

Pre-Operations Report

Operation Name: Boulder Creek (Alternate)

County: Marion

Management Basin: Scattered

Table 1. Operation Areas, Types and Acres

Area	Type of Operation	Gross Acres	Net Acres
	PC-M	276	251
	MC	5	5
Total		281	256

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 ridge tops and moderate to steep side-slopes of two divides between Dry Creek and two western most tributaries of Boulder Creek. The underlying rocks are sedimentary & igneous origin mapped as "Undifferentiated tuffaceous sedimentary rocks."

The elevation within the operation ranges from 2,600 to 3,280 feet. This soil is classed as the USFS soil resource inventory types 212 and 21. These soils are thin, gravelly loams. The soils are well to excessively drained. Permeability is very rapid in the surface soils. The operation supports Site Class IV Douglas-fir and western hemlock.

II. CURRENT STAND CONDITION:

Area I is a 60 year old Douglas-fir stand currently classified as Understory. The overstory consists of Douglas-fir, western hemlock, and western red cedar trees. Western hemlock, dogwood, vine maple, salal, ferns and huckleberry can be found in the understory. There are approximately 8 snags per acre; very little sound down wood; and 7,000 cubic feet per acre of down wood in all decay classes within Area I. (*SLI, 2005*)

Area II is a five acre portion of the same stand type as Area I. These five acres consist of extremely dense red alder trees. Sword ferns occupy the understory beneath the alder trees.

Table 2. Stand Inventory Information

Area	Prescription	Stand ID ¹	Species	Age	DBH	BA	TPA	SDI	Acres ²
I	PC-M	12394	DF	60	15	248	206	65	276
		Target ³			19	150	78	35	
II	MC	12394	RA	50	10	190	370	80	5

1 The source of stand inventory information is SLI from 2005.

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 STAND CONDITION:

This operation is located in the Scattered Basin. This basin is a diverse mixture of ownership, stand ages, species mixtures, and site quality. As indicated by its name, the Scattered Basin is a conglomeration of scattered ODF ownership parcels that range in size from 40 acres to 1000 acres. The operation is located within a parcel which is approximately 340 acres in size. Most of the smaller parcels within the basin are viewed as land exchange candidates due to the intermingled nature of the ownership. The Boulder Creek operation is a land exchange candidate.

The desired future condition for Area I and Area II is Layered. (*Cascade District Implementation Plan, 2003*) The entire Boulder Creek block will remain as one Stand Level Inventory type after the operation. The younger areas and stream buffers in the stand are part of the overall landscape design for the block and should not be separated out. These areas will add horizontal diversity to the stand.

The **Anticipated Pathway for Area I** begins with thinning the overstory:

- This will be a moderate density, first entry, commercial thinning
- In 3-5 years following the thinning, the stand may be evaluated for fertilization.
- In 10-15 years (age 70), the stand will be commercially thinned for the second time. This thinning will be moderate to heavy. The understory trees will be protected during this operation, but impacts from logging may result in non-uniform stocking of the understory.
- A third commercial thinning is planned when the overstory trees are about 80-years old. Following this operation, the understory will be cultured by regulating density and species mixture, and managing competing vegetation.

- Regeneration Harvest is planned to occur between overstory age 110 and 150 years.

The **Anticipated Pathway for Area II** begins with a regeneration harvest:

- Area II will be replanted with western red cedar.
- Area II will be evaluated for a pre-commercial thin in 10 years.
- The stand may be evaluated for a commercial thin around age 40.

Table 3. Stand Structure Information

Area	Stand ID	Current	Post Harvest ¹	Desired Future	Acres
I	12394	UDS	LYR	LYR	276
II	12394	UDS	REG	LYR	5

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 **proposed management prescription for Area I** is:

- All trees greater than 8 inches DBH thin to: basal area of 150; TPA 78; ave. DBH 19 inches; and SDI 35%.
- Douglas-fir and merchantable western hemlock will be the species targeted for thinning from below.
- All red alder of merchantable size will be harvested.
- Reserve from cutting all: western red cedar, pacific yew, all hardwoods (other than red alder) and western hemlock trees less than 8 inches in diameter.
- Old growth trees will be reserved from cutting and will not count towards meeting the prescription.
- Retain snags as safety permits.
- Down wood will be retained.
- The **Total Residual Stand (overstory and understory) in Area I will be:** basal area of 160; TPA 223; ave. DBH 8 inches; SDI 39%.

The **proposed management prescription for Area II** is:

- Cut all red alder and remove all merchantable wood.
- Place all remaining un-merchantable pieces and limbs in rows not to exceed 20 feet in length and 3 feet in height. Instructions will be given after merchantable pieces are removed.
- Reserve ALL conifers within Area II.
- All open areas will be replanted with western red cedar trees.

V. ESTIMATED TIMBER AND REVENUE INFORMATION:

Table 4. Timber and Revenue

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

	Conifer	Hardwood	Total
Net Volume (MBF)	2,895	1	2,896
Stumpage Value (\$/MBF)	\$300	\$100	
Estimated Gross Value	\$868,500	\$100	\$868,600
		Project Costs:	\$10,000
		Estimated Net Value:	\$858,600

VI. TRANSPORTATION PLANNING AND HARVESTING:

Access to the sale area will be via the Hi-way 22 to USFS Boulder Ridge road and National forest development road 701. Haul permits will be needed to use USFS roads. Several legacy roads exist within the timber sale unit. Some of these roads are scheduled to be re-opened with a scheduled USFS timber sale. Logging will be predominately accomplished with cable yarding from existing legacy roads that will be re-opened. Spurs within the sale will be evaluated for closure at sales end. The main criteria for closing the roads is to minimize illegal dumping and water management on sensitive roads.

Project work summary

- Reopen existing roads, approximately 1 mile
- Brush roads into the sale area as needed

Table 5. Transportation Planning Summary (Miles).

Activity	Mainline	Collector	Rocked Spur	Dirt Spur
Construct	0	0	0	0
Improve	0	0	0	1
Maintain	0	0	1.5	0
Close/Block	0	0	0	0
Vacate	0	0	0	0

*For determination of road class either use results of the Harvest and Habitat roads classifications, or if this information is not available then low use roads are spurs, medium use roads are collectors and high use roads are mainlines. Use these same criteria when comparing the total for all AOP sales to the IP plans.

VII. AQUATIC RESOURCES AND WATER QUALITY:

There are approximately 8 small non-fish bearing within the operation. These streams flow into Boulder Creek.

Management activities within riparian areas of these streams will focus on achieving properly functioning aquatic and riparian habitat conditions over time. Riparian Management Areas (RMAs) will be established immediately adjacent to streams for the purpose of protecting aquatic and riparian resources and maintaining the functions and ecological processes of the streams. The Management Standards for Aquatic and Riparian Areas found in the *NWO State Forests Management Plan* (pg. J-1 – J-16) will be followed within these RMAs.

The following measures will be used to minimize impacts to streams: 1. No ground based equipment will be allowed within 25 feet of any non-fish bearing streams, 2. There will be seasonal restrictions as to when ground yarding and road construction will be allowed (i.e. during dry seasons), 3. Erosion control measures will be used on areas of soils exposed during road construction or improvement, 4. In any cable portions of the operation, one end suspension of logs during yarding will be required, 5. Road ditches will be disconnected from streams, 6. Road maintenance will be required during log hauling.

VIII. T&E SPECIES CONSIDERATIONS:

This operation was surveyed for Northern Spotted Owls during the 2006 survey season with no responses. It will be surveyed again during the 2007 survey season. A revised survey station layout is being utilized during the 2007 survey season to improve coverage for the area. A biological assessment has been prepared by the NWOA biologist for the Dry Hansen and Dry Creek NSO sites of

which this operation lies within. This assessment has been reviewed by the Oregon Department of Fish and Wildlife and the US Department of Fish and Wildlife (USFW). A field tour will be scheduled with the USFW to discuss their comments at the site. Following this visit, the biological assessment and the comments from both agencies will be reviewed by the Program Director and the Area Director who will then determine how to proceed with the planned operation.

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:

There are small areas of steep slopes in the headwaters of the swale draining to Dry Creek in the western portion of the sale area and a somewhat larger band of steep slopes in the headwaters of the western fork of Boulder Creek. The initial hazard and risk assessment from the geotechnical specialist is moderate for occurrence of landslides. If these steep sloped areas remain within the sale area as the sale layout proceeds, the geotechnical specialist will be consulted to determine if a field visit is needed.

X. RECREATION RESOURCES:

There are no developed recreation resources within or adjacent to this operation.

XI. CULTURAL RESOURCES:

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:

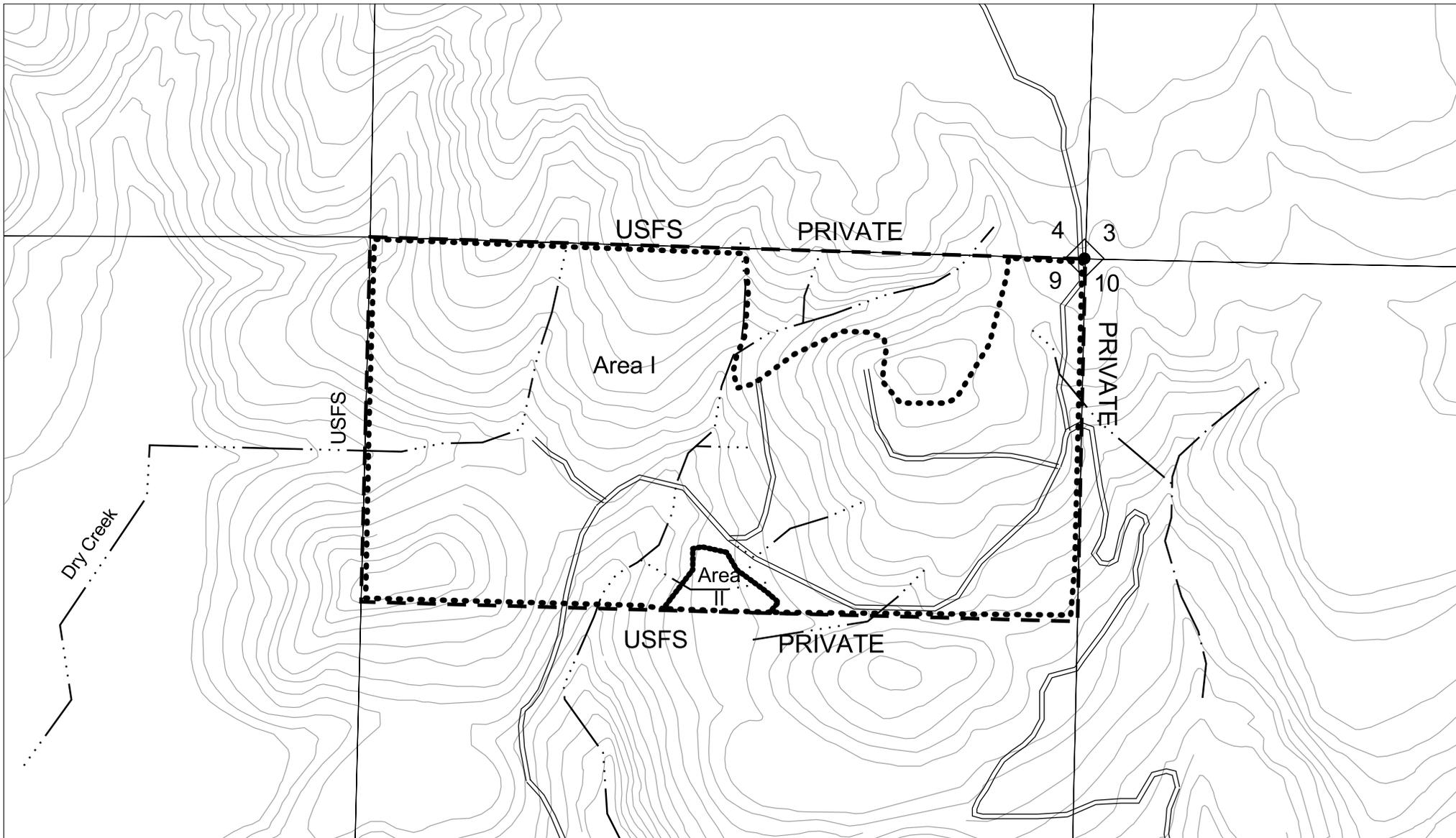
There are no scenic resources associated with this operation.

XIII. OTHER RESOURCE CONSIDERATIONS:

There are no other resource considerations.

XIV. LAND MANAGEMENT CLASSIFICATION SUMMARY:

The operation contains Focused Stewardship, Aquatic and Riparian Habitat for twelve small streams. See Section VII, Aquatic Resources and Water Quality for the management guidelines to be utilized.



- Santiam State Forest
- Boulder Creek
- Roads
- Streams
- FISH
- NONFISH
- UNKNOWN
- 40 foot contours

BOULDER CREEK (Alt)
 --TOPOGRAPHY--
 FY '08 SALE PLAN
 NORTH CASCADE DISTRICT

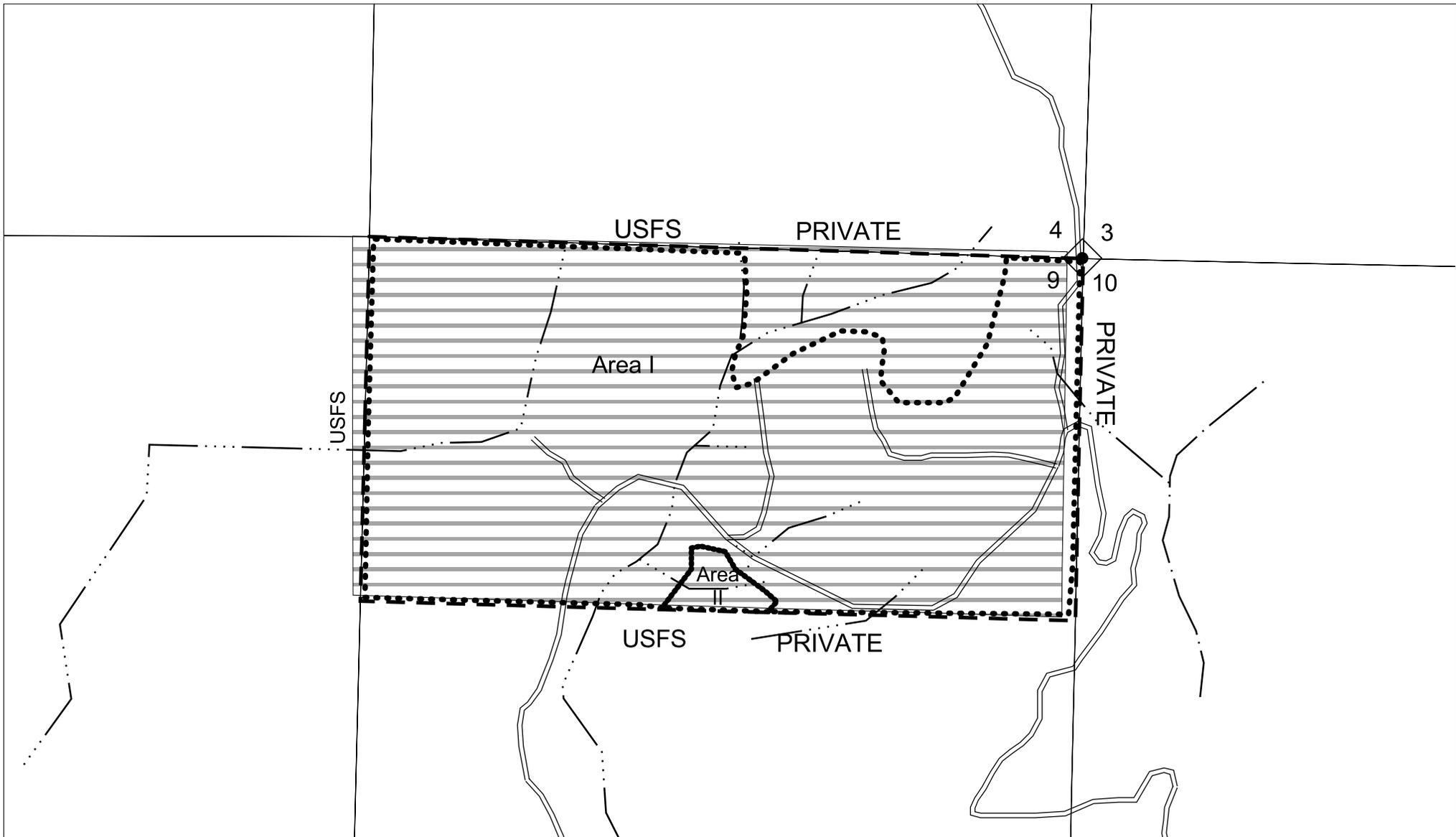
Portions of Section 9
 T10S, R6E W. M.
 Marion County, OR



Approximate Net Acreage:
 PC-M 251
 MC 5



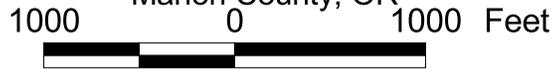
This product is for informational use and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.



-  Santiam State Forest
-  Boulder Creek
-  Roads
-  Streams
-  FISH
-  NONFISH
-  UNKNOWN
-  40 foot contours

BOULDER CREEK (Alt)
 --DESIRED FUTURE CONDITION--
 FY '08 SALE PLAN
 NORTH CASCADE DISTRICT

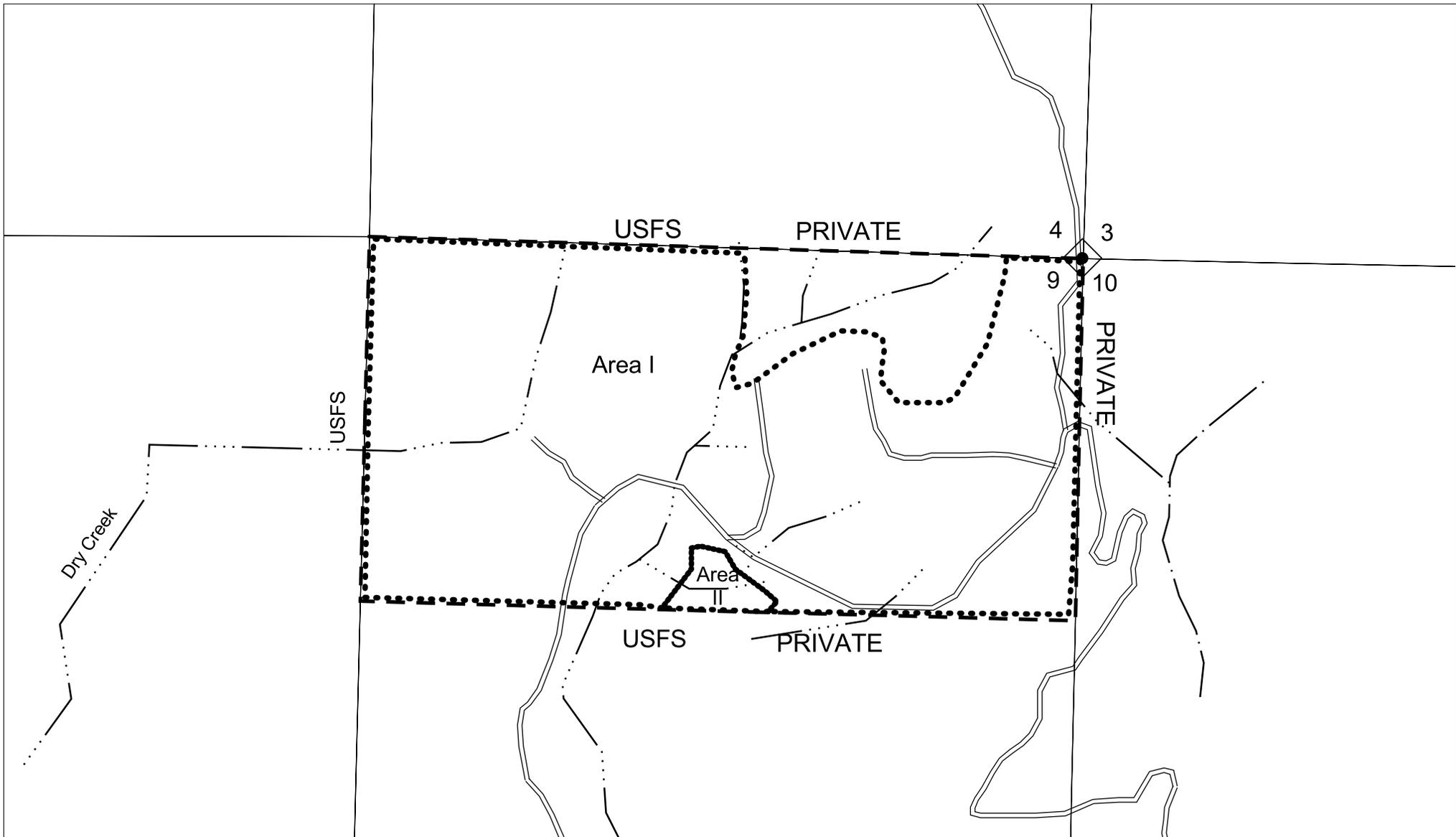
Portions of Section 9
 T10S, R6E W. M.
 Marion County, OR



Approximate Net Acreage:
 PC-M 251
 MC 5



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BOULDER CREEK (Alt)
 --KEY RESOURCES--
 FY '08 SALE PLAN
 NORTH CASCADE DISTRICT

Portions of Section 9
 T10S, R6E W. M.
 Marion County, OR



Approximate Net Acreage:
 PC-M 251
 MC 5



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- Santiam State Forest
- Boulder Creek
- Roads
- Streams**
- FISH
- NONFISH
- UNKNOWN
- 40 foot contours

Preliminary Biological Assessment of the Proposed Boulder Creek Timber Sale: Potential Impacts to the Dry Creek and Dry-Hansen Northern Spotted Owl Sites

Prepared by: Clint Smith

Date: 25 January 2007

Acknowledgements

Jodi Kroon and Rod Kraemer provided careful edits and thoughtful suggestions that improved the quality of this BA. Matt Gostin helped me to obtain, interpret, and describe the spotted owl survey data at the Dry Creek site. Jerry Chetock assisted with the suitable habitat determinations presented in this BA. I am grateful to all these people and to others who played smaller, but still important roles in the preparation of this BA.

Introduction

Purpose. The proposed Boulder Creek timber sale (FY08) is entirely located within 1.2 miles of the Dry Creek northern spotted owl activity center (owl circle). A portion of the sale (74 of 267 total sale acres) also is located within the Dry-Hansen owl circle. The purpose of this Biological Assessment (BA) is to summarize the habitat conditions within these owl circles and within the portions of the proposed sale area located within each owl circle. I will discuss anticipated effects of the sale prescription on spotted owl habitat quality. I also will offer a risk assessment and discuss implications with regards to the rescinded U.S. Fish & Wildlife Service "Incidental Take Guidelines" (Guidelines) (U.S. Fish & Wildlife Service 1990).

Policy Direction.

ODF Policy. Current policy ('Northern Spotted Owl Management Measures.' Memo from Ross Holloway, October 23, 2000) states: "In all cases, we will follow practices that 'avoid take' of northern spotted owls...The...area biologist will evaluate planned sales by applying the (incidental take guidelines) and considering the location of the activity (proximity to nest or activity center); the size of the operation; the nature of the silvicultural prescription; and other pertinent factors...Decisions on whether to proceed with sales within owl circles will be made by the Program Director and Area Director..."

Rescinded USFWS spotted owl take guidelines. The rescinded Federal Incidental Take Guidelines (U.S. Fish & Wildlife Service 1990) recommended that to avoid incidental take of northern spotted owls, managers avoid any harvest activity which results in less than 500 acres of suitable habitat within a 0.7-mile radius of a spotted owl activity center. The guidelines also recommended that within the Oregon Cascades province, managers avoid any harvest activity that results in less than 1182 acres of suitable habitat within a 1.2-mile radius of the activity center. The difficulties of performing this analysis for the Dry Creek and Dry-Hansen owl sites include identifying which stands provide suitable habitat and anticipating the short-term effects of the proposed management prescription and past management activities on spotted owl habitat quality.

Background

Survey History. Federal ownership within the landscape surrounding the Boulder Creek sale area has been surveyed in the past by the U.S. Forest Service (USFS). These surveys identified several spotted owl sites, many of which still are considered active.

ODF's contract spotted owl surveyors (Kingfisher Ecological) have conducted spotted owl surveys on State and Federal ownerships within 1.2 miles of the Boulder Creek sale area in 2005-2006 using a combination of night surveys from road stations and day-time walk-through transects. Survey station coverage in the area to the north and northwest of the Dry Creek activity center (A.C.) is less than ideal (see Figures 1-2), so I will make a recommendation regarding the 2007 surveys in the following section.

Site Information.

Dry Creek. The following sighting information was reported by Daryl Whitmore, USFS.

- 1987 Daytime pair with 2 fledglings
- 1988 Nighttime single
- 1997 Daytime single
- No surveys in 2006

The USFS reported on 13 September 2006 that there have been no surveys in the vicinity of the Dry Creek activity center in the past three years. Prior to this period, the USFS also reported performing "several" road surveys more than three years ago just south of the activity center with no responses. During 2004 and 2005 the USFS performed surveys from a call point that was 0.9 mile from the activity center with no responses. This call point was described by the USFS as being "too far away from the activity center to be considered a calling station that would detect the owls."

Kingfisher Ecological conducted spotted owl surveys in the Dry Creek owl circle in 2005-2006 with no observations attributed to the Dry Creek site. However, no stations were located within a fairly large roadless area north and northwest of the activity center in complex topography (Figures 1-2). Further complicating the matter, in 2005 a male spotted owl was heard at the survey station located about 1500 feet south of the Dry Creek A.C. Due to the faint nature of this call, the surveyor assumed that the responding bird was a long distance to the north and attributed the response to the Dry-Hansen site. However, due to the lack of survey stations between the Dry Creek A.C. and the Dry-Hansen A.C. and to the presence of side canyons on the eastern side of the Dry Creek canyon, it also is possible that the responding bird was much closer to the survey station than estimated and should have been attributed to the Dry Creek site.

Site status remains 'Pair' with two years of vacancy. Due to the lack of stations in the Dry Creek canyon, I recommend that improvements to the survey station layout be made for the 2007 surveys to obtain better coverage of the canyon, and that an additional walk-in survey transect be located along the eastern portion of the Dry Creek canyon. In addition, I recommend that 6 survey visits be made in 2007, rather than the standard 3 visits, before declaring the Dry Creek site vacant.

Dry Hansen. The USFS located a pair at this site in 1987, 1990, 1991, 1993, 1996, and 1998. According to the USFS, a male occupied this pair site in 2003, but there were no responses in 2004. Early in the 2005 season, USFS surveyors found an un-banded, non-nesting male at this site. Later in the season, Kingfisher surveyors heard a male at night on two occasions, a female at night on two occasions, and a pair once at night. In 2006, a male and female were heard on several occasions. Late in the season, the male and female were found ½ mile apart on the same follow-up visit. Both birds were moused; no young were present. Site status remains 'Pair' (Kingfisher 2006).

Sale Area Information. The following description is from the North Cascade District's preliminary draft Pre-operations Report:

"Area I is a 60 year old Douglas-fir stand currently classified as Understory. the overstory consists of Douglas-fir, western hemlock, and western red cedar trees. Western hemlock, dogwood, vine maple, salal, ferns and huckleberry can be found in the understory. There are approximately 8 snags per acre; very little sound down wood; and 7,000 cubic feet per acre of down wood in all decay classes within Area I.

Area II is a five acre portion of the same stand type as Area I. These five acres consist of extremely dense red alder trees. The understory consists of sword fern and sedges."

The description of Area I fits closely with my recollection from my field visits to the sale area. However, the alder-dominated wet area along the edge of Area II is more structurally complex than indicated by this description, in that it has a developing hemlock understory. The structure of the alder-dominated wet area (where several stream channels converge) along the edge of Area II is what I normally would characterize as a 'complex alder' stand.

Prescription. The following description is from the North Cascade District's preliminary draft Pre-operations Report:

"The proposed management prescription for Area I is:

- All trees greater than 8 inches DBH thin to: basal area of 150; TPA 78; ave. DBH 19 inches; and SDI 35%.
- Douglas-fir and merchantable western hemlock will be the species targeted for thinning from below.
- All red alder of merchantable size will be harvested.
- Reserve from cutting all: western red cedar, pacific yew, all hardwoods (other than red alder) and western hemlock trees less than 8 inches in diameter.
- Old growth trees will be reserved from cutting and will not count towards meeting the prescription.
- Retain snags as safety permits.
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- The Total Residual Stand (overstory and understory) in Area I will be: basal area of 160; TPA 223; ave. DBH 8 inches; SDI 39%.

The proposed management prescription for Area II is:

- Cut all red alder and remove all merchantable wood.
- Place all remaining un-merchantable pieces and limbs in rows not to exceed 20 feet in length and 3 feet in height. Instructions will be given after merchantable pieces are removed.
- Reserve ALL conifers within Area II.
- All open areas will be replanted with western red cedar trees.

Assumptions

In this section, I will cite research conducted using spotted owls living in 2nd growth stands on ODF ownership within the northern Oregon Coast Range. I understand that due to differences in geographic location and possibly due to ecosystem differences, the results of this research may not be directly applicable to spotted owls within ODF's North Cascades District. However, the ODF research is some of the best available information on spotted owl use of 2nd growth habitats. Because young, 2nd growth stands predominate on the ODF ownership within the Dry Creek spotted owl circle, I believe that the results of the Coast Range research are relevant to this situation.

Defining the home range. The home ranges and habitat use of the birds using the Dry Creek and Dry-Hansen spotted owl sites are not known. Known owl locations are plotted in Figure 1, but this represents incomplete information.

Anthony et al. (1999) found that spotted owls in 2nd growth forests in the northern Oregon Coast Range frequently have very large home ranges, extending well beyond 1.5 miles. In the absence of better information on the home ranges of any birds using the site, the following discussion on the habitat situation will describe stand conditions within a 0.7 and a 1.2 mile radius around the established activity center, as recommended by the Guidelines.

Defining Suitable Habitat. It is difficult to define suitable habitat for spotted owls in younger forests. Documentation provided with the "Procedures Leading to Endangered Species Compliance for the Northern Spotted Owl" (U.S. Fish & Wildlife Service, 1990) describes spotted owl suitable habitat as stands that exhibit: "...moderate to high canopy closure; a multilayered, multispecies 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 old growth, but they 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 vegetational and structural components...”

The majority of stands used by spotted owls on ODF ownership do not meet the above definition of suitable habitat.

ODF has some data on the use of younger forest types from North Coast spotted owl sites on ODF lands. An attempt to create a habitat suitability index (HSI) for spotted owls was conducted by Islam et al. (1997). Although this investigation was limited by various factors, the major finding was a positive correlation between owl site occupancy and the acreage of stands averaging 18 inches or greater in DBH (according to ODF's OSCUR timber inventory database) within ¼ and ½ mile of the owl site activity center.

A telemetry study of several owls on the Clatsop State Forest (Anthony et al. 1999) found many spotted owl foraging locations in smaller diameter stands averaging 12-17 inches and greater. The investigators in the HSI study noted that many owl responses had occurred in stands ranging from 12-17 inches in average DBH, but that there was no correlation between this size class and owl occupancy. They thought that some stands less than 18 inches DBH probably were suitable to some degree, but the attributes that determine habitat suitability were not apparent. The telemetry study and a concurrent study of habitat in areas where owls were located (Tappeiner et al. 1999) have found that hardwoods, especially hardwood/conifer edges, are an important component of spotted owl foraging habitat in both the Clatsop and Elliott State Forests. The habitat study also found that spotted owl nesting and foraging sites had larger average DBH and fewer trees per acre than non-use areas. So, other factors in addition to DBH that contribute to spotted owl habitat quality likely include hardwoods (especially hardwood/conifer edges), stand age, snags, down wood, and horizontal diversity.

My observation is that within many of the younger stands used by spotted owls on ODF ownership, suitable habitat occurs at the patch rather than at the stand level. This may help explain why spotted owls living in landscapes on ODF ownership, with amounts of 'habitat' that greatly exceed the minimum recommendations of the Incidental Take Guidelines, have such poor demographic performance (Anthony et al. 2000). It may take many more acres of younger stands to provide the number of suitable habitat patches that would be contained in a much lesser acreage of old-growth forest. The energetics of a bird moving between the more sparsely distributed habitat patches also may reduce viability. Therefore, retaining 2nd growth 'habitat' at or near the minimum standards could result in negative impacts to individual spotted owl sites.

Because of the correlation between acreage of 18"+ DBH stands to spotted owl occupancy (Islam et al. 1997), it may be reasonable to assume that these stands provide suitable habitat for spotted owls. However, the majority of the 18"+ DBH stands on ODF ownership do not contain all the structural components described in the earlier paragraph. From a biological perspective, not all stands averaging 12"+ DBH provide suitable habitat for spotted owls. Indeed, I routinely make determinations that 12-17" DBH stands within and adjacent to proposed sale areas do not provide suitable spotted owl habitat based upon stand density, structural diversity, and tree diversity (Northern Spotted Owl Surveying on State Forest Lands, General File # 3-2-1-330.2) considering the following factors:

- *Stand Density.* Extremely dense stands could preclude spotted owl use because of the difficulty for owls to maneuver through the stand. Studies on ODF managed lands showed that spotted owls foraged in stands that had more sparse spacing and larger tree diameters than stands not used for foraging (Tappeiner et al. 1999).
- *Structural Diversity.* Stands lacking in vertical and horizontal diversity may provide poor habitat for prey species and/or few perching/hunting opportunities for spotted owls.
- *Tree Diversity.* Single species stands may provide poor habitat for prey species and/or few perching/hunting opportunities for spotted owls. Studies on ODF managed lands have shown that hardwood stem density (Tappeiner et al. 1999) and especially conifer/hardwood edge (Anthony et al. 1999) were significant predictors of spotted owl use of younger stands.

The standard used to determine habitat suitability in this BA was the same as that used when determining survey requirements: "If ODF were proposing a timber sale in a comparable stand, would I recommend spotted owl surveys?"

In this analysis, I have assumed that recently thinned stands have converted 'Suitable' habitat to 'Non-suitable.' In reality the situation is not that simple. I know that spotted owls may respond to recent management activities in ways that I don't understand. Due to mechanical damage, harvest activities may result in loss of snags and down wood in the more advanced stages of decay. This may reduce habitat capacity for the small-medium mammal prey of spotted owls. Many of the recently thinned stands reported in this analysis appear to have been small-diameter, dense stands, which may not have provided suitable habitat before the thinning. Many of these thinnings, especially those on private ownership, have left patchy, but well-stocked, stands which may have enhanced the ability of spotted owls to fly through and forage within these stands. Some of these stands may function as low quality spotted owl habitat in the relatively near future. However, due to the short-term impacts of the harvest operations, I have categorized these thinned stands as 'Non-suitable' for the purpose of this assessment.

Habitat on Federal and Private Ownership. Habitat acreages on Federal (USDA Forest Service) and on private ownership within this owl circle were estimated using aerial photo analysis combined with ground truthing. I also had access to estimated DBH data from stand ages from the Federal timber inventory, and they are shown in Figure 1. However, I discovered during ground-truthing that this Federal DBH information is not very reliable for many of these stands, and is not directly comparable to the ODF DBH information. Therefore, I have not summarized the Federal DBH data in tables.

Because I do not have access to timber inventory data for the private ownership, this habitat information also is not directly comparable to the ODF OCSUR data.

I conducted the on-site habitat assessment with Jerry Chetock from the North Cascades District using recent stereo aerial photographs. We ground truthed several stands where habitat suitability could not be determined from aerial photo interpretation. There was one stand of questionable habitat suitable located within the Dry-Hansen owl circle that we did not visit; so I have designated habitat suitability of that stand as "Unknown" in the figures and tables.

Evaluation of Habitat on ODF Ownership. As directed by current policy (Northern Spotted Owl Surveying on State Forest Lands, General File # 3-2-1-330.2), I (with Jerry Chetock) also have conducted a site-specific evaluation of habitat suitability on the 11-17" DBH stands on ODF ownership, using the same techniques and standards as described in the previous section on non-ODF ownership.

All stands were digitized and acreages were calculated using ArcView.

Impact Assessment and Discussion

Landscape Analysis. Figure 1 shows the spotted owl activity centers, owl circle, spotted owl observations, timber sale location, stand ages, and average stand diameters (based on ODF's OSCUR timber inventory database, Stand99) on ODF ownership within the Shoofly Creek owl circle. Figure 1 also shows the Federal DBH information. Figure 2 shows the results of the photo- and ground-based habitat assessment.

Table 1 summarizes average stand DBH on ODF ownership within 0.7 miles of the Dry Creek activity center. Table 2 summarizes stand ages on ODF ownerships within the 0.7-mile radius Dry Creek circle. Table 3 summarizes the Suitable Spotted Owl habitat within 0.7 miles of the Dry Creek Spotted Owl activity center on all ownership. Tables 4-6 provide the same information for the 1.2-mile radius Dry Creek owl circle. Tables 7-9 provide the same information for the 1.2-mile Dry-Hansen owl circle. Because the proposed Boulder Creek sale is located more than 0.7 miles beyond the Dry-Hansen activity center, I have not summarized habitat information for the 0.7-mile radius Dry-Hansen owl circle.

Age and DBH information on ODF ownership comes from ODF's OSCUR timber inventory database (Stand99). Average DBH is estimated using a growth model, so these estimates may not be entirely accurate.

It is likely that a spotted owl living within this landscape would range beyond 1.2 miles. This is supported by the large home range sizes observed during the radio-telemetry study conducted on ODF lands in Clatsop County (Anthony et al. 1999).

Recent Thinnings. A large portion of the private ownership and some of the Federal ownership within the Dry Creek owl circle, and lesser acreage in the Dry-Hansen circle was recently thinned (Tables 3, 6, & 9).

In the late '90s ODF sponsored a case study looking at spotted owl habitat use before and immediately after a commercial thinning designed to be non-detrimental in the short term (Bayless et al. 2001). In this case study, spotted owl habitat use shifted away from the recent commercial thinning immediately after harvest. We do not have information on if or when the owls would again use the area as they did prior to harvest. (This owl site has since been determined to be 'Historic.')

The "Agreement for the Conservation of Northern Spotted Owls" ('Agreement') between ODF and the U.S. Fish & Wildlife Service (signed 5 September 2001), which applies to operations within the northern Oregon Coast Range, prohibits ODF from classifying stands logged (including thinnings) since 1998 as 'suitable' spotted owl habitat. Within the area covered by the 'Agreement', I normally would categorize stands thinned prior to 1998 as 'suitable' if they had a stand structure where I normally would request owl surveys. I cite this reference to the 'Agreement' because it gives some indication of how the U.S. Fish & Wildlife Service views habitat suitability of recent thinnings, at least in the northern Oregon Coast Range.

In this BA, I have categorized all recently thinned stands as 'Non-suitable' habitat for spotted owls.

Anticipated Effects of the Sale Prescription. Although the sale area consists of relatively young and small timber, I have classified much of the sale as 'Suitable' spotted owl habitat due to tree species diversity and horizontal diversity within the stand. Harvest of this sale will thin the overstory trees and will allow increased light into the understory, which should stimulate the growth of tolerant conifer in the understory, enhance development of understory brush species, and increase growth of residual overstory trees. This should enhance development of higher quality spotted owl habitat over the long term. However, there likely will be short-term detrimental effects of applying a uniform prescription over such a large area near the activity center. The planned removal of all merchantable red alder within the sale area also is likely to result in degradation of spotted owl habitat quality for an indeterminate period. When I conducted my on-site review of habitat suitability, I felt the complex alder stands in the vicinity of Area II was some of the higher quality spotted owl habitat within the ODF parcel. The planned clearcut harvest in Area II will not only convert suitable habitat to 'Non-suitable', but the resulting clearcut edge likely will degrade the value of the surrounding stand.

The Boulder Creek sale will impact 160 acres of suitable habitat within 0.7 miles and 237 acres of suitable habitat within 1.2 miles of the Dry Creek activity center. This sale will impact no suitable habitat within 0.7 miles and 74 acres of suitable habitat within 1.2 miles of the Dry-Hansen activity center.

Discussion

Landscape Condition. Suitable habitat amounts in the Dry Creek owl circle will be above (but not greatly exceeding) the minimum acreage amount suggested by the Incidental Take Guidelines after harvest of the Boulder Creek sale (569 acres within 0.7-miles, Table 3; and 1278 acres within 1.2-miles, Table 6). Due to the marginal nature of much of the suitable habitat within this circle, it is likely that birds using this site require larger acreage of suitable habitat and/or has a larger home range.

Suitable habitat amounts in the Dry-Hansen owl circle will be above (but not greatly exceeding) the minimum acreage amount suggested by the Incidental Take Guidelines after harvest of the Boulder Creek sale (1256 acres, Table 9). As shown in Figures 1-2, the habitat in the northern portion of this owl circle is greatly fragmented by clearcut harvests. However, much of the remaining suitable habitat in the northern portion of the circle is old-growth or old-growth structure, so it is possible that the birds using this site can survive with habitat acreages closer to the minimum standard.

Anticipated Impacts of the Harvest Prescription.

Short Term. I anticipate that habitat quality within the sale area will be reduced over the short term after implementation of the harvest prescription.

Long Term. Throughout Area I, implementing the harvest prescription should stimulate development of layered stand structure, which should result in an improvement in spotted owl habitat quality. One unknown factor is how the planned alder removal throughout the sale will impact future trajectory of spotted owl habitat quality. I anticipate that this will delay the recovery and improvement in habitat quality.

Within and near Area II, I anticipate that implementing the harvest prescription will severely degrade habitat suitability over both the short- and long-term.

Risk Assessment

Biological Risk Assessment.

Dry Creek Site. Harvest of the Boulder Creek sale will impact a large portion of the area directly northeast of the Dry Creek activity center. The southwest corner of the sale is within 985 feet of the activity center (70-acre circle); however, more than 70 contiguous acres of suitable habitat are located outside ODF ownership to provide a 70-acre core area. Over most of the sale area, implementing the harvest prescription likely will improve habitat quality over the long term, but there likely will be detrimental impacts over the short- mid-term.

I anticipate that harvest of the Boulder Creek sale poses a 'Moderate' risk to continued viability of the Dry Creek spotted owl site due to:

- the large size of the sale area,
- proximity of the sale to the activity center,
- overall low quality of suitable habitat throughout much of the owl circle, and
- relatively low amount of this low quality habitat in both the 0.7-mile and 1.2-mile radius circles.

Measures that may reduce risk to this site include:

- move sale boundary away from activity center,
- introduce more patchiness into the sale prescription by including scattered skips or no-harvest areas, and
- retain all hardwoods, including red alder, or significantly reduce amount of alder to be harvested.

Dry-Hansen Site. This site also will have a relatively low amount of suitable habitat remaining after harvest of the Boulder Creek sale. However, habitat quality near the activity center, although fragmented, is of much higher quality than near the Dry Creek site. Also, the proposed Boulder Creek sale is located on the outside edge of the 1.2-mile owl circle for this site, so the sale would not impact any potential core use area. Indeed, due to likely competition with the Dry Creek site, I suspect the Dry-Hansen birds do not frequently use the Boulder Creek sale area. Therefore, I anticipate that harvest of the Boulder Creek sale poses a 'Low' risk to continued viability of the Dry-Hansen spotted owl site.

Compliance with the Incidental Take Guidelines. Habitat acreages for all affected owl circles will exceed the recommendations of the Incidental Take Guidelines after harvest of the proposed Boulder Creek sale (569 acres within 0.7 miles and 1278 acres within 1.2 miles of the Dry Creek A.C. and 1256 acres within 1.2 miles of the Dry-Hansen A.C. Although the southwestern sale boundary is located very near the Dry Creek activity center, more than 70 acres of similar habitat are located outside ODF ownership to provide the required 70-acre core area. Therefore, harvest of Boulder Creek would be consistent with the recommendations of the Incidental Take Guidelines.

Consultation with ODFW

Rod Kraemer with the Oregon Department of Fish & Wildlife (ODFW) has reviewed the final draft of this BA. Rod has provided several insightful edits and suggestions, all of which I have attempted to incorporate into the BA. Rod also provided the following comments:

"I concur with the conclusion that this thinning sale poses a 'moderate' risk to the continued viability of the Dry Creek northern spotted owl site, and a 'low' risk to the continued viability of the Dry-Hansen northern spotted owl site. Sufficient suitable spotted owl habitat within 0.7 and

1.2 miles of the Dry Creek and Dry-Hansen northern spotted owl sites will be maintained in accordance with USFWS recommendations to reduce potential risk of 'incidental take', and will accelerate the development of spotted owl habitat in the long-term. However, in the short-term, suitable habitat within 1.2 miles of the Dry Creek site is low quality for nesting, roosting, and foraging and may be marginal in its ability to sustain a pair of spotted owls that are capable of successfully reproducing. Strategies to consider that may lessen potential risk and short-term detrimental impacts to the Dry Creek site include maintaining additional suitable habitat within the 0.7 mile circle and designing and implementing a variable density thinning or including unthinned patches and hardwood retention to increase ecotones and horizontal diversity."

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Table 1. Average Stand DBH (according to ODF's OSCUR timber inventory database -- 'Stand99' and photo/ground review) on ODF ownership within a 0.7-mile radius of the Dry Creek Northern Spotted Owl activity center.

DBH	Total ODF Acres		Boulder Creek		Acres Outside Sales	
	Suitable	Non-suitable	Suitable	Non-suitable	Suitable	Non-suitable
0-11	--	1	--	1	--	0
12-17	160	2	160	2	0	0
18-25	0	--	0	--	0	--
26"+	0	--	0	--	0	--
Total	160	3	160	3	0	0

Table 2. Stand age (according to ODF's OSCUR timber inventory database -- 'Stand02') on ODF ownership within a 0.7-mile radius of the Dry Creek Northern Spotted Owl activity center

Age	ODF Acres	Boulder Creek Acres	ODF Acres Outside Sales
0-39	1	1	0
40-49	19	19	0
50-59	130	130	0
60-69	13	13	0
70-99	0	0	0
100+	0	0	0
Totals	163	163	0

Table 3. Spotted Owl habitat on all ownerships within 0.7 miles of the Dry Creek Northern Spotted Owl activity center.

	Suitable	Non-Suitable
ODF	160	3
Federal	577	155
Private	46	39
Total	783	197
Recent Federal Thinnings	30	--
Recent Private Thinnings	24	--
Total	729	251
Boulder Creek Sale	160	3
Total Acres outside Sales	569	411

Table 4. Average Stand DBH (according to ODF's OSCUR timber inventory database -- 'Stand99' and photo/ground review) on ODF ownership within a 1.2-mile radius of the Dry Creek Northern Spotted Owl activity center.

DBH	Total ODF Acres		Boulder Creek		Acres Outside Sales	
	Suitable	Non-suitable	Suitable	Non-suitable	Suitable	Non-suitable
0-11	--	37	--	5	--	32
12-17	252	26	237	25	15	1
18-25	0	--	0	--	0	--
26"+	0	--	0	--	0	--
Total	252	63	237	30	15	33

Table 5. Stand age (according to ODF's OSCUR timber inventory database -- 'Stand02') on ODF ownership within a 1.2-mile radius of the Dry Creek Northern Spotted Owl activity center

Age	ODF Acres	Boulder Creek Acres	ODF Acres Outside Sales
0-39	37	5	32
40-49	21	19	2
50-59	234	221	13
60-69	22	22	0
70-99	0	0	0
100+	0	0	0
Totals	314	267	47

Table 6. Spotted Owl habitat on all ownerships within 1.2 miles of the Dry Creek Northern Spotted Owl activity center.

	Suitable	Non-Suitable
ODF	251	63
Federal	1174	490
Private	474	430
Total	1899	983
Recent Federal Thinnings	83	--
Recent Private Thinnings	301	--
Total	1515	1367
Boulder Creek Sale	237	30
Total Acres outside Sales	1278	1604

Table 7. Average Stand DBH (according to ODF's OSCUR timber inventory database -- 'Stand99' and photo/ground review) on ODF ownership within a 1.2-mile radius of the Dry-Hansen Northern Spotted Owl activity center.

DBH	Total ODF Acres		Boulder Creek		Acres Outside Sales	
	Suitable	Non-suitable	Suitable	Non-suitable	Suitable	Non-suitable
0-11	--	0	--	0	--	0
12-17	74	0	74	0	0	0
18-25	0	--	0	--	0	--
26"+	0	--	0	--	0	--
Total	74	0	74	0	0	0

Table 8. Stand age (according to ODF's OSCUR timber inventory database -- 'Stand02') on ODF ownership within a 1.2-mile radius of the Dry-Hansen Northern Spotted Owl activity center

Age	ODF Acres	Boulder Creek Acres	ODF Acres Outside Sales
0-39	0	0	0
40-49	6	6	0
50-59	68	68	0
60-69	0	0	0
70-99	0	0	0
100+	0	0	0
Totals	74	74	0

Table 9. Spotted Owl habitat on all ownerships within 1.2 miles of the Dry-Hansen Northern Spotted Owl activity center.

	Suitable	Non-Suitable	Unknown
ODF	74	0	0
Federal	1407	1234	38
Private	14	114	0
Total	1495	1348	38
Recent Federal Thinnings	161	--	0
Recent Private Thinnings	4	--	0
Total	1330	1513	38
Boulder Creek Sale	74		0
Total Acres outside Sales	1256	1587	38