

RESOURCE INVENTORY: SHADY LANE TREE FARM

**Lot 900, Section 25
Township 11 South, Range 6 West, W.M.
Benton County, Oregon**



December 2007

RESOURCE INVENTORY: SHADY LANE TREE FARM

Lot 900, Section 25
Township 11 South, Range 6 West, W.M.
Benton County, Oregon

by

Jerry Witler and Kevin Young
Foresters

December 2, 2007

RESOURCE INVENTORY: SHADY LANE TREE FARM

Lot 900, Section 25
Township 11 South, Range 6 West, W.M.
Benton County, Oregon

Table of Contents

	page
<i>Description of Timber and Timberland</i>	
Location and Access	1
Topography	1
Cover Type Descriptions	2
<i>Methods</i>	
Timber Volume	4
Growth	6
Snags	6
Down Woody Material	7
<i>Results</i>	
Timber Volume	8
Growth	12
Snags	14
Down Woody Material	15
<i>Appendices</i>	
A. Log Sort, Grade, and Volume Data by Cover Type	17
B. Stand Tables	21
C. Distribution of Down Woody Material by Diameter and Length Classes	26

DESCRIPTION OF TIMBER AND TIMBERLAND

Location and Access

The Shady Lane Tree Farm is located about four miles west of Corvallis. It is Tax Lot 900 in Section 25, Township 11 South, Range 6 West, W.M., Benton County. Muddy Bottom Road, which is graveled and well maintained, forms the north boundary. The property has no interior road access.

According to the County Assessor's Tax Lot Map, total acreage is 45.27. Of this total, about 31.8 acres are forested. Figure 1 is an aerial photograph of the Tree Farm. A cover type map is superimposed on the photograph. Cover types are described below.

Wooden posts mark the northeast and southeast property corners. As is evident in Figure 1, all of the east and south boundaries and most of the west boundary are timber harvest lines.

Topography

Most of the property slopes northerly towards Elkhorn Creek and Muddy Bottom Road. The area near Muddy Bottom Road, which includes the northern islands of Cover Types 1 and 3, is flat. In much of this area, the water table is high, with standing water in spots during wet weather. The terrain then rises sharply going south through Cover Type 2. The climb is less steep in the center and south, which is covered primarily by the south island of Cover Type 1. The terrain is steeper again as it climbs to the southeast corner. Most of the property can be logged with ground-based systems, such as a tractor or shovel. On the steep pitches, however, logs will have to be pulled by cable.

Elkhorn Creek flows through the northwest portion of the property, outside of the timbered area. Two small tributaries flow northerly through the timber into Elkhorn Creek. These streams are shown in Figure 1.

Cover Type Descriptions

Douglas-fir and red alder are the predominant species on the property. These two species occur in all forested cover types. Minor species include bigleaf maple, willow, cherry, and Oregon ash. Willow and ash were noted only in Cover Type 3.

In a sample of nine Douglas-firs from throughout the property, ages ranged from 52 to 72 years, with an average of 64. The nine-tree sample indicates that average Douglas-fir site index, base age 50, is 130. This index is Class II on a scale of I to V, with I being the most productive for growing this species.

For the cruise, the forested area was divided into three cover types. No evidence of any logging since stand origin was noted in any of them. They are described as follows:

Type 1 (14.2 Acres) - Well stocked red alder with only scattered Douglas-fir. This type is divided into two islands. The northern island contains areas with a high water table. The southern island is upland and on well drained soils.

Type 2 (10.1 Acres) - Well stocked Douglas-fir mixed with small areas of red alder. Per acre volumes are highest in this type. In general, it lies on the steepest topography.

Type 3 (7.5 Acres) - Poorly stocked hardwoods with scattered large Douglas-firs. Much of this type contains heavy brush, such as vine maple and salmonberry, and is difficult to traverse.

The northwest corner of the property is a low, wet, brush-dominated area with few trees.

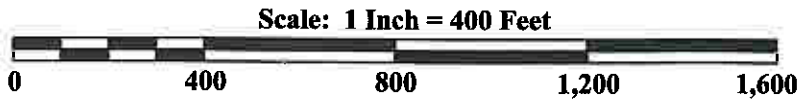
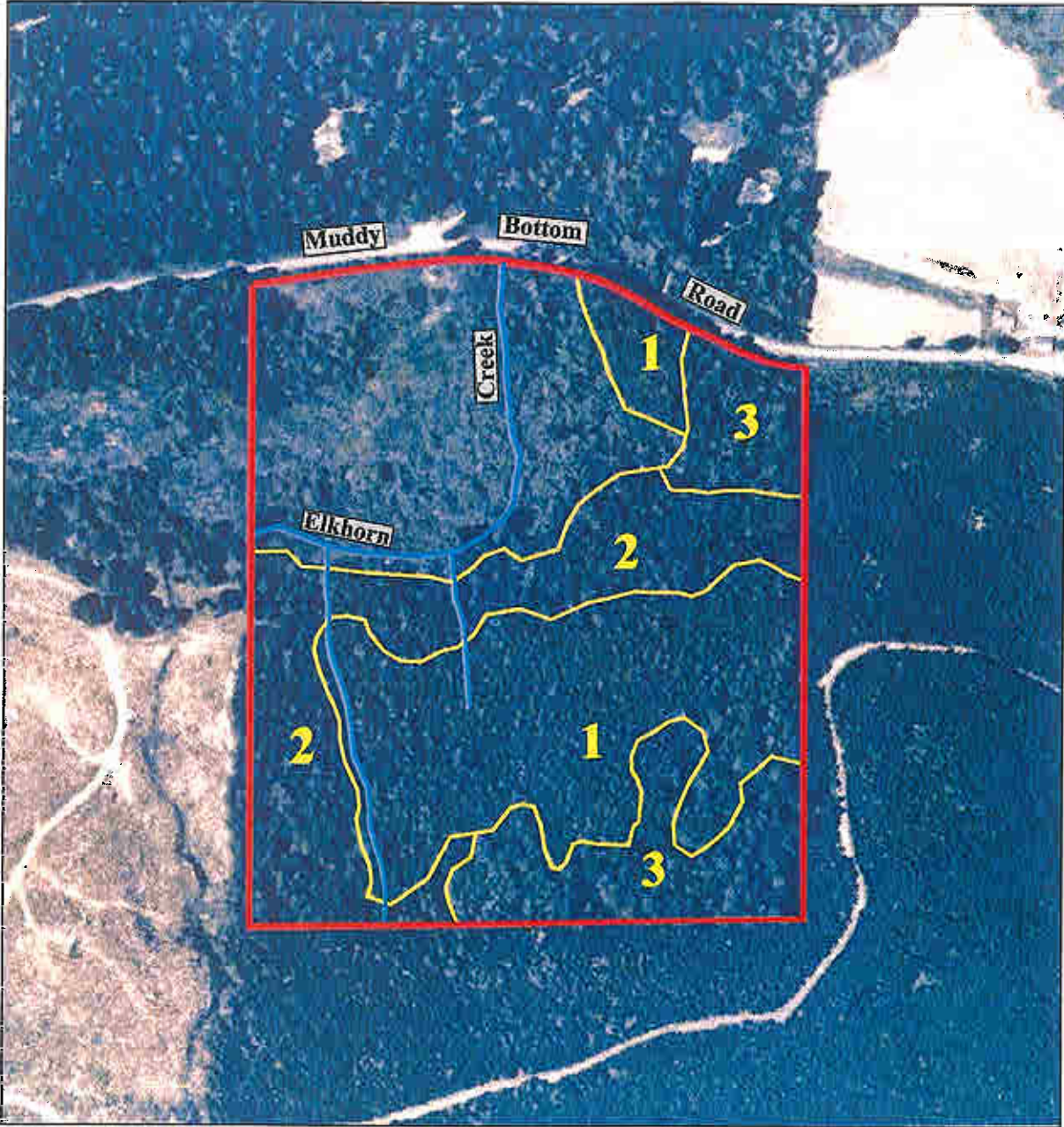


Figure 1. Cover Types

METHODS

Timber Volume

Timber and other resources were inventoried by Jerry Witle and Kevin Young on November 20 and 22, 2007. The cover type map in Figure 1 was prepared by digitally superimposing a copy of the County Assessor's Tax Lot Map onto the aerial photograph and then delineating cover types. Type boundaries drawn in the office were verified in the field and modified as necessary. Figure 1 was prepared and acreages calculated using AutoCad software.

Timber was sampled with 34 variable radius plots located on a square 200-foot grid. Types 1, 2, and 3 were sampled with 14, 12, and 8 plots, respectively. Basal area factor was 27.78 in Type 1 and 20.00 in Type 3. Basal area factor for most plots in Type 2 was 40.00. However, because some type boundaries were modified after completion of the cruise, one plot in Type 2 was sampled with a basal area factor of 27.78, and two, with a factor of 20.00. Sighting point for determining whether trees were in a sample plot was four feet above stump level.

Species, diameter at four feet above stump level (D4H), form factor, merchantable height, and estimated defect were recorded for each sample tree. Merchantable height generally is height to an inside bark diameter of five inches or to an outside bark diameter of 40 percent of outside bark diameter at 16 feet above stump level, whichever is shorter. When the top log is pulp quality, the minimum top diameter is three inches rather than five. If a tree is broken below this point, merchantable height is to the break.

Preferred length for Douglas-fir export quality logs was 40 feet. For domestic sawlogs of this species, preferred length was 36 to 40 feet. Preferred length for hardwoods was 30 feet. Logs were cruised in other lengths due to defect or at the top of the tree. In some cases, logs were bucked shorter in order to improve sort recovery.

Maximum log length for all species was 40 feet, and minimum was 12. All logs contained 12 inches of trim. Minimum scaling diameter was three inches for pulp logs. The minimum merchantable tree contained at least one 5 inch by 16 foot log, plus trim. All trees with at least the minimum log were cruised.

Each log was assigned a sort and grade. Table 1 lists the sorts used in the cruise. The first five pertain to Douglas-fir quality logs. Sorts change periodically with market conditions.

Table 1. Log Sort Definitions

J EX 12 – Special Mill or very good No. 2 Sawmill appearance. No sweep, hooked butts, or knot whorls. Defect deductions less than 5 percent of gross scale. Knots generally less than 1.0 inches, well scattered in upper quarter. Minimum scaling diameter 12 inches, minimum length 26 feet.

CJ EX 12 - Good No. 2 Sawmill quality. No excessive taper or sweep. Defect deductions less than 10 percent of gross scale. Knots generally less than 1.5 inches, well distributed. Minimum scaling diameter 12 inches, minimum length 26 feet.

C EX 12 - Medium No. 2 Sawmill quality. No excessive taper or sweep. Defect deductions less than 10 percent of gross scale. Knots generally less than 2.5 inches, well distributed. Minimum scaling diameter 12 inches, minimum length 26 feet.

J EX 8 - Special Mill appearance. No sweep, hooked butts or knot whorls. Defect deductions less than 5 percent of gross scale. Knots generally less than 0.5 inches, well scattered in upper quarter. Scaling diameter 8 to 11 inches, minimum length 30 feet.

K EX 8 - Good No. 3 Sawmill quality. No excessive taper or sweep. Defect deductions less than 10 percent of gross scale. Knots generally less than 2 inches. Scaling diameter between 8 and 11 inches, minimum length 30 feet.

DOMESTIC - Sawlog quality conifer. Either too small for export, or rough, bumpy, with sweep, hook, or defect that excludes export sorts. Minimum scaling diameter 5 inches, minimum length 12 feet.

HI HWD - High quality hardwood sawlog. At least 50 percent surface clear, straight, defect deductions less than 25 percent of gross scale. Minimum scaling diameter 8 inches, minimum length 12 feet.

HI HWD6 (red alder only) – Similar to HI HWD, but with a scaling diameter of 6 or 7 inches, butt cut only.

PULP - Either too small for other sorts or cannot be classified as a sawlog due to sweep, roughness, or other defects. Minimum scaling diameter 3 inches, minimum length 12 feet.

Grades follow the Columbia River Log Scaling and Grading rules. Unlike sorts, they remain constant over time. Logs graded No. 3 Sawmill Rough met the size requirements for No. 2 Sawmill grade, but were classified as No. 3 Sawmill due to roughness.

The data were analyzed using the Super A.C.E. computer cruise program.

Growth

Current board foot volume growth was estimated using Dr. James Arney's Forest Projection System (FPS). Growth was projected for five years, and then average annual increment was calculated. FPS is a distant-dependent growth model. Its projections depend on the variations in stocking within each type. These variations are obtained from the cruise data. FPS is able to model growth of mixed species stands such as on the Shady Lane Tree Farm.

In order to verify the results from the FPS model, 38 trees were bored in order to measure five-year diameter growth increment, 19 Douglas-firs, 16 red alders, and three bigleaf maples. The sample covered the range of size classes on the property. The growth increment sample included nine dominant and co-dominant Douglas-firs used for estimating site index. On each of these nine trees, breast height age (age at 4.5 feet above ground level) and total height also were measured. Site index is an important variable in the growth model.

In addition, total height was measured on two trees of each species on each plot, when available. The site sample trees were part of the total height sample. FPS uses total height in its calculations rather than merchantable height. The sample of total heights was used to develop a graph relating merchantable height to total height.

Snags

Snags were tallied using 0.2 acre circular plots with the same centers as the variable radius plots. The tally included all snags that were at least 5.6 inches in diameter at four feet above stump level and 10 feet tall. For each snag, species, diameter, height, and decay class were recorded. Five decay classes were identified:

- 1 - bark loosened, sapwood riddled by beetles, heartwood intact, limbs intact, top intact
- 2 - bark mined by beetles, sapwood mined extensively, heartwood softened with cavities, limbs broken, top broken

- 3 - bark sloughing off, sapwood decayed considerably, heartwood decayed and partly sloughed, stubs of largest branches remain, top gone
- 4 - bark piled at base, sapwood sloughed off, no sound heartwood, limbs gone, top gone
- 5 - bark gone, sapwood gone, heartwood in the remaining stub, limbs gone, top gone

Down Woody Material

Large down woody material was sampled by the line intersect method. From each plot center, a 50-foot horizontal line was extended in the direction of travel. Another 50-foot line was extended from center at 120 degrees to the first. Material was sampled that intersected an imaginary vertical plane six feet high along each of these lines. All down woody material at least four inches in diameter at the point of intersection was tallied. Each piece was classified by species, if possible. Diameter at the point of intersection and length were recorded. In addition, each piece was assigned a decay class. Decay classes were identified as follows:

- 1 - bark intact, twigs less than three centimeters in diameter present, texture intact, shape round, original color, log elevated on support points
- 2 - bark intact, twigs less than three centimeters in diameter absent, texture intact to partly soft, shape round, original color, log elevated on support points but sagging slightly
- 3 - trace of bark, twigs less than three centimeters in diameter absent, texture in hard, large pieces, shape round, original color to faded, log is sagging near ground
- 4 - bark absent, twigs less than three centimeters in diameter absent, texture in small, soft, blocky pieces, round to oval shape, light brown to faded brown or yellowish color, all of log on ground
- 5 - bark absent, twigs less than three centimeters in diameter absent, texture soft and powdery, oval shape, faded to light yellow or gray color, all of log on ground

Cubic volume, weight, and number of pieces by size class were calculated according to methods outlined in a 1982 publication by C. E. Van Wagner of the Canadian Forestry Service (Practical aspects of the line intersect method, Petawawa National Forestry Institute, Chalk River, Ontario, Information Report PI-X-12, 11 p.). In determining weight, sound material was assigned a specific gravity of 0.45, and rotten material, 0.30. Material falling in decay classes 1 and 2 was considered sound, and that falling in classes 3, 4, or 5 was considered rotten.

RESULTS

Timber Volume

Table 2 contains average stand data for each type and for all types combined. It includes diameter, basal area, number of trees, number and size of logs, and cubic and board foot volumes.

Estimated total net volume on the property is 826 MBF (thousand board feet). Of this total, Douglas-fir contains 489 MBF, and red alder, 327 MBF. Together, these species account for 99 percent of total volume. In terms of volume, red alder dominates in Type 1, and Douglas-fir dominates in Types 2 and 3. However, red alder stem count is higher in all three types. Type 1, which covers 32 percent of the forested area, contains 53 percent of total volume. Although cherry and Oregon ash are growing on the property, none fell in any of the sample plots.

Standard error of mean total net board foot volume on the property is 7.8 percent. Standard errors are 8.4 percent for Type 1, 10.7 percent for Type 2, and 33.3 percent for Type 3. Standard error is a measure of the precision of the volume estimate. Based on sampling error alone, the probability that true volume is within one standard error of cruise volume is 68 percent. It is 95 percent that the true value is within two standard errors of cruise volume, and 99 percent that it is within three. Actual sampling error is likely lower than calculated, however. Standard error calculations are based on the assumption of a random sample. However, plots were installed on a regular grid. The acreage, therefore, was covered more completely than with a random sample.

Table 3 breaks down volume by species, sort, and grade. The tables in Appendix A contain the breakdowns by type. Overall, 48 percent of Douglas-fir volume is in export quality logs, and 83 percent of alder volume is in sawlog quality logs. Douglas-fir quality is best in Type 2, where 49 percent of its volume is export quality. Alder quality is best in Type 1, where 86 percent of its volume is sawlog quality. Most other hardwood volume is pulp quality.

Appendix B contains stand tables for each of the three types. These tables show estimated total height, basal area, number of trees, number of logs, and cubic and board foot volumes for each species by diameter class.

Table 2. Cruise Summary¹

Species	Avg. D4H (in.)	Basal Area/Ac (sq ft)	Trees /Ac	Logs /Ac	<----- Average Net Volume ----->				Type Totals (net)	
					Per Log: Cubic Feet	Per Log: Board Feet	Per Acre: Cubic Feet	Per Acre: Board Feet	Cunits	MBF
<u>Type 1 - 14.2 Acres</u>										
Douglas-fir	21.5	15.9	6.3	14	48	199	694	2880	98	41
Red Alder	14.0	146.8	136.6	286	18	58	5239	16648	744	236
Totals/Averages	14.5	162.7	142.8	301	20	65	5933	19528	842	277
<u>Type 2 - 10.1 Acres</u>										
Douglas-fir	23.4	165.3	55.5	157	52	230	8114	36102	820	365
Red Alder	13.4	59.6	61.3	126	17	48	2164	6045	219	61
Bigleaf Maple	11.0	11.7	17.5	21	14	38	281	783	28	8
Totals/Averages	18.0	236.6	134.3	304	35	141	10559	42930	1066	434
<u>Type 3 - 7.5 Acres</u>										
Douglas-fir	23.6	55.0	18.1	45	56	247	2526	11106	189	83
Red Alder	18.1	45.0	25.1	42	30	95	1237	4003	93	30
Willow	10.3	7.5	13.0	13	10	20	133	257	10	2
Totals/Averages	18.7	107.5	56.2	100	39	154	3897	15366	292	115
<u>All Types Combined - 31.8 Acres</u>										
Douglas-fir	23.2	72.6	24.7	67	52	230	3483	15372	1107	489
Red Alder	14.2	95.1	86.4	178	19	58	3319	10298	1055	327
Bigleaf Maple	11.0	3.7	5.6	7	14	38	89	249	28	8
Willow	10.3	1.8	3.1	3	10	20	31	61	10	2
Totals/Averages	16.3	173.2	119.7	254	27	102	6922	25979	2201	826

¹Definitions:

D4H = diameter at four feet above stump level

Basal area = cross-sectional area of stems at four feet above stump level

Cunit = 100 cubic feet

MBF = thousand board feet

Table 3. Log Sort, Grade, and Volume Data - All Types Combined (page 1 of 2)

SORT/GRADE		Property	Per Acre			Average		Percentage of Net Board				
		Data	Data		Log Data		Feet by Gross Log Length					
		Net	Gross	Net	No. of	Len	Net	12-14	16-24	26-34	36-40	
	MBF	BdFt	BdFt	Logs	(ft.)	BdFt						
<u>Douglas-fir</u>												
J EX 12	2 SAW	37	1154	1154	3	40	363				100	
CJ EX 12	2 SAW	124	3914	3889	9	40	456		3		97	
C EX 12	2 SAW	58	1825	1822	3	40	541				100	
J EX 8	3 SAW	3	104	104	1	40	120				100	
K EX 8	3 SAW	11	334	334	2	40	145				100	
DOMESTIC	2 SAW	177	5735	5554	17	33	334		12	3	85	
DOMESTIC	3 SAW	61	1965	1927	19	33	102		17	11	71	
DOMESTIC	3SAW RGH	5	182	155	1	27	282		25	28	47	
DOMESTIC	4 SAW	12	371	364	11	24	33		73	15	11	
PULP	UTILITY	2	70	70	2	18	45		100			
CULL	CULL		203									
TOTALS/AVERAGES		489	15856	15372	67	33	230		9	4	87	
<u>Red Alder</u>												
HI HWD	1 SAW	3	111	107	<1	30	290				100	
HI HWD	2 SAW	60	2047	1895	12	28	160		26	60	13	
HI HWD	3 SAW	51	1711	1601	13	31	121		6	72	22	
HI HWD	4 SAW	105	3624	3294	48	33	69		6	41	53	
HI HWD6	4 SAW	19	637	600	13	35	47			28	72	
HWD SAW	3 SAW	23	831	714	6	29	120		11	66	24	
HWD SAW	4 SAW	12	465	384	9	25	44		34	66		
PULP	4 SAW	5	181	167	8	20	22		70	30		
PULP	UTILITY	49	1534	1534	69	30	22	6	27	36	31	
CULL	CULL		699									
TOTALS/AVERAGES		327	11840	10298	178	30	58		1	15	51	33

(continued on page 11)

Table 3. Log Sort, Grade, and Volume Data - All Types Combined (page 2 of 2)

SORT/GRADE		Property	Per Acre			Average		Percentage of Net Board			
		Data	Data		Log Data		Feet by Gross Log Length				
		Net	Gross	Net	No. of	Len	Net	12-14	16-24	26-34	36-40
MBF	BdFt	BdFt	Logs	(ft.)	BdFt						
<u>Bigleaf Maple</u>											
HI HWD	4 SAW	1	27	27	<1	30	70			100	
PULP	4 SAW	2	78	58	2	30	30			100	
PULP	UTILITY	5	188	164	4	35	39	14	36	14	37
CULL	CULL		50								
TOTALS/AVERAGES		8	341	249	7	33	38	9	23	43	24
<u>Willow</u>											
PULP	UTILITY	2	61	61	3	23	20	54	28	18	
TOTALS/AVERAGES		2	61	61	3	23	20	54	28	18	
<u>PROPERTY</u>											
TOTALS/AVERAGES		826	28098	25979	254	31	102	1	11	23	65

Growth

Table 4 shows estimated board foot volume growth for each type and species based on FPS projections. Estimated current annual growth rate for the three forest types is 22.9 MBF per year, a rate of 2.8 percent. Douglas-fir is adding 14.8 MBF per year, and red alder, 7.4 MBF. Type 3 is growing at the fastest rate because trees are mostly open-grown. Type 1, stocked primarily with mature red alder, is growing at the slowest rate.

The growth rates projected for bigleaf maple and willow are relatively high because most of these trees are small. For small trees, a given increment in diameter or height growth results in a large gain in board foot volume relative to bigger trees.

From the 38 sample cores, average annual basal area growth over the last five years was 2.9 percent for Douglas-fir, 3.7 percent for red alder, and 1.9 percent for bigleaf maple. In comparison, FPS projects average annual basal area growth rates of 1.3 percent for Douglas-fir, 1.1 percent for red alder, and 3.8 percent for bigleaf maple for the next five years. The relatively large difference between projected basal area growth and that indicated by the cores suggests that FPS may have underestimated growth. However, two factors explain some of the difference. First, FPS projects net growth, or the difference between gross growth and losses due to mortality. The core samples do not account for mortality. Second, growth may slow in the next five years compared with the last five as tree crowns close and shorten.

Table 4. Estimated Annual Growth by Cover Type and Species

Type	Species	Net Volume/ Acre (BdFt)	Total Net Volume (BdFt)	Rate (Percent of Current Volume)
1	Douglas-fir	115	1,633	4.0
	Red Alder	309	4,388	1.9
	Totals/Averages	424	6,021	2.2
2	Douglas-fir	1,021	10,312	2.8
	Red Alder	150	1,515	2.5
	Bigleaf Maple	49	495	6.3
	Totals/Averages	1,220	12,322	2.8
3	Douglas-fir	382	2,865	3.4
	Red Alder	197	1,478	4.9
	Willow	28	210	10.9
	Totals/Averages	607	4,553	4.0
All Types	Douglas-fir	466	14,810	3.0
	Red Alder	232	7,381	2.3
	Bigleaf Maple	15	495	6.3
	Willow	7	210	10.9
	Totals/Averages	720	22,896	2.8

Snags

Table 5 lists number of snags by decay class and cover type. The three timber types contain an average of only 2.6 snags per acre. Most are small, with diameters less than 11 inches. For all types, an average of only 0.3 per acre are at least 11 inches in diameter and at least 30 feet tall, the minimum size that counts towards the wildlife tree retention requirements after clearcutting under Oregon's Forest Practices Rules.

Except for Decay Class 1, snags are evenly distributed between the classes. Of the 2.6 snags per acre, 1.3 are Douglas-fir, 1.2 are red alder, and the remaining 0.1 are cherry. Of the 0.3 snags at least 11 inches in diameter and at least 30 feet tall, 0.1 are Douglas-fir, and 0.2 are red alder.

Table 5. Number of Snags per Acre by Decay Class

Type/Size	Decay Class					Total
	1	2	3	4	5	
1 - All 5.6"+	0	0.4	0.4	1.1	0.4	2.1
11"+ ,30'+	0	0.4	0	0	0	0.4
2 - All 5.6"+	0	0.4	1.2	0.4	0.4	2.5
11"+ ,30'+	0	0	0	0	0	0
3 - All 5.6"+	0	1.3	0.6	0	1.9	3.8
11"+ ,30'+	0	0	0.6	0	0	0.6
All - All 5.6"+	0	0.6	0.7	0.6	0.8	2.6
11"+ ,30'+	0	0.2	0.1	0	0	0.3

Down Woody Material

Table 6 lists volume and weight of large down woody debris for each of the three timber types. Average volume of down woody material is 933 cubic feet per acre. Average per acre weight is 10.1 tons. Overall, 59 percent of total weight is from material that has advanced decay, that in classes 3, 4, and 5. Type 1 has less material and more decay than the other two types.

For the entire property, Douglas-fir contributes 60 percent of total weight of large down woody debris. Hardwoods, primarily red alder, contribute the remainder. Douglas-fir accounts for 40 percent of the weight in Type 1, 71 percent in Type 2, and 54 percent in Type 3.

Table 7 shows the distribution of down woody material by diameter and length class for the three types combined. Number of pieces averages 154 per acre. Although pieces up to 27 inches in diameter and up to 65 feet in length were tallied, most are under nine inches in diameter and 15 feet in length. Appendix C shows the distributions by type. All three have similar patterns. Type 2 contains the most pieces per acre, 236.

Table 6. Volumes and Weights of Down Woody Material

Type	Per Acre Volume (cubic feet)	Total Volume (cubic feet)	Per Acre Weight (tons)	Total Weight (tons)	Weight in Decay Classes 3, 4, & 5 (% of Total)
1	486	6,901	4.6	65	100
2	1,489	15,039	16.0	162	62
3	1,029	7,718	12.7	95	28
Totals/Averages	933	29,658	10.1	322	59

Table 7. Distribution of Down Woody Material
by Diameter and Length Classes - All Types Combined

Intersect Diameter (inches)	Number of Pieces/Acre									Totals
	Length (feet)									
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41+	
4	7	17	8	2	1		1	1		36
5	6	10	2	5	5	2		1	1	31
6	6	5	3	1	2			1		17
7		5	1	2		1			1	10
8			5	3	2	2	1	2	1	15
9	13	7				2				21
10		2								2
11-15			3		2	1		1	1	8
16-20		8	1	1		1			1	12
21-25					1					1
26-30					1					1
Totals	32	53	23	15	13	8	2	5	4	154

APPENDIX A

LOG SORT, GRADE, AND VOLUME DATA BY TYPE

Table A1. Log Sort, Grade, and Volume Data - Type 1

SORT/GRADE	Type Data	Per Acre Data		No. of Logs	Average Log Data		Percentage of Net Board Feet by Gross Log Length				
		Net MBF	Gross BdFt		Net BdFt	Len (ft.)	Net BdFt	12-14	16-24	26-34	36-40
<u>Douglas-fir</u>											
CJ EX 12	2 SAW	15	1092	1066	2	40	561				100
K EX 8	3 SAW	3	243	243	2	40	150				100
DOMESTIC	2 SAW	13	964	929	2	32	402		15		85
DOMESTIC	3 SAW	5	339	330	4	36	81		16		84
DOMESTIC	3SAW RGH	3	243	208	<1	32	580			22	78
DOMESTIC	4 SAW	1	82	82	2	20	40		100		
PULP	UTILITY	<1	22	22	2	20	10		100		
TOTALS/AVERAGES		41	2983	2880	14	32	199		10	2	88
<u>Red Alder</u>											
HI HWD	1 SAW	3	247	239	1	30	290			100	
HI HWD	2 SAW	46	3529	3246	21	28	157		26	57	18
HI HWD	3 SAW	40	2955	2804	23	31	122		8	68	24
HI HWD	4 SAW	84	6437	5927	84	33	70		7	34	59
HI HWD6	4 SAW	17	1295	1214	27	35	46			31	69
HWD SAW	3 SAW	9	793	663	7	29	92		12	65	24
HWD SAW	4 SAW	4	334	264	7	22	38		73	27	
PULP	4 SAW	5	373	359	16	21	23		69	31	
PULP	UTILITY	27	1931	1931	101	29	19		41	20	39
CULL	CULL		1048								
TOTALS/AVERAGES		236	18943	16648	286	30	58		17	44	39
<u>TYPE 1</u>											
TOTALS/AVERAGES		277	21926	19528	301	30	65		16	38	46

Table A2. Log Sort, Grade, and Volume Data - Type 2 (page 1 of 2)

SORT/GRADE	Type Data	Per Acre Data		No. of Logs	Average Log Data		Percentage of Net Board Feet by Gross Log Length				
		Net MBF	Gross BdFt		Net BdFt	Len (ft.)	Net BdFt	12-14	16-24	26-34	36-40
<u>Douglas-fir</u>											
J EX 12	2 SAW	37	3634	3634	10	40	363				100
CJ EX 12	2 SAW	85	8450	8424	19	40	443		5		95
C EX 12	2 SAW	47	4663	4663	9	40	524				100
J EX 8	3 SAW	3	326	326	3	40	120				100
K EX 8	3 SAW	5	510	510	4	40	140				100
DOMESTIC	2 SAW	128	13065	12690	40	33	316		11	4	85
DOMESTIC	3 SAW	48	4848	4778	46	32	104		18	12	70
DOMESTIC	3SAW RGH	1	154	134	1	25	196		70	30	
DOMESTIC	4 SAW	8	755	755	24	23	31		79	11	10
PULP	UTILITY	2	189	189	2	16	100		100		
CULL	CULL		340								
TOTALS/AVERAGES		365	36934	36102	157	33	230		9	4	87
<u>Red Alder</u>											
HI HWD	2 SAW	10	1028	957	6	29	161		14	86	
HI HWD	3 SAW	10	1061	953	8	31	117			82	18
HI HWD	4 SAW	21	2362	2039	33	32	63			71	29
HI HWD6	4 SAW	2	183	183	3	40	60				100
HWD SAW	3 SAW	1	135	135	2	20	80		100		
HWD SAW	4 SAW	6	657	557	11	28	50		19	81	
PULP	4 SAW	<1	45	23	2	16	10		100		
PULP	UTILITY	12	1198	1198	61	32	19		1	71	28
CULL	CULL		256								
TOTALS/AVERAGES		61	6926	6045	126	31	48		7	72	21

(continued on page 19)

Table A2. Log Sort, Grade, and Volume Data - Type 2 (page 2 of 2)

SORT/GRADE	Type Data	Per Acre Data		No. of Logs	Average Log Data		Percentage of Net Board Feet by Gross Log Length				
		Net	Gross		Len	Net	12-14	16-24	26-34	36-40	
		MBF	BdFt		(ft.)	BdFt					
<u>Bigleaf Maple</u>											
HI HWD	4 SAW	1	84	84	1	30	70				100
PULP	4 SAW	2	244	183	6	30	30				100
PULP	UTILITY	5	590	516	13	35	39	14	36	14	37
CULL	CULL		156								
TOTALS/AVERAGES		8	1075	783	21	33	38	9	23	43	24
<u>TYPE 2</u>											
TOTALS/AVERAGES		434	44935	42930	304	32	141	<1	9	15	76

Table A3. Log Sort, Grade, and Volume Data - Type 3

SORT/GRADE		Type Data	Per Acre Data			Average Log Data		Percentage of Net Board Feet by Gross Log Length				
		Net MBF	Gross BdFt	Net BdFt	No. of Logs	Len (ft.)	Net BdFt	Feet by Gross Log Length				
								12-14	16-24	26-34	36-40	
<u>Douglas-fir</u>												
CJ EX 12	2 SAW	23	3148	3128	7	40	450				100	
C EX 12	2 SAW	11	1457	1444	2	40	633				100	
K EX 8	3 SAW	2	269	269	2	40	150				100	
DOMESTIC	2 SAW	35	4896	4701	12	33	391		12		88	
DOMESTIC	3 SAW	8	1163	1111	11	32	106		15	15	70	
DOMESTIC	3SAW RGH	1	105	83	1	24	113		43	57		
DOMESTIC	4 SAW	3	403	371	11	27	35		46	34	19	
CULL	CULL		402									
TOTALS/AVERAGES		83	11842		11106	4	33	247		8	3	88
<u>Red Alder</u>												
HI HWD	2 SAW	5	613		602	3	24	191		62	38	
HI HWD	3 SAW	1	233		197	2	30	110			100	
HWD SAW	3 SAW	12	1837		1590	9	31	170			74	26
HWD SAW	4 SAW	3	455		378	9	25	43		12	88	
PULP	UTILITY	9	1236		1236	1	25	66	33	17	38	12
CULL	CULL		636									
TOTALS/AVERAGES		30	5010	4003	42	26	95		10	16	60	14
<u>Willow</u>												
PULP	UTILITY	2	257	257	13	23	20		54	28	18	
TOTALS/AVERAGES		2	257	257	13	23	20		54	28	18	
<u>TYPE 3</u>												
TOTALS/AVERAGES		115	17109	15366	100	29	154		4	11	18	68

APPENDIX B

STAND TABLES

Table B1. Stand Table: Type 1

D4H (in.)	Total Height (feet)	Basal Area/ Acre (sq ft)	Trees/ Acre	Logs/ Acre	Net CuFt/ Acre	Net BdFt/ Acre	Total Net MBF
<u>Douglas-fir</u>							
13	77	2.0	2.2	4	65	151	2
15	117	2.0	1.6	3	76	307	4
24	117	2.0	0.6	1	85	347	5
29	127	6.0	1.3	4	270	1103	16
30	128	2.0	0.4	1	97	465	7
45	145	2.0	0.2	1	101	507	7
Totals		15.9	6.3	14	694	2880	41
<u>Red Alder</u>							
9	72	4.0	9.0	13	126	314	4
10	86	7.9	14.6	29	287	910	13
11	87	7.9	12.0	24	301	872	12
12	88	17.9	22.7	45	677	1819	26
13	86	15.9	17.2	34	601	1808	26
14	96	11.9	11.1	24	466	1522	22
15	93	17.9	14.6	36	700	2345	33
16	85	19.8	14.2	33	696	2288	32
17	95	7.9	5.0	13	306	1083	15
18	85	11.9	6.7	16	406	1370	19
19	88	6.0	3.0	7	179	574	8
21	88	9.9	4.1	8	350	1237	18
24	83	2.0	0.6	1	21	76	1
25	66	2.0	0.6	1	54	151	2
26	86	2.0	0.5	1	22	65	1
28	86	2.0	0.5	1	46	213	3
Totals		146.8	136.6	286	5239	16648	236
Type 1 Totals		162.7	142.8	301	5933	19528	277

Table B2. Stand Table: Type 2 (page 1 of 2)

D4H (in.)	Total Height (feet)	Basal Area/ Acre (sq ft)	Trees/ Acre	Logs/ Acre	Net CuFt/ Acre	Net BdFt/ Acre	Total Net MBF
<u>Douglas-fir</u>							
15	94	3.3	2.7	5	120	407	4
16	112	3.3	2.4	5	134	501	5
17	117	3.3	2.1	6	152	550	6
18	115	3.3	1.9	6	128	509	5
19	138	6.7	3.4	10	340	1388	14
20	122	25.0	11.5	31	1168	4622	47
21	140	6.7	2.8	8	341	1455	15
22	130	6.7	2.5	6	308	1326	13
23	130	10.0	3.5	10	475	1987	20
24	148	8.3	2.7	8	440	1936	20
25	140	20.0	5.9	18	982	4322	44
26	147	6.7	1.8	5	344	1591	16
27	147	10.0	2.5	8	513	2381	24
28	144	10.0	2.3	7	492	2237	23
29	129	4.0	0.9	3	200	939	9
30	147	13.0	2.6	8	662	3274	33
31	150	6.7	1.3	3	343	1692	17
32	165	6.7	1.2	4	367	1850	19
34	133	3.3	0.5	2	164	772	8
36	146	1.7	0.2	1	85	448	5
37	155	3.3	0.4	1	180	955	10
38	158	3.3	0.4	1	176	957	10
Totals		165.3	55.5	157	8114	36102	365
<u>Red Alder</u>							
10	84	5.0	9.2	18	189	581	6
11	83	3.3	5.1	10	131	303	3
12	81	13.3	17.0	34	475	1104	11
13	73	3.3	3.6	7	116	289	3
14	79	11.7	10.9	22	410	1091	11
15	88	10.6	8.7	19	381	1134	11

(continued on page 23)

Table B2. Stand Table: Type 2 (page 2 of 2)

D4H (in.)	Total Height (feet)	Basal Area/ Acre (sq ft)	Trees/ Acre	Logs/ Acre	Net CuFt/ Acre	Net BdFt/ Acre	Total Net MBF
<u>Red Alder (continued)</u>							
16	99	1.7	1.2	4	74	227	2
17	103	1.7	1.1	3	62	201	2
18	103	3.3	1.9	4	133	406	4
19	93	3.3	1.7	3	113	423	4
20	89	2.3	1.1	2	79	287	3
Totals		59.6	61.3	126	2164	6045	61
<u>Bigleaf Maple</u>							
8	51	3.3	9.5	10	86	191	2
10	60	3.3	6.1	6	79	183	2
16	89	1.7	1.2	4	55	191	2
30	86	3.3	0.7	1	60	217	2
Totals		11.7	17.5	21	281	783	8
Type 2 Totals		236.6	134.3	304	10559	42930	434

Table B3. Stand Table: Type 3 (page 1 of 2)

D4H (in.)	Total Height (feet)	Basal Area/ Acre (sq ft)	Trees/ Acre	Logs/ Acre	Net CuFt/ Acre	Net BdFt/ Acre	Total Net MBF
<u>Douglas-fir</u>							
12	54	2.5	3.2	3	45	127	1
16	103	2.5	1.8	4	98	340	3
19	115	2.5	1.3	3	108	394	3
20	127	2.5	1.1	3	125	516	4
21	125	5.0	2.1	6	238	977	7
22	132	2.5	0.9	3	123	530	4
24	129	2.5	0.8	2	119	493	4
26	130	5.0	1.4	4	245	1065	8
29	136	10.0	2.2	7	485	2186	16
31	131	5.0	1.0	3	207	949	7
32	137	2.5	0.4	1	118	573	4
33	144	5.0	0.8	3	257	1237	9
34	138	5.0	0.8	2	238	1146	9
37	140	2.5	0.3	1	121	573	4
Totals		55.0	18.1	45	2526	11106	83
<u>Red Alder</u>							
10	51	2.5	4.6	5	60	92	1
14	49	2.5	2.3	5	51	140	1
16	71	12.5	9.0	14	358	1003	8
18	57	2.5	1.4	3	66	212	2
19	83	2.5	1.3	4	72	317	2
20	94	2.5	1.1	2	91	309	2
25	82	10.0	2.9	5	261	917	7
26	67	2.5	0.7	1	47	210	2
27	92	2.5	0.6	1	91	377	3
28	69	2.5	0.6	1	74	152	1
29	79	2.5	0.5	1	65	273	2
Totals		45.0	25.1	42	1237	4003	30

(continued on page 25)

Table B3. Stand Table: Type 3 (page 2 of 2)

D4H (in.)	Total Height (feet)	Basal Area/ Acre (sq ft)	Trees/ Acre	Logs/ Acre	Net CuFt/ Acre	Net BdFt/ Acre	Total Net MBF
<u>Willow</u>							
8	34	2.5	7.2	7	50	72	1
10	40	2.5	4.6	5	55	46	<1
19	40	2.5	1.3	1	28	140	1
Totals		7.5	13.0	13	133	257	2
<hr/>							
Type 3 Totals		107.5	56.2	100	3897	15366	115

APPENDIX C

DISTRIBUTION OF DOWN WOODY MATERIAL BY DIAMETER AND LENGTH CLASSES

Table C1. Distribution of Down Woody Material
by Diameter and Length Classes - Type 1

Number of Pieces/Acre

Intersect Diameter (inches)	Length (feet)									Totals
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41+	
4	16	6	4		2			1		30
5		12	4	3	2				1	22
6			4	3						6
7		6				2			1	9
8			11	3		2				16
9	16					2				18
10										0
11-15								1		1
16-20		12								12
21-25										0
26-30										0
Totals	32	36	23	9	4	6	0	2	2	114

Table C2. Distribution of Down Woody Material
by Diameter and Length Classes - Type 2

Intersect Diameter (inches)	Number of Pieces/Acre									Totals
	Length (feet)									
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41+	
4		29	13				2			43
5	19	7		10	7	4				47
6	19	7	4		5			2		37
7			4	3					1	9
8				6	2	2	2	3		16
9	19	21				2				40
10		7								7
11-15			9		7				3	19
16-20		7	4			2			1	15
21-25					2					2
26-30										0
Totals	57	78	35	19	25	10	3	4	5	236

Table C3. Distribution of Down Woody Material
by Diameter and Length Classes - Type 3

Number of Pieces/Acre

Intersect Diameter (inches)	Length (feet)									Totals
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41+	
4		21	7	9			3			40
5		11			7	3		4		25
6		11								11
7		11		5						15
8					4		3	4	2	13
9										0
10										0
11-15							3		2	5
16-20				5					1	6
21-25										0
26-30					4					4
Totals	0	53	7	19	15	6	5	9	5	119