Quality, for the management guidelines to be utilized. This area also contains Special Stewardship, Research. See Section XIII Other Resource Considerations, for the management guidelines to be utilized. Immediately north of Area I is Special Stewardship, Transmission Lines.

Area II contains Focused Stewardship, Aquatic and Riparian Habitat for four perennial Type N streams. See Section VII, Aquatic Resources and Water Quality, for the management guidelines to be utilized. A portion of Area II is classified Special Stewardship, Operationally Limited. The operational limitations are because of rock bluffs and poor soil conditions. As mentioned previously in Section VI., no proposed roads will cross high landslide hazard locations. The Area geotechnical specialist will be consulted if evidence of recent landslide activity is identified during sale layout.



GREEN TWEENER

FY 09 AOP
 NORTH CASCADE DISTRICT
 ATTACHMENT A : TOPOGRAPHY
 PORTIONS OF SECTIONS 22, 23, 25, 26
 T9S, R4E, W.M.
 MARION COUNTY, OR

Legend

- Surfacd Road
- - - Unsurfcd Road
- Sale Boundaries
- • - New Road Construction
- — Type F Stream
- Type N Stream
- - - - - Unknown Stream
- · - State Forest Property Boundary
- 40 Foot Contours
- Common School Land

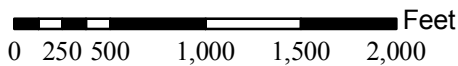


APPROXIMATE NET ACRES

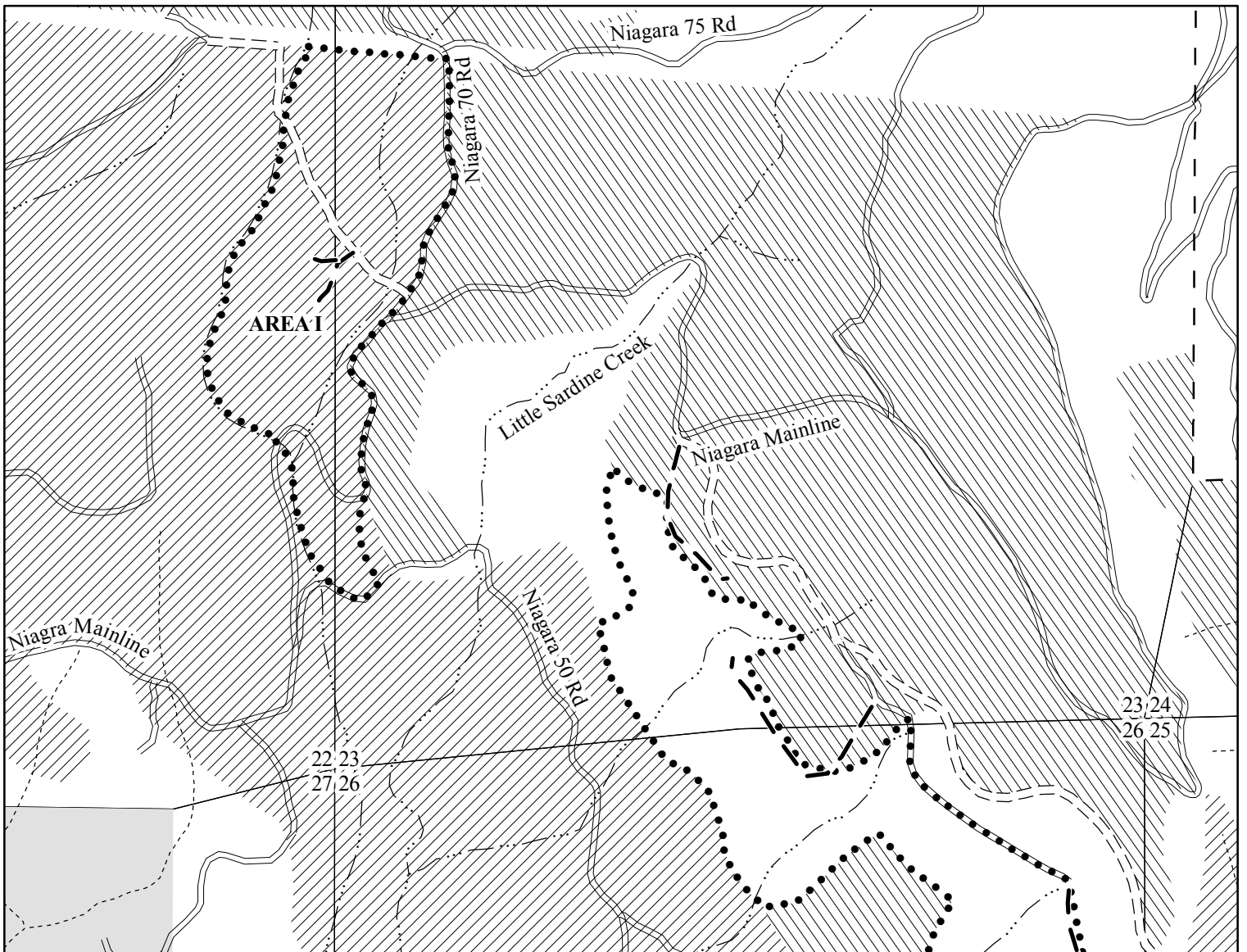
AREA I : 62 (PC)
 AREA II : 123 (PC)

This product is for informational use and
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 for legal, engineering, or surveying purposes.

Scale
 1:12,000
 1 inch = 1000 feet



STATE
 PRIVATE



GREEN TWEENER

FY 09 AOP
 NORTH CASCADE DISTRICT
 ATTACHMENT B : DESIRED FUTURE CONDITION

PORTIONS OF SECTIONS 22, 23, 25, 26

T9S, R4E, W.M.
 MARION COUNTY, OR

Legend

- Sale Boundaries
- Surfaced Road
- - - Unsurfaced Road
- • - New Road Construction
- - Type F Stream
- · · Type N Stream
- - - - Unknown Stream
- /// LYR
- \\ \\ OFS
- · - State Forest Property Boundary
- Common School Land



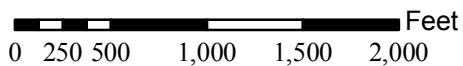
APPROXIMATE NET ACRES

AREA I : 62 (PC)

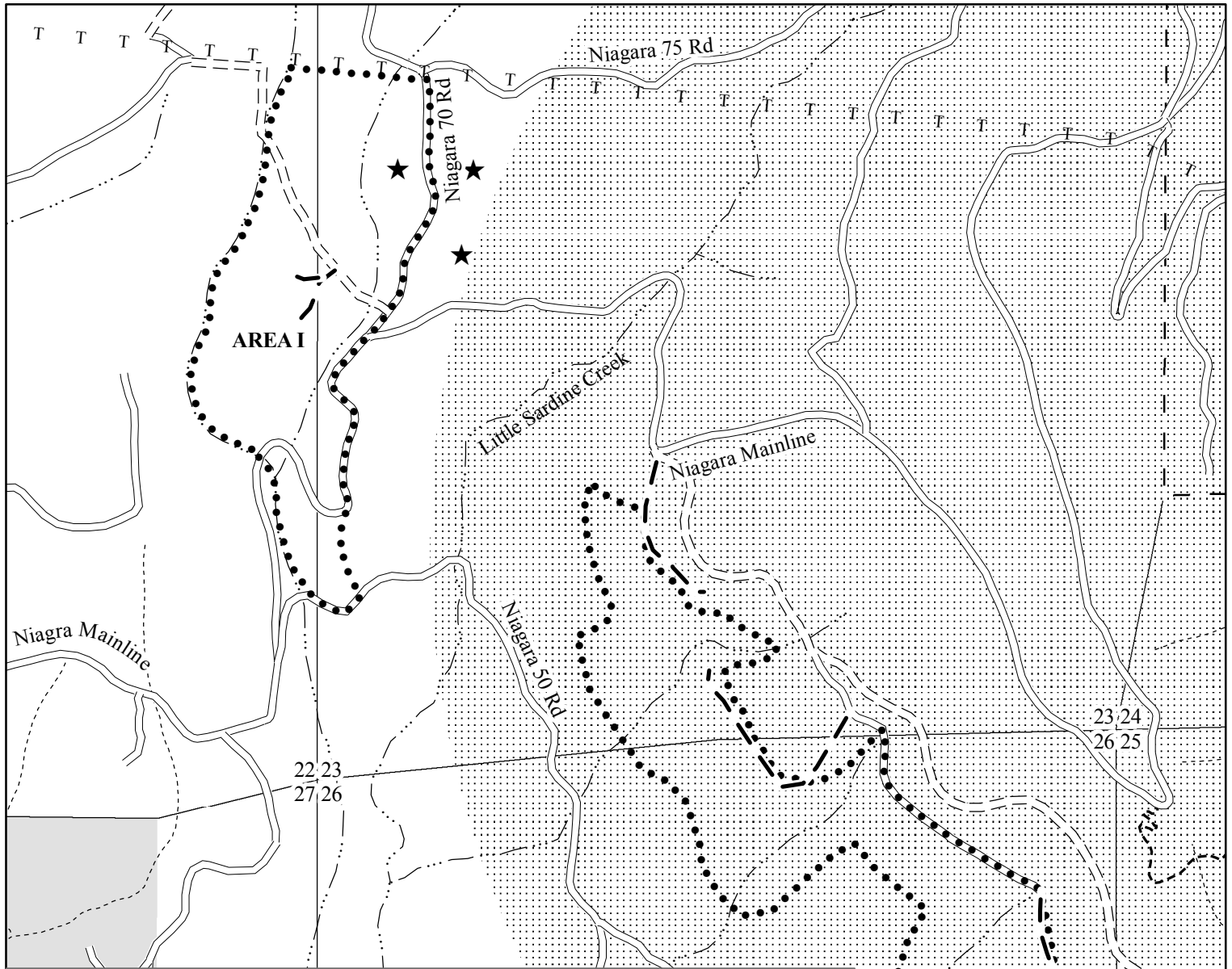
AREA II : 123 (PC)

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Scale
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 1 inch = 1000 feet



STATE
 PRIVATE



GREEN TWEENER

FY 09 AOP
 NORTH CASCADE DISTRICT
 ATTACHMENT C : KEY RESOURCES
 PORTIONS OF SECTIONS 22, 23, 25, 26
 T9S, R4E, W.M.
 MARION COUNTY, OR

Legend

- Sale Boundaries
- T T Transmission Line
- ==== Surfaced Road
- Unsurfaced Road
- New Road Construction
- Type F Stream
- Type N Stream
- Unknown Stream
- Hiking Trail
- ★ Research Area
- 1.2 Mile NSO Circle
- - - State Forest Property Boundary
- Common School Land

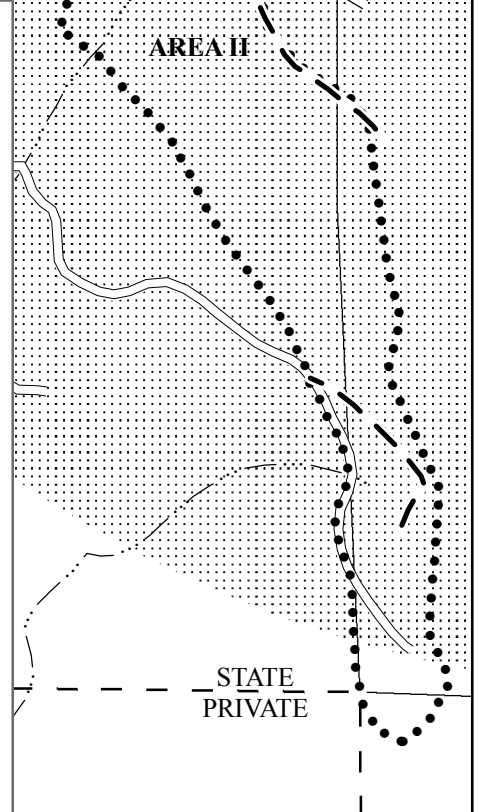
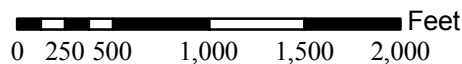


APPROXIMATE NET ACRES

AREA I : 62 (PC)
 AREA II : 123 (PC)

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Scale
 1:12,000
 1 inch = 1000 feet



SUBJECT: Revised Preliminary Biological Assessment Green Tweener Thin timber sale: potential impacts to Drop Off northern spotted owl site

FROM: Rod Kraemer and Marcia Humes

DATE: 29 September 2006

INTRODUCTION

Purpose. The Oregon Department of Forestry (ODF) has proposed Green Tweener Thin timber sale in the Santiam State Forest located in Marion County, Oregon. Green Tweener Thin timber sale is in the FY 2007 operations plan of the North Cascade District. Since Green Tweener Thin timber sale is located within the provincial home range of the Drop-Off northern spotted owl (NSO), a Biological Assessment (BA) is needed to evaluate impacts. The NSO is a state and federally listed 'threatened' species by the Oregon Fish and Wildlife Commission and the U.S. Fish and Wildlife Service (USFWS), respectively. The purpose of this revised preliminary BA is to document and take into consideration new spotted owl habitat information provided by the USFWS. The ODF conducted a field review of the proposed Green Tweener Thin timber sale area with the USFWS on 20 June 2006. This revised preliminary BA is intended to replace the preliminary BA prepared 10 February 2006.

Policy Direction. The Northwest Oregon State Forests Management Plan provides management direction for all Board of Forestry Lands and Common School Forest Lands in northwest Oregon. The resource management goals and strategies are intended to achieve the greatest permanent value through a system of integrated resource management. This plan is guided by legal and policy mandates. The ODF's management activities are conducted in compliance with all state and federal environmental laws, including the state and federal Endangered Species Act (ESA), respectively. 'Take' of threatened or endangered species is prohibited under Section 9 of the federal ESA. The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Such acts may include significant habitat modifications or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. The policies and procedures for lands managed by the ODF in northwest Oregon are to avoid 'take' of NSO. 'Take' avoidance is accomplished on lands managed by ODF in the North Cascade District through the application of the rescinded USFWS take-avoidance guidelines (USFWS 1990).

The USFWS recommends the following stepwise approach to avoid or reduce the risk of incidental take:

1. Conduct NSO surveys during the breeding season and prior to any harvest activity according to protocols endorsed by the USFWS.

2. Avoid any harvest activity which results in less than 70 acres of the best available suitable owl habitat encompassing the NSO nest site and/or activity center of a pair of spotted owls.
3. Avoid any harvest activity which results in less than 500 acres of suitable NSO habitat within 0.7 mile radius (1000 acres) of a nest site and/or activity center. The 500 acres may include the 70 acres in No. 2 above and should be as contiguous as possible.
4. Avoid any harvest activity which results in less than 40% coverage (1182 acres) by suitable owl habitat within a circle with a radius centered on a nest site and/or center of activity and as prescribed by physiographic provinces. The 40% may include the acreage required in No. 2 and No. 3 above.

The ODF biologists also assessed the ‘risk’ that the proposed operation may pose to the Drop-Off NSO. A number of factors in addition to the USFWS take-avoidance guidelines, including the proximity of the operation to the owl site, the prescription proposed, the size of the operation, the history of activity near the site, and other relevant factors were used to determine the ‘risk assessment’.

BACKGROUND

Survey Information. Surveys for northern spotted owls have been conducted in the vicinity of the sale area since at least 1992. At that time, a nesting pair was located on Forest Service land and was named Rocky Top. This site was renamed Sardine Creek in 1993 and is located approximately 1 mile to the east of the Drop-Off northern spotted owl site (Figure 1). Responses attributed to the Sardine Creek site are located within 0.5 miles of the Drop-Off activity center. A pair was located at Sardine Creek in 1994 and 1995. The site was last surveyed in 1999 when a male was located, and the site was reclassified as a resident single that year. The Sardine Creek site has not been surveyed since 1999, and the status remains as resident single.

Kingfisher Ecological, Inc., conducted surveys for northern spotted owls in all potential NSO habitat in and around planned timber sales and known owl sites in the ODF Cascade District. Potential spotted owl habitat was surveyed in accordance with the protocol for surveying proposed management activities that may impact NSO (USFWS 1992). As a result of these surveys, the Drop-Off NSO site was located within 1.2 miles of the proposed timber sale (Figure 1).

Drop-Off Northern Spotted Owl Site Information. The Drop-Off NSO site was established in 2004. A sub-adult male was found once early in the season, and a pair was found late in the season. There were also several male and female night responses (Figure 1). The activity center was placed at the April 29 male location (Figure 1). This location was used instead of the pair day location because it was earlier in the season, and was believed the pair had followed the surveyor the previous night. In 2005, a male was heard three times at night and found once during the day. The male was not banded and no females were heard. In 2006, the female was heard once at night, in the vicinity of the

activity center. The pair status of this site and location of the activity center have not changed since 2004.

Timber Sale Area Information. The Green Tweener Thin timber sale consists of two units (Area 1 = 71 acres, Area 2 = 128 acres). Area 2 is located within the 1.2 miles of the Drop-Off NSO site (Figure 1). The current stand condition of Area 2 consists of a 50 year old stand currently classified as Understory (UDS). This stand type occurs after the stem exclusion stage has created small openings in the canopy, when enough light and nutrients become available to allow herbs, shrubs, and new trees to grow again in the understory. These stands have trees larger than sapling size. Tree canopies may range from a single species, single-layered, main canopy with associated dominant, codominant, and suppressed trees; to multiple species canopies. However, significant layering of tree crowns has not yet developed. The overstory consists of Douglas-fir with some scattered western hemlock. According to SLI inventory, the stand in Area 2 has the following average stand characteristics:

- diameter breast height (DBH)=13 inches;
- basal area (BA)=192 square feet/acre;
- trees per acre (TPA)=201;
- stand density index (SDI)=52;
- 4 snags/acre;
- 100 cubic feet/acre of sound downed wood;
- 2700 cubic feet/acre of downed wood in all decay classes;
- understory consisting of vine maple, Oregon grape, bear grass, salal, and sword fern.

The proposed management prescription for Area 2 is:

- Thin all trees greater than 8 inches DBH. After harvesting, Area 2 is expected to have the following average stand characteristics: DBH=14 inches, BA=135 square feet/acre, TPA=122, and SDI=35.
- No special efforts to protect understory trees, but many will survive.
- Maintain existing downed wood and snags where possible.

ASSUMPTIONS

Defining Drop-Off NSO Home Range. According to the procedures leading to ESA compliance for the NSO (USFWS 1990), the median home range size for spotted owls in the Oregon Cascades is 2955 acres, or the approximate equivalent of the area encompassed by a circle with a radius of 1.2 miles (2880 acres using Arcview 3.2). Although northern spotted owls generally do not have circular home ranges, in the absence of more specific information about the home range of the Drop-Off NSO, the analyses presented below assume that a 1.2 mile radius circle around the activity center approximates the home range of the Drop-Off NSO site. This assessment also discusses

other possible configurations of the home range for this site, given survey and habitat information.

Defining Suitable Northern Spotted Owl Habitat. For the purposes of ESA compliance, the USFWS (1990) describes suitable NSO habitat as stands that exhibit the following characteristics:

- moderate to high canopy closure;
- a multi-layered, multi-species canopy dominated by large overstory trees
- a high incidence of large trees with large cavities, broken tops, and other indications of decadence;
- numerous large snags;
- heavy accumulations of logs and other woody debris on the forest floor; and
- considerable open space within and beneath the canopy.

These attributes are usually found in mature and old conifer forests, but are sometimes found in younger forests, especially those that contain remnant large trees or patches of large trees from earlier stands. It is important to note that the age of forests is not as important a factor in determining habitat suitability as are vegetation and structural components (USFWS 1990). Forest stand structural attributes positively associated with foraging, roosting and nesting include vertical canopy layering, tree height or diameter diversity, canopy volume, canopy closure, snag diameter, snag basal area or volume, tree diameter and log volume (Courtney et al. 2004).

Northern Spotted Owls also occur in some forest stands that are less than 80 years old. Several studies have investigated NSO home range and habitat use in young forests on ODF lands in western Oregon (Islam et al. 1997, Anthony et al. 2000, Tappeiner et al. 2000, Glenn et al. 2004). Islam et al. (1997) investigated the relationship between demography of NSO and habitat characteristics at the landscape level on ODF lands, and reported that the minimum diameter of the dominant conifer trees in stands of NSO habitat should be at least 18 inches and stands should also contain about three size classes and have variation in stem density within the stand. Anthony et al. examined habitat in owl home ranges on ODF lands in the Northern Coast Range (NCR) of Oregon and Elliott State Forest (ESF) in south-central Oregon Coast Range. Individual owls in the NCR study area selected mature forest and hardwood forest, and avoided young and pole stands. At ESF, owls selected mixed-age conifer, mature conifer, old conifer, and hardwood forest, and avoided young and pole. Owls were also found close to conifer-hardwood ecotones more often than expected in both study areas. At NCR, Tappeiner et al. 2000 reported that nest and forage sites had larger trees, lower tree densities, and more hardwood stems than low use sites, and that higher owl success (combination of site occupancy and reproduction indices) was positively correlated with average tree size and negatively correlated with tree density. Glenn et al. 2004 reported that individual owls on their study areas in the NCR and ESF varied greatly in habitat use patterns and appeared to be using different strategies for surviving in younger forests. In younger, or less

structurally diverse landscapes, the use of hardwoods was more frequent than in landscapes dominated by older conifer forest. Hardwoods may contribute structural diversity and prey base than are otherwise in short supply in relatively young, homogenous landscapes lacking remnant old-forest structures.

In the Conservation Agreement for Northern Spotted Owls between ODF and USFWS, suitable habitat for spotted owls is considered to include stands with an average QDBH greater than 11 inches.

The Drop-Off northern spotted owl site occurs in the Sardine Creek watershed. The Sardine Creek drainage is steep and rocky, with relatively open, rocky slopes interspersed with continuous canopy forest stands. During the 1950's, a large forest fire burned in this watershed. Many of the stands in the fire area were subsequently salvaged, so that in accessible areas, few large snags and logs are present. The site was planted with off-site Douglas fir seedlings in the early to mid 1950's, so most of the stands in this watershed are approximately 50 years old. Although the seedlings came from an off-site seed source, the trees are relatively healthy at this time. However, it is unclear if there will be long-term problems with the trees' health and vigor because of their off-site origin. Overall, stands burned by the fire contain relatively small diameter trees and lack significant structural diversity. Most of the 1.2 mile circle surrounding the Drop-Off activity center is composed of stands burned in this fire and subsequently replanted. Older, more complex stands that were not burned in the fire are present in the east half of the Drop-Off home range, primarily on Forest Service land.

For the purposes of this assessment, two separate analyses were done of the Drop-Off home range. One analysis considers information about average stand diameter on ODF lands from the department's computerized forest inventory system databases (OSCUR; Figure 2) and compares this to the habitat standards (QDBH <11"; 12-17"; 18-26" and >26") from the Conservation Agreement for Northern Spotted Owls.

A second analysis was done that considers more recent stand typing for the Stand Level Inventory (SLI) and relies primarily on field reconnaissance and aerial photo interpretation for evaluating whether or not the habitat is suitable for northern spotted owls. This latter analysis was considered to be necessary for several reasons:

- 1) the polygons delineated for the forest inventory information (OSCUR polygons) do not consistently represent breaks in stand types when compared to the aerial photos;
- 2) the diameters given in the OSCUR inventory information are projected from data collected in 15-25 years previously and thus have questionable accuracy and utility;
- 3) more recent stand typing for SLI appears more consistent with aerial photos.

Habitat determinations within 1.2 miles of the Drop-Off northern spotted owl site were made by ODF wildlife biologists considering spotted owl response locations, field

reconnaissance, aerial photo interpretation, local knowledge about stand history, information from research on northern spotted owls, including results of NSO research on ODF lands, and field review with the USFWS.

The habitat determinations in this revised preliminary BA differ from those in the preliminary BA primarily because of the use of the SLI polygons (the previous BA utilized aerial photo stand typing that does not exist in any of ODF's inventory layers), and because of additional field reconnaissance and review with USFWS. Suitable NSO habitat for the second assessment was defined as:

- Forest stands with spotted owl use;
- Forest stands similar in appearance to utilized stands on aerial photos;
- Forest stands with structural characteristics needed to accommodate owls, as determined by ODF biologists, using professional judgment, considering canopy cover, stand density, structural diversity, and tree diversity.

Recently thinned stands were evaluated on a stand-by-stand basis, depending on the structural characteristics in the residual stand and response to the thinning prescription. The recently (2003) completed Green Wave thin was not considered to be suitable habitat due to insufficient canopy cover. The Green Sardine sale, completed in 1999, was considered to be suitable habitat because of sufficient canopy cover and structural diversity.

IMPACT ASSESSMENT AND DISCUSSION

Landscape Analysis.

Diameter assessment.

Table 1 shows the acres of stands by diameter class within 0.7 miles and 1.2 miles of the Drop-Off activity center. Within 0.7 miles, there are 425 acres with an average diameter greater than 11 inches. Of these, 108 acres were thinned in the Green Wave Thin, leaving 317 acres on ODF managed lands with an average diameter greater than 11 inches not recently thinned. Additionally, there are 15 acres of suitable habitat on other ownerships within 0.7 miles of the activity center. There is a total of 332 acres of stands averaging more than 11 inches dbh within 0.7 miles of the activity center, or 34% of the 0.7 mile circle. The Green Tweener Thin timber sale will thin 9 acres of suitable spotted owl habitat within 0.7 miles of the activity center, leaving 323 acres, or 33% of the 0.7 mile circle following harvest.

Within 1.2 miles of the Drop-Off activity center, there are 1013 acres of ODF stands with an average diameter greater than 11 inches. Of these, 281 acres were thinned in the Green Wave Thin, leaving 732 acres on ODF managed lands with an average diameter greater than 11 inches not recently thinned in this sale. Additionally, there are 382 acres of suitable habitat on other ownerships within 1.2 miles of the activity center. There is a total of 1114 acres of stands averaging more than 11 inches dbh, or 39% of the 1.2 mile

circle. The Green Tweener timber sale will thin 118 acres of stands greater than 11 inches dbh within 1.2 miles of the Drop-Off NSO activity center. Following harvest, there will be 996 acres (35%) of stands greater than 11 inches dbh not recently thinned.

Field Review assessment.

The forest stand structure in Area 2 of the proposed timber sale is young and dense, deficient in large trees/snags, and lacks structural diversity, thereby providing few nesting and roosting opportunities for spotted owls. This Area was not considered to be suitable habitat in the original preliminary BA. However, based upon a field review with the USFWS, the stand structure in Area 2 was determined to be sufficient to provide foraging opportunities for spotted owls (K. Maurice, pers. com). Accumulations of snags and downed wood are sufficient to support important prey species, such as the northern flying squirrel; moderate amounts of shrub cover and a diversity of shrub types promote prey populations as well as accessibility of prey to NSOs; and there is sufficient open space below the canopy for owls to fly. Therefore, based upon new information provided by the USFWS on 20 June 2006, Area 2 of the proposed timber sale was reevaluated and determined to be suitable NSO habitat.

Based upon this information, spotted owl habitat suitability within the 1.2 mile provincial home range of the Drop-Off NSO activity center was also reevaluated (see Figure 3). Much of the home range circle consists of similar stands to the Green Tweener timber sale, and therefore is also considered to be suitable habitat. Exceptions include areas that are on open rocky slopes, and areas within the recently thinned Green Wave timber sale. The more recently delineated SLI polygons were used to define habitat polygons rather than the older OSCUR polygons, because they better represented breaks in stand types seen on the aerial photos. A few modifications were made to these boundaries in order to separate the open rocky slopes from the more contiguous forest. The results of this assessment are shown in Table 2 and Figure 3. Within 0.7 miles of the Drop-Off activity center, it was determined that there are approximately 486 acres of suitable habitat, or 49% of the 0.7 mile circle. The Green Tweener timber sale will thin 9 acres within the 0.7 mile circle. Within 1.2 miles of the Drop-Off activity center, there are 1,704 acres of suitable habitat on ODF and adjacent landowners, or 59% of the 1.2 mile circle. The Green Tweener timber sale will thin 118 acres of suitable habitat. When these acres are excluded, approximately 1586 acres, or 55% of the 1.2 mile circle will consist of suitable habitat.

The Green Sardine timber sale, thinned in 1999, makes up 172 acres of the 1.2 mile circle. Although the field assessment determined that these acres are suitable habitat for spotted owls, if these acres were not counted towards the suitable habitat within 1.2 miles, 1,414 acres of suitable habitat, or 49% of the 1.2 mile circle would remain in suitable habitat.

Table 1. Acres of stands by dbh on ODF lands, and acres of suitable and non-suitable habitat on other ownerships within 0.7 mile and 1.2 mile radii of Drop-Off NSO site.

	0.7 mile circle							
Land Owner	0-11	12-17	18-26	26+	Total ≥12"	Suitable	Non-suitable	Total
ODF	443	277	26	122	425			868
PRIVATE						4	87	91
USFS						11	12	23
Grand Total	443	277	26	122	425	15	99	982

	1.2 mile circle							
Land Owner	0-11	12-17	18-26	26+	Total ≥12"	Suitable	Non-suitable	Total
ODF	1024	854	37	122	1013			2037
PRIVATE						37	273	310
USFS						345	189	534
Grand Total	1024	854	37	122	1013	382	462	2881

Table 2. Acres of suitable and non-suitable habitat, based on field review, on ODF lands and on other ownerships within 0.7 mile and 1.2 mile radii of Drop-Off NSO site.

Land Owner	0.7 mile circle		0.7 Total	1.2 mile circle		1.2 Total
	Suitable	Non-suitable		Suitable	Non-suitable	
ODF	471	399	870	1322	715	2037
PRIVATE	4	87	91	37	273	310
USFS	11	12	24	345	189	534
Grand Total	486	499	985	1704	1177	2881

Effects of the Prescription

Anthony et al. 2000 recommended that habitat for NSO may be enhanced or created through active management, and suggested that carefully designed thinning operations developed after detailed site evaluations may accelerate the development of stands into forests with structural attributes more likely to accommodate NSO. Tappeiner et al. 2000 reported that low stand density, whether achieved naturally or created through management appeared to be important in the formation of stand structural characteristics associated with NSO use on ODF lands in the NCR and ESF.

While thinning the Green Tweener timber sale may cause the canopy of this stand to be opened up to a point that it would be avoided by northern spotted owls in the short term, in the long term this prescription is likely to allow development of suitable habitat characteristics in a more timely manner than if the thinning were not done. The Green Sardine timber sale, completed in 1999, is an example of this. The stands thinned in this sale 7-9 years ago currently exhibit more understory development and a more complex canopy structure than the unthinned Green Tweener sale. The trees are larger and there is considerable open space within and beneath the canopy, as well as a moderate canopy closure. The proposed prescription for a relative density (RD) of 35 is similar to the prescription for the Green Sardine sale (RD 30), although it is a lighter thinning, which may result in a slightly higher canopy closure immediately following harvest, and subsequently slightly less understory development. Nevertheless, the thinning is likely to improve habitat suitability for NSO's in a similar time frame.

Discussion

This timber sale is located approximately 0.7 miles west of the Drop-Off northern spotted owl activity center. All locations of the Drop Off northern spotted owls have been within the Sardine Creek drainage, and no spotted owls have been located in the sale area. A ridge separates the sale area from the main Sardine Creek drainage.

Habitat to the east of the activity center on Forest Service land appears to be higher quality (see Figure 1). These stands are similar to ODF stand types that inventory information indicates are over 100-years-old, and have large diameter trees. Spotted owls have been located in these areas in the past (Sardine Creek site), but surveys in recent years have not covered these stands, and it is not known if this site is currently occupied. If the Sardine Creek site is not occupied, it seems likely that the Drop Off northern spotted owls would be using the higher quality habitat in addition to the stands where they have been located during surveys, resulting in a home range that may be skewed to the east, rather than circular.

The proposed timber sale area and much of the provincial home range of the Drop-Off NSO is dominated by 50-year old Douglas fir stands with little structural diversity, and generally may be considered to provide low quality foraging habitats for spotted owls. High quality forest habitats generally preferred by spotted owls for nesting, roosting, and foraging exist to the east of the Drop-Off NSO activity center, but are scarce within the provincial home range of the Drop-Off NSO. It is unclear how spotted owls may be

using landscapes, such as the Sardine Creek watershed, which are dominated by extensive areas of younger forests which provide relatively low quality suitable spotted owl habitat. It is possible that the Sardine Creek watershed may not provide spotted owl habitat in sufficient quality and quantity at the present time to support a pair of spotted owls that are capable of reproducing successfully. The Drop-Off NSO site does not have a long history of occupancy. A pair of spotted owls was found to occupy this site for one year, and there has never been a nest or young produced.

There is currently 59% suitable habitat within 1.2 miles of the Drop Off northern spotted owl site, but only 49% suitable habitat within 0.7 miles. The Green Tweener timber sale will modify 118 acres of suitable habitat within 1.2 miles and 9 acres within 0.7 miles. Although 500 acres of suitable habitat are not available within a 0.7 mile radius of the Drop Off activity center, there are 500 acres of contiguous suitable habitat that incorporate the activity center and include habitat to the east of the 0.7 mile circle. Current and previous spotted owl activity suggests that this area receives the most use by spotted owls. Although a portion of the Green Tweener timber sale is within 0.7 miles of the activity center, it is not contiguous to other suitable habitat adjacent to the activity center, and is separated from this suitable habitat by a recent thinning and by open rocky slopes on the other side of the ridge. It is unlikely, in my opinion, that the 9 acres in the Green Tweener timber sale are part of the core habitat for this owl pair.

CONCLUSIONS AND RISK ASSESSMENT

Biological Risk

The Green Tweener Thin timber sale poses a 'low' risk to the continued viability of the Drop-Off NSO site. This evaluation is based on the following factors:

- Fifty-five percent of the 1.2 mile circle will remain in suitable habitat following harvest of the Green Tweener sale.
- Although there is less than 500 acres of suitable habitat within a 0.7 mile circle, there are 500 acres of contiguous suitable habitat adjacent to the activity center.
- Survey data suggest that spotted owls rarely use the sale area, if at all;
- Because of its location relative to the activity center, it is unlikely that the Green Tweener timber sale is part of the core habitat for this owl pair;
- The Green Tweener timber sale contains relatively low quality foraging habitat for spotted owls and there are many acres of similar stands on the landscape;
- The prescription for the timber sale is a thinning, that, considering previous activity in the area, is likely to improve the habitat quality of the stand over a relatively short period of time.

Compliance. Timber harvest which results in less than 70 acres of the best available suitable spotted owl encompassing the Drop-Off NSO activity center will be avoided. Suitable spotted owl habitat within 0.7 mile circle is below USFWS recommendations to reduce potential risk of 'incidental take', and the proposed timber sale area will impact and modify 9 acres of low quality spotted owl foraging habitat. Sufficient suitable spotted owl habitat within 1.2 miles of the Drop-Off NSO activity center will be maintained in accordance with USFWS recommendations to reduce potential risk of

‘incidental take’. Although the sale is not in compliance with the guideline to maintain 50% suitable habitat within 0.7 miles of the activity center, the biological risk of the sale is considered to be low for the reasons discussed above. In particular, the timber sale will thin only 9 acres located in the outer periphery of the 0.7 mile circle and not contiguous with other suitable habitat within the Sardine Creek watershed where the Drop-Off NSO activity center is located.

CONSULTATION

Oregon Department of Fish and Wildlife. Charlie Bruce from ODFW reviewed this Biological Assessment and had the following comments: “I concur with the conclusion that this thinning sale will have little if any impact on spotted owl use toward the "core" area to the NE. As indicated in the BA, only a small portion (9 acres) of the sale unit is found within .7 miles of the activity center such as it is. Much of habitat between the sale unit and the core area is considered unsuitable or was earlier thinned 3 years ago with the Green Wave sale.”

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