

**COMPREHENSIVE FOREST  
MANAGEMENT PLAN**

**for the**

*City of Montesano*

***CHAPIN COLLINS MEMORIAL  
FOREST***

Prepared April, 2018 by

**City of Montesano  
Forestry Department  
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**ADOPTION PAGE**

**This Update of the Montesano City Forest Comprehensive Management Plan was adopted by City Council Resolution on \_\_\_\_\_, 2018**

**LANDOWNER APPROVAL SIGNATURE (REQUIRED)**

**We, Mayor Vini Samuel and the 2018 City Council, approve of the contents of this plan and do adopt the implementation of the described management activities found herein.**

\_\_\_\_\_  
**Mayor Vini Samuel** \_\_\_\_\_  
**Date Signed**

\_\_\_\_\_  
**Plan Reviser/City Forester Loren J. Hiner, CF,** \_\_\_\_\_  
**Date Signed**

**WTFS MANAGEMENT PLAN APPROVAL**

**This plan meets the requirements for a Washington Tree Farm Program Management Plan.**

\_\_\_\_\_  
**Washington Tree Farm Program Authorized Representative Signature, Date**

**Print Name:** \_\_\_\_\_

**Title:** **Certified Tree Farm Inspector #**

**Affiliation:** **Washington Tree Farm Program**

**Address:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

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## STATEMENT OF PURPOSE & GOALS

The City of Montesano has owned timberland surrounding the developed city proper since 1931. Since its purchase the citizens of Montesano have enjoyed many uses and benefits from the forest.

In 1973, Weyerhaeuser Company prepared an Inventory Report and Management Analysis for the City under a Tree Farm Management Agreement. For many years the City Forest was managed consistent with the Weyerhaeuser Report recommendations. Since 1988, city forestry staff has been gathering intensive and detailed inventory information to evaluate, refine and update the Weyerhaeuser Report. The original 1996 draft of this plan required major revision due to an extremely destructive ice storm after Christmas 1996. A massive salvage logging effort occurred during 1997 and 1998.

After a major plan revision was completed in 1999, the City Council brought together a Professional Peer Review team in 2000 to evaluate the plan and our Forest Management activities under the plan. The Peer Review team recommended further plan revision. This version of the Comprehensive Forest Management Plan represents the current inventory and history and is the culmination and summary of this extensive review and process.

The Comprehensive Forest Management Plan provides the basis for overall management direction to the City Forestry Department for activities on the City Forest. The plan is meant to be flexible and dynamic, since current decisions have long-range impacts. In preparing and implementing this plan, the City will be able to continue to carry out its mission to improve the quality of life and provide quality services for its 4,000+ present citizen stockholders, as well as all future generations of Montesano stockholders.

The Montesano City Forest shall be managed for a mix of objectives; long term sustainability and a healthy environment are the overarching priorities to guide all management decisions. Forest revenue shall be optimized using cultural practices that are consistent with maintenance of recreational opportunities, viewshed considerations, and the good stewardship of fish and wildlife habitats. The Montesano City Forest is certified by the American Tree Farm System as a sustainably managed forest: certification #WA-4303. More information on the ATFS and its standards for certification can be found at [www.treefarmssystem.org](http://www.treefarmssystem.org).

## FOREST HISTORY

The City of Montesano is home to one of the Northwest's outstanding examples of a small, municipally-owned watershed. In 1931, the City purchased 5,493 acres of cut-over timberland from Neil Cooney (Grays Harbor Commercial Co., Cosmopolis) for \$12,000, to provide a source of water for the city and future timber investment revenues. The source of the funds was a bond taken out by the City Water Fund which put the ownership an asset of the city's Water Fund

In 1936, after much work and effort sponsored by the Montesano Active Club and other organizations and individuals, Lake Sylvia State Park was created around thirty-acre Sylvia Lake. Fifty acres of the park were deeded from Puget Sound Power & Light Company, while another twelve acres were purchased by the Montesano Active Club from Silas Wilder. The rest of the 172 acres for the park were dedicated from the city watershed purchase.

In 1947, under the direction of two professional foresters on the City Council, Lewis B. Snelling and F. L. Nethery, the first comprehensive forest plan was prepared. The forest was cruised and appraised by crew-leader Malcom Dick and other foresters living in Montesano including Forrest C. Reed, John Pate, and Lloyd Metke.

Although the entire watershed area had been logged between 1902 and 1912, there was 11,935 MBF of timber (mostly residual hemlock) valued at \$53,000 in 1947. Almost all of the old logged-off land was covered with thick young stands of fir and hemlock.

According to Councilman Nethery, the Forest Management Plan was viewed as "The starting and continuation of a plan of sustained yield management that will assure a perpetual income for the City of Montesano for 80 years or more after this body of Councilmen are gone and forgotten."

Lewis B. Snelling, City Councilman and managing forester of the Clemons Tree Farm for Weyerhaeuser did not live to see the year-to-year harvesting of the City watershed timber. Snelling was killed in a woods accident February 5, 1948.

Schafer Bros. Logging purchased the first timber sale (4,250 MBF) for \$77,860 in September, 1948. The next sale in May, 1953 was to Anderson & Middleton for \$88,360 (4,500 MBF). Simpson later bought a 7 MMBF sale in May, 1955 for \$177,540 which was later acquired by Weyerhaeuser. The last major timber sale of the early era was \$240,000 for 9 MMBF in April, 1956 made to Eclipse Lumber from Everett (later acquired and logged by Weyerhaeuser). One of the major provisions in these timber sales was for the construction of certain roads, both for timber removal as well as management access and fire protection.

In May, 1967, the City sold three isolated land parcels laying north of the Sylvia Creek watershed totaling 375 acres to Weyerhaeuser for \$103,700.

Weyerhaeuser prepared an “Inventory Report and Management Analysis” for the City Forest in 1973 under a Tree Farm Management Agreement. The City also drilled wells for the city water supply in 1973 and designated the forest land to be managed primarily for sustained timber production as a tree farm.

In 1975 a full-time forester position was approved and Bud Wild, who had been active in City Forest management under a Weyerhaeuser agreement, was hired by the City to provide consistent, professional management of the tree farm. Bud orchestrated activities for the next 13 years until his retirement in 1987.

Ron Schillinger was next hired to take over as forest manager. Ron’s capable and visionary management over the ensuing 20 years, during which time the forest products industry was dragged kicking and screaming into a new era of environmental regulations, garnered the City over 20 million dollars in net revenue and developed the City Forest into a model of exemplary municipal forest management.

In 2007 Ron Schillinger felt the need to take more of a city-wide management roll and resigned his post as City Forester to run for Mayor. Upon Ron’s announced resignation the City once again went through the analysis of whether or not it needed its own full-time forester or whether its needs would be more efficiently met through contracting with a third-party firm or agency. After debate and analysis, once again the council decided that its municipal forest was of such value that it warranted in-house management; after the ensuing posting and interviewing process, Loren Hiner was hired to fill the office as the City’s third full-time forester.

In 2011 The City Council approved the purchase of 112 acres in section of T17N R8W. In 2016 the Council approved the purchase of the west half of section 33 T18N R07W, 320 acres abutting the east side of the City Forest, from Fruit Growers Supply Co. for a price of \$1,350,00. This purchase was made by the General Fund and gives the General Fund a 6% interest in the City Forest. In 2017 the City purchased 16.5 acres abutting the south edge of the City Forest (adjacent to the Loughhead Lane water tank site) from Clarence Haney for \$82,000. These transactions bring the City’s current forest ownership to 5,387 acres of timberland.

Certainly, those individuals who originally planned for and brought about the City’s ownership of the forest watershed would be tremendously proud and pleased with their investment. They passed on a legacy of wise, civic-minded stewardship to generations of Montesano citizens. This is a legacy which has continued down through City Councils for the last 85+ years.

Tables 1 and 2 on the following pages summarizes the history of forest management operations since 1975

TABLE 1. Forest Operations History

YEAR	CLEAR-CUT ACRES	SLASH BURNING ACRES	TREE PLANTING		BRUSH CONTROL ACRES	ROAD BUILDING MILES	PCT THINNING ACRES	PRUNING ACRES
			ACRES	TREES				
1975	5	0	79	60,000	30	0	0	0
1976	80	0	5	2,500	30	3	76	0
1977	98	33	145	90,300	20	0.4	134	0
1978	189	0	33	16,000	0	1.9	200	0
1979	122	130	0	0	264	5.5	69	0
1980	83	260	130	51,400	0	0.9	90	0
1981	0	0	320	123,500	142	0	320	0
1982	60	60	0	0	60	1	353	0
1983	35	0	60	28,200	0	0	325	0
1984	25	60	0	0	0	0	0	0
1985	146	80	60	25,200	0	0	0	0
1986	7	65	80	35,760	0	0	0	0
1987	196	0	65	30,720	0	2.3	0	0
1988	150	268	70	33,185	0	0.8	0	0
1989	38	100	256	155,145	0	1.3	0	0
1990	137	0	135	54,400	0	0.3	0	0
1991	183	168	121	81,050	0	1.9	0	10
1992	96	65	225	112,000	0	0	166	20
1993	32	58	122	50,000	25	1.2	316	20
1994	0	0	61	32,450	169	0	0	100
1995	32	30	58	20,050	20	0.9	43	120
1996	65	95	32	42,200	50	0.71	14	100
1997	502	90	95	40,500	50	2.51	400	135
1998	18	107	512	246,647	210	0.5	153	97
1999	0	0	66	33,000	0	0	0	0
2000	43	0	0	0	84	0	0	107
2001	57	5	145	53,000	10	CT ACRES	40	0
2002	45	0	5	2,240	47	83	263	0
2003	87	41	55	25,000	100	52	0	0
2004	99	55	80	40,000	0	50	0	52
2005	0	0	98.5	53,000	0	125	0	62
2006	38	5	38	25,000	0	0	0	0
2007	35	15	20	5,000	0	100	0	0
2008	146	48	35	11,160	110	0	0	0
2009	37	20	150	65,280		0	107	0
2010	95		37	16,840		0	0	

TABLE 1. Forest Operations History (Continued)

YEAR	CLEAR-CUT ACRES	TREE PLANTING		PCT ACRES (PRE-COMMERCIAL THINNING)	CT ACRES (COMMERCIAL THINNING)
		ACRES	TREES		
2011	202	95	32,405	162	0
2012	179	202	67,820	233	0
2013	163	179	64,360	0	0
2014	73	163	59,620	153	217
2015	0	73	24,290	69	59
2016	108	0	0	0	0
2017	82	108	36,487	84	0

TABLE 2. Annual Revenue History

Year	Total Income	Total Expense	Net Return	Return Per Acre
<b>Prior forest management</b>				
1970	\$15,707	\$13,679	\$2,028	\$0.41
1971	\$2,447	\$9,005	(\$6,558)	(\$1.33)
1972	\$495	\$4,122	(\$3,627)	(\$0.73)
<b>Weyerhaeuser Tree Farm Family</b>				
1973	\$402,004	\$127,129	\$274,875	\$55.58
1974	\$232,520	\$123,736	\$108,784	\$21.99
<b>First City Forester - Bud Wild</b>				
1975	\$86,750	\$100,550	(\$13,800)	(\$2.79)
1976	\$633,754	\$371,576	\$262,178	\$53.01
1977	\$711,446	\$340,230	\$371,216	\$75.05
1978	\$1,369,398	\$374,445	\$994,953	\$201.16
1979	\$1,079,322	\$505,388	\$573,934	\$116.04
1980	\$962,260	\$396,797	\$565,463	\$114.33
1981	\$25,460	\$150,941	(\$125,481)	(\$25.37)
1982	\$551,098	\$306,497	\$244,601	\$49.45
1983	\$403,006	\$239,745	\$163,261	\$33.01
1984	\$299,105	\$186,704	\$112,401	\$22.73
1985	\$1,118,269	\$468,511	\$649,758	\$131.37
1986	\$77,541	\$111,626	(\$34,085)	(\$6.89)
<b>Second City Forester - Ron Schillinger</b>				
1987	\$1,937,419	\$748,221	\$1,189,198	\$240.44
1988	\$1,650,739	\$703,683	\$947,056	\$191.48
1989	\$576,853	\$367,890	\$208,963	\$42.25
1990	\$2,945,578	\$294,767	\$2,650,811	\$535.95
1991	\$1,914,227	\$195,464	\$1,718,763	\$347.51
1992	\$1,150,287	\$213,108	\$937,179	\$189.48
1993	\$237,845	\$287,957	(\$50,112)	(\$10.13)
1994	\$146,058	\$173,329	(\$27,271)	(\$5.51)
1995	\$1,168,420	\$591,236	\$577,184	\$116.70
1996	\$1,579,456	\$452,131	\$1,127,325	\$227.93
1997	\$6,308,128	\$1,809,906	\$4,498,222	\$909.47
1998	\$1,663,233	\$950,594	\$712,639	\$144.08
1999	\$119,491	\$223,225	(\$103,734)	(\$20.97)
2000	\$408,453	\$248,298	\$160,155	\$32.38
2001	\$1,300,120	\$167,960	\$1,132,160	\$228.90
2002	\$723,234	\$264,521	\$458,713	\$92.74
2003	\$1,032,713	\$249,281	\$783,432	\$158.40
2004	\$1,235,937	\$263,164	\$972,773	\$196.68
2005	\$993,216	\$311,460	\$681,756	\$137.84
2006	\$1,027,785	\$162,156	\$865,629	\$175.02
2007	\$825,212	\$310,915	\$514,297	\$103.98
<b>Ten Year Average (1998-2007)</b>				<b>\$124.91</b>

TABLE 2. Annual Revenue History (Continued)

Year	Total Income	Total Expense	Net Return	Return Per Acre
<b>Third City Forester – Loren J. Hiner</b>				
2008	\$1,788,035	\$747,523	\$1,040,512	\$210.37
2009	\$507,500	\$498,250	\$9,250	\$1.87
2010	\$1,265,941	\$202,125	\$1,063,816	\$215.09
2011	\$2,478,862	\$492,369	\$1,986,493	\$401.64
2012	\$1,591,937	\$296,243	\$1,295,694	\$256.17
2013	\$2,390,726	\$265,975	\$2,124,751	\$420.08
2014	\$1,394,407	\$673,186	\$721,221	\$142.59
2015	\$390,639	\$311,365	\$79,274	\$15.67
2016	\$661,362	\$219,659	\$441,703	\$87.33
2017	\$880,985	\$352,368	\$528,617	\$98.02
<b>Ten Year Average (2008-2017)</b>				<b>\$185.00</b>

## FOREST RESOURCE INVENTORY

### OWNERSHIP:

The current 5,387 acres constituting the City Forest are located in a contiguous block almost 3 miles square, north of the City proper, surrounding the state park, as shown in Figure 1. Table 3 provides a listing of the ownership acreage by section.

The total perimeter of the ownership is approximately 20 miles. Weyerhaeuser borders almost 50% of the boundary, the State Park 15%, making them our largest and most important neighbors. Timber management companies, including Green Diamond, Green Crow, and Skok border another 25% combined.

Within the legal ownership, roads occupy approximately 130 acres. A natural gas pipeline easement covers 22 acres. And there are an estimated 1,025 acres of unstable slopes, wetlands and riparian management buffer zones. The productive land base for timber is approximately 4,200 acres when the above areas are removed, which is approximately 80% of the total ownership.

All property corners have been surveyed and monumented. Property lines are marked with blazes and red paint where mature timber exists.



FIGURE 1. Ownership Map

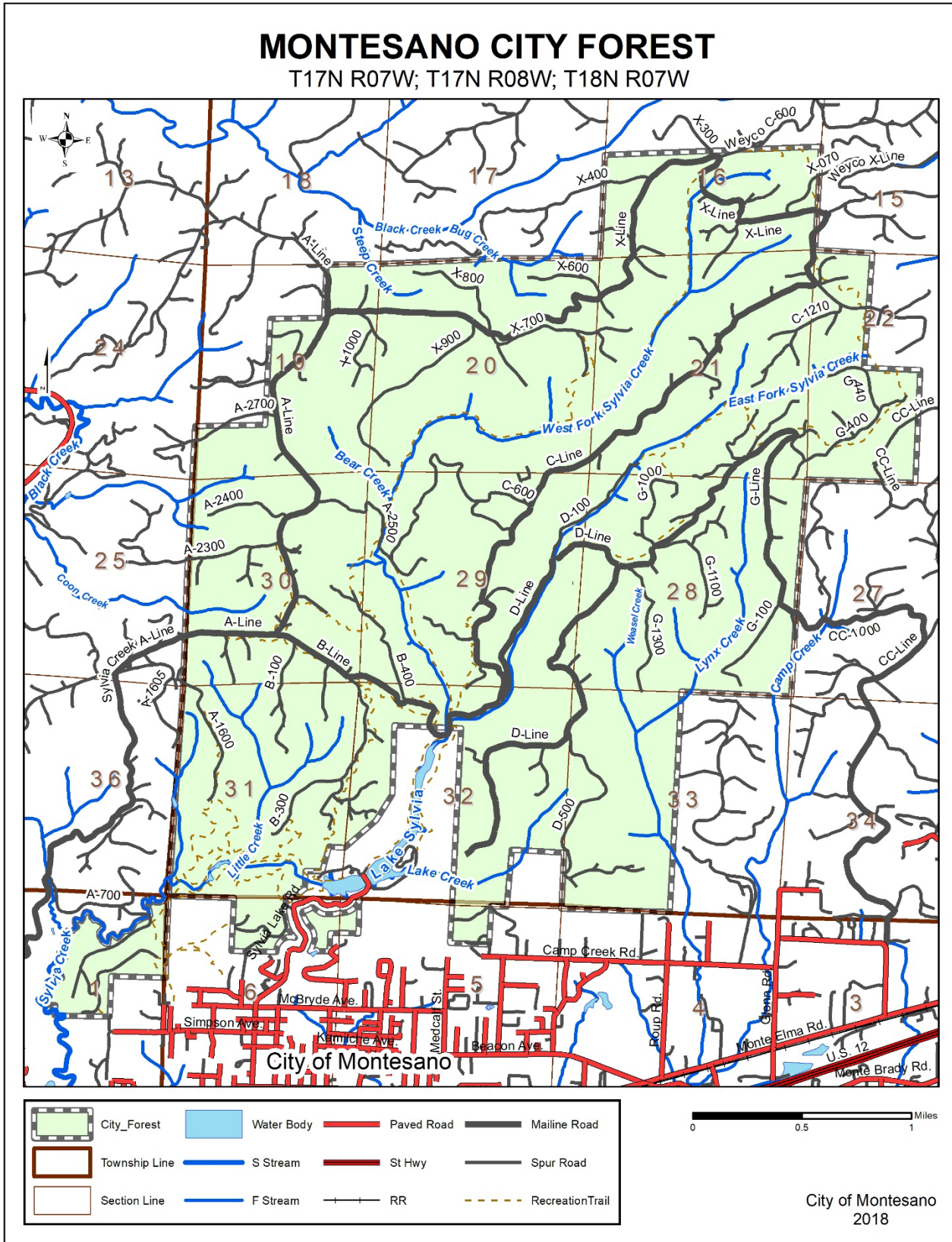


TABLE 3. Forestland Inventory

Section	Township	Range	Acres Owned	Parcel Number(s)
5	17N	7W	5.51	170705120090
			5.51	170705120080
			5.51	170705120070
			5.51	617070512006
			5.35	617070522002
6	17N	7W	12.69	617070611001
			38.76	617070612001
1	17N	8W	13.75	617080142001
			98.25	617080111002
16	18N	7W	320.00	618071630000
19	18N	7W	333.00	618071940000
20	18N	7W	640.00	618072000000
21	18N	7W	640.00	618072100000
22	18N	7W	240.00	618072230000
28	18N	7W	640.00	618072800000
29	18N	7W	640.00	618072900000
30	18N	7W	530.00	618073000000
31	18N	7W	478.00	618073110000
			13.26	618073144002
			6.16	618073144004
			21.00	618073223001
32	18N	7W	10.00	618073232001
			55.00	618073222000
			190.00	618073210000
			120.00	618073242000
33	18N	7W	320.00	180733200000
<b>TOTAL*</b>			<b>5,387.26 acres</b>	

\* Source is Grays Harbor County Assessor records.

## SOILS:

Almost 85% of the watershed area is covered by two soil types of very similar character. Figure 2 shows the soil type distribution. The Zenker and Elochoman soil series are both very deep, well-drained soils with high available water capacity derived from sandstone parent material. Zenker soils are found primarily on side-slopes, while Elochoman soils primarily blanket the broad ridgetops and small plateaus.

Most of the soils are rated as mid to high Site Class II. The well-drained soils are extremely productive for Douglas fir and western hemlock growth for several reasons: First, the deep soil provides a large reservoir for support, water, aeration and nutrients. Second, there are large amounts of nitrogen in the soil, and the annual additions of nitrogen from abundant plant growth is high. Climatically, there is always water available for growth, and a high number of growing days per year.

In 1973 Weyerhaeuser provided the following inventory by site class:

<u>Site Class</u>	<u>Acres</u>	<u>Percent of Total</u>
Site I	1,795	36%
Site II+	2,760	56%
Site II	369	7%
Site III	22	0.5%

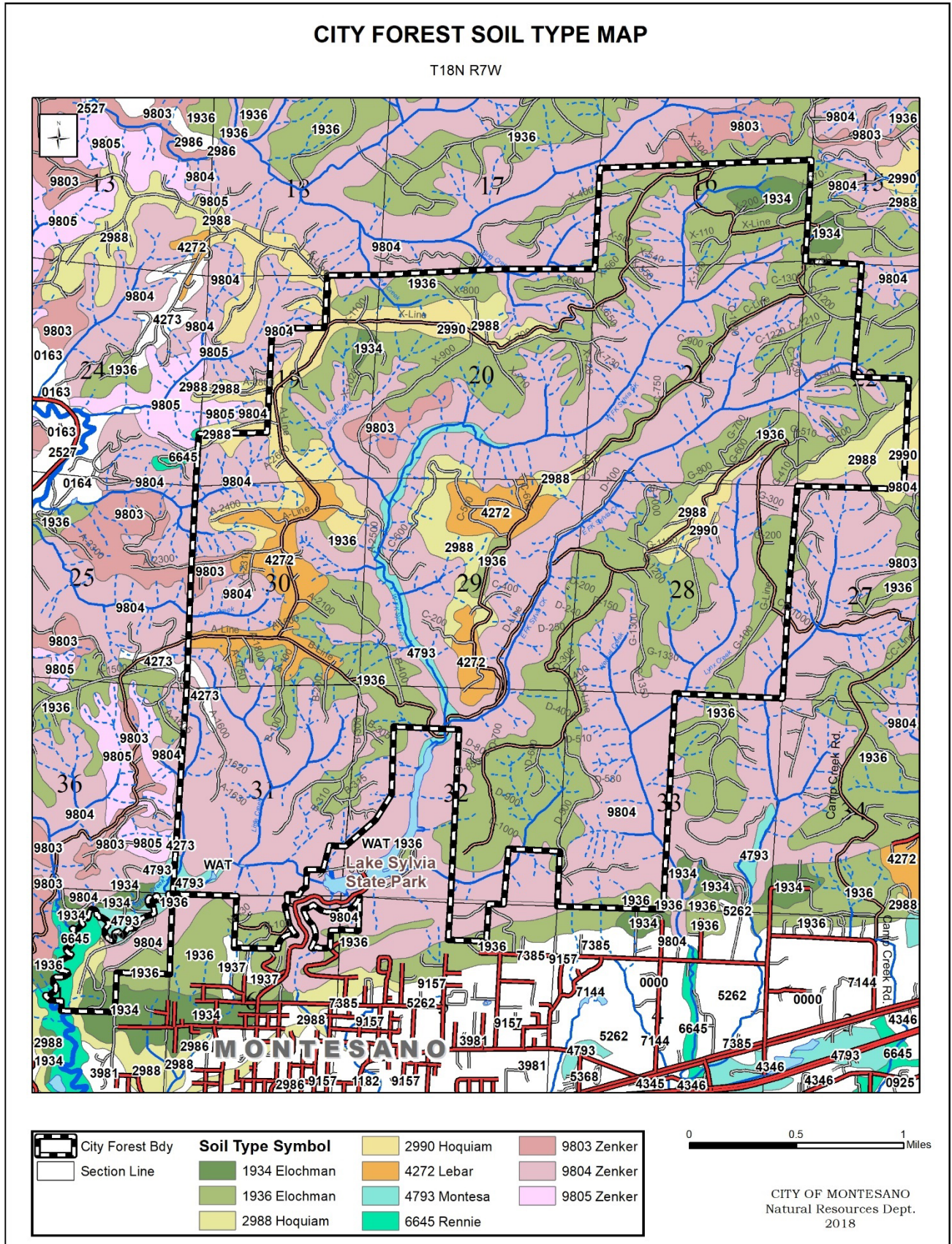
On the basis of a 50-year site index curve, the mean index is 136 for Douglas fir and 124 for western hemlock, with 186 cubic feet per acre per year growth for Douglas fir and 276 cubic feet per acre per year for hemlock.

The primary concerns for forest management are high potential for soil compaction from ground equipment operating on wet soils, steep slopes which are subject to mass failures in both a managed and unmanaged condition, and severe competition from invading brush and red alder.

There is little natural rock in most of the soils, since sandstone does not weather into gravel. Small and limited, but very interesting formations of Hoquiam soils exist in both the East Fork and West Fork headwater drainages of Sylvia Creek. These formations deposited over glacial drift provide excellent sources of rounded pebbles and cobbles for in-stream gravel spawning habitat for fish.



FIGURE 2. Soil Type Map



## TREE SPECIES and AGE CLASSES:

Douglas fir and western hemlock are the primary tree species occurring throughout the City Forest. Lesser amounts of western red cedar, noble fir, Sitka spruce, red alder, big leaf maple and cottonwood are also present, especially in the valley bottoms and along the streams. Figure 3 is a bar graph depicting forest acres by five-year age classes. Figure 4 is a map that indicates the location of timber stands by age class.

Table 4 summarizes by species the estimate of the merchantable volume on the forest (to a 5" top) as of 12/31/2017. The forest stands are reinventory cruised on a seven-year rotation. Past harvest history and reforestation has obviously determined the present status of the forest. The few remaining older-age stands established prior to 1970 are predominantly hemlock (66%) because of natural seeding following logging. Younger stands, established since 1970, are 85% Douglas fir as a result of our reforestation and thinning programs.

The current acreage in each 5-year age class shown in Table 4 traces harvest activities back to the early 1960's when active harvesting was begun. By referring back to Table 1, it can quickly be seen that annual harvests have not been consistent from year to year, varying from 0 to 200 acres. Changes in the timber market and the City's need for funds has been the cause of this.

The current standing timber inventory as represented in Table 4 is at this time is 74% Douglas fir (33,692 mbf) and 22% hemlock (10,531 mbf). The total standing merchantable timber inventory on the forest is estimated at 47,219 mbf. The average stand volume is about 10,825 bf/acre.

FIGURE 3. Age Class Graph

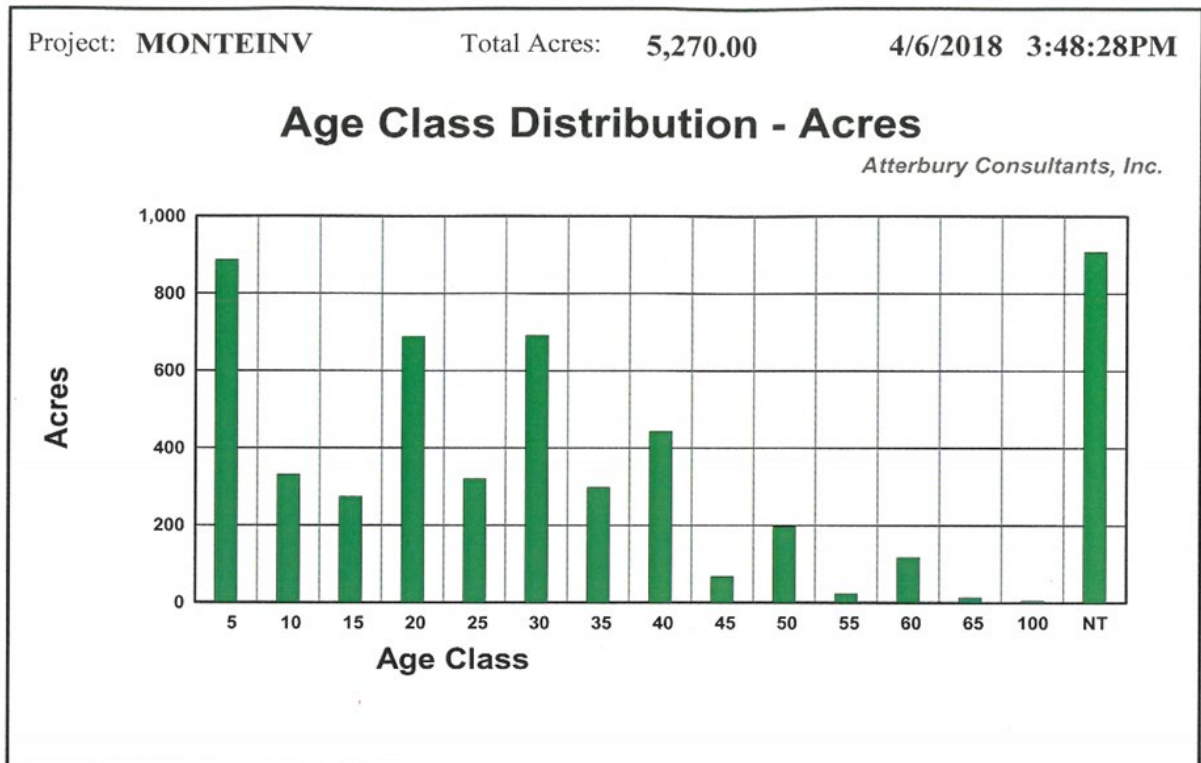




FIGURE 4. Age Class Map

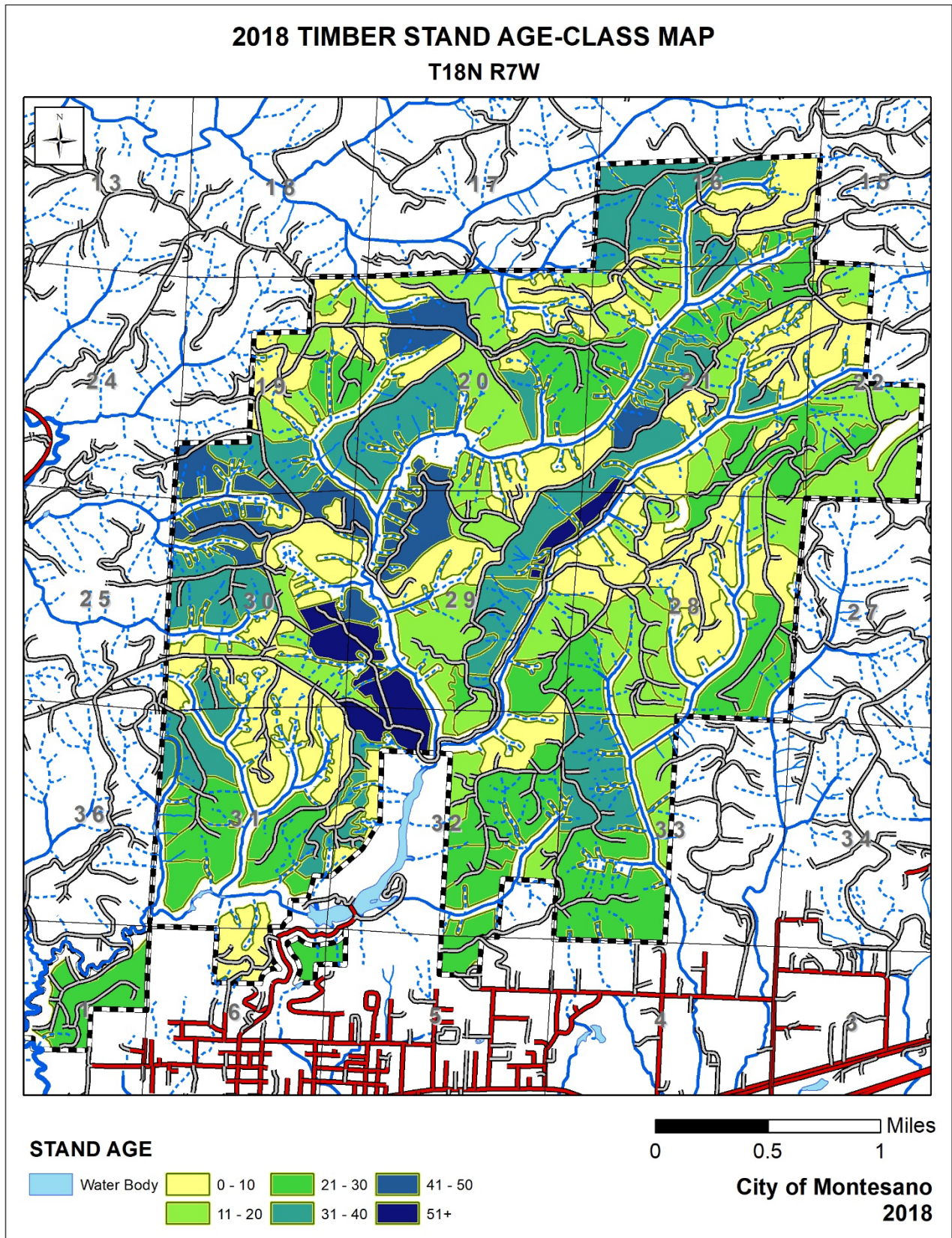
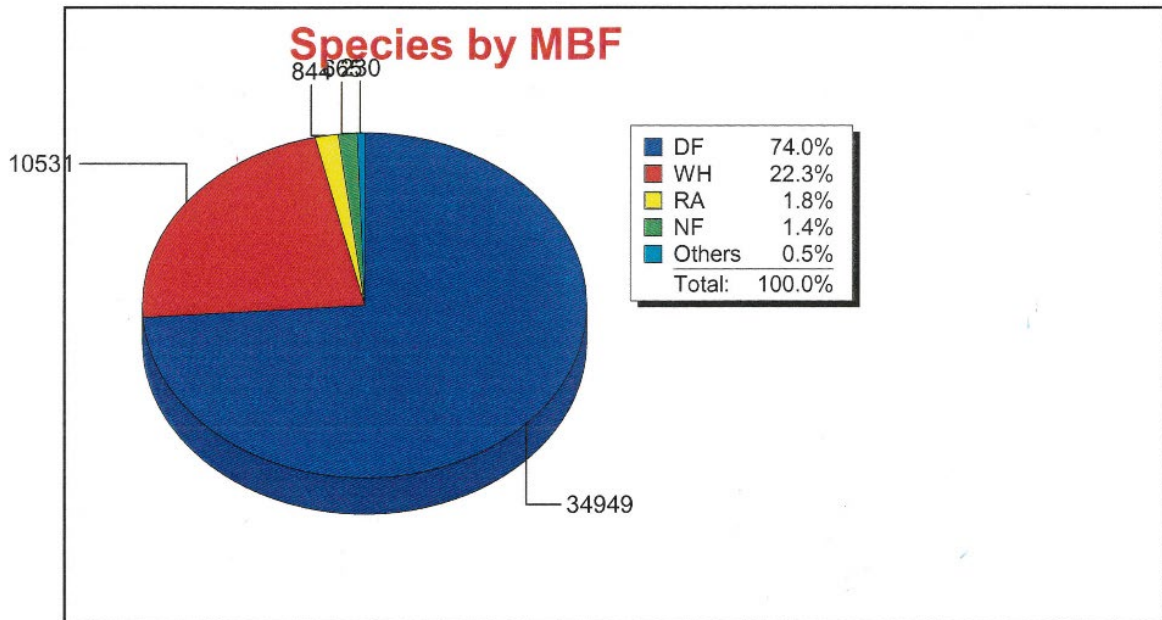


TABLE 4. Species Summary

FI PSPCLOGV		Species Summary - Logs and Volumes							
<table border="1"> <tr> <td>T17N R07W S06 Ty020</td> <td>19.0</td> </tr> <tr> <td>T18N R07W S33 Ty330</td> <td>37.0</td> </tr> </table>		T17N R07W S06 Ty020	19.0	T18N R07W S33 Ty330	37.0	Project	MONTEINV	Page No	1
T17N R07W S06 Ty020	19.0								
T18N R07W S33 Ty330	37.0								
		Acres	4,362.00	Date:	4/9/2018				
		Grown Year:	2018	Time	9:04:12AM				
Species	S T	Total Number Logs	Total Gross Cunits	Total Net Cunits	Total Gross MBF	Total Net MBF			
DOUG FIR		750,293	81,193	80,187	35,291	34,949			
WHEMLOCK		169,228	22,606	22,206	10,628	10,531			
R ALDER		53,700	2,839	2,632	863	844			
NOB FIR		9,601	1,381	1,380	665	665			
WR CEDAR		785	392	392	174	171			
S SPRUCE		189	143	143	60	60			
OTH HDWD		36,672	92	69					
<b>Totals</b>		1,020,467	108,645	107,009	47,681	47,219			
<b>Average Per Acre =</b>		233.94	24.91	24.53	10.931	10.825			
<b>Average Log Size =</b>			11	10	47	46			





## FOREST ROADS:

The network of roads in the forest represents a significant capital improvement, and serves very important multiple uses, including resource management, recreation, fire protection, general access and forest operations. Figure 1 shows the road network on the forest in detail by road number and type. Table 5 lists all 43.4 miles of roads on the forest by road footage.

There are two access points into the City Forest for vehicle traffic: the Sylvania Creek A-Line on the west and the Camp Creek Mainline on the east. The Sylvania Creek A-Line is an extension off the Clear View county road, which is the first right as you travel up the Wynoochee Valley Road. The A-Line travels through Weyerhaeuser tree farm property for about three miles before entering the City Forest on Sylvania Ridge. The Camp Creek mainline begins from a corner of the Camp Creek county road about three miles east of the city limits. The Camp Creek mainline travels about three miles up through Merrill and Ring and Green Diamond tree farm lands before entering the City Forest on Grouse Ridge. The City has permanent easements over both of these access routes.

Road intensity on the forest averages about 5.2 miles per square mile of ownership. The average cost of construction in this area for this standard of road is about \$75,000 per mile. At this average, the replacement value for the total 43.4 miles of road would be \$3,250,000. At this point, the ownership is completely roaded.

Generally, road construction specifications have been a 16-foot subgrade with a 3-foot wide ditch 1-foot deep on the cut-slope side, and 12 to 16-foot wide river-rock surfacing to a depth of 8" (about 40 cubic yards/100' station). This construction standard is light-duty and builds a road fit for hauling during only about six months of the year, during the dry season. (Year-round haul roads need about 20 inches of rock and cost about twice as much to build.) Maximum grades have been 12% adverse and 17% favorable. Almost 80% of the roads on the forest are ridgetop roads.

In addition to the road system, there is 19,300 feet (3.7 mile) of natural gas pipeline that runs through the tree farm with a 50-foot easement mowed every other year to control vegetation growth.

TABLE 5. Forest Road Inventory

Mainline Roads		Secondary Spurs (cont.)		Secondary Spurs (cont.)	
A-Line	12,670'	C-300	440'	G-300	530'
B-Line	7,250'	C-400	870'	G-400	3,860'
C-Line	17,410'	C-500	1,440'	G-410	550'
D-Line	16,300'	C-600	7,760'	G-420	240'
X-Line	17,740'	C-605	1,280'	G-430	830'
G-Line	11,090'	C-700	440'	G-440	2,130'
<b>15.6 miles</b>	<b>82,460'</b>	C-750	350'	G-500	550'
		C-800	1,140'	G-510	320'
		C-900	730'	G-600	1,930'
		C-1000	420'	G-700	1,840'
		C-1100	300'	G-800	1,140'
		C-1200	1,400'	G-900	770'
		C-1210	3,130'	G-1000	2,500'
		C-1220	740'	G-1100	2,930'
		C-1230	550'	G-1150	1,470'
		C-1250	800'	N-100	2,370'
		C-1260	920'	N-120	730'
		C-1300	580'	N-130	420'
		CC-Line	2,040'	X-070	1,460'
		D-150	550'	X-100	1,520'
		D-240	500'	X-110	1,020'
		D-250	500'	X-200	1,110'
		D-300	470'	X-300	130'
		D-400	410'	X-400	1,130'
		D-420	380'	X-500	800'
		D-500	6,670'	X-540	820'
		D-510	610'	X-550	1,010'
		D-530	380'	X-560	480'
		D-540	940'	X-600	2,030'
		D-550	560'	X-650	590'
		D-600	1,770'	X-700	3,430'
		D-700	410'	X-710	1,270'
		D-800	700'	X-720	1,180'
		D-850	640'	X-730	970'
		D-900	708'	X-800	2,910'
		D-1000	420'	X-900	5,260'
		G-070	660'	X-1000	1,460'
		G-100	2,820'	X-1010	790'
		G-200	290'	X-1100	730'
				<b>27.8 miles</b>	<b>145,828'</b>

**TOTAL ROAD MILES: 43.4**

## WATER and WETLANDS:

The City Forest lies within four major watersheds: Black Creek, Sylvania Creek, Camp Creek and Satsop, all draining into the Chehalis River system. The West Fork of Sylvania Creek at 1,764 acres is the largest, most important subdrainage covering twice the area of any other subdrainage and occupying over one-third of the total forest ownership. Figure 5 shows the subdrainage boundaries and the stream classifications within the forest.

Although much of the forest is in uplands with an estimated 43 miles of headwater Type Np streams (small, low flow, no fish), there is over 12 miles of Type F (resident fish-bearing) water on the forest, and almost one mile of lower Sylvania Creek that is anadromous fish-bearing.

Only two significant wetland areas exist on the forest, both in the southwest corner of the ownership. In addition, there are two major waterfalls, Lake Sylvania dam, and the old headworks dam on the East Fork of Sylvania Creek.

## FISH:

A comprehensive inventory of fish in the Sylvania Creek Watershed was made by the City of Montesano under a "Jobs for the Environment" grant in the summer of 1994. The objectives were to: a) provide baseline data for evaluation of enhancement projects and impacts of forest management activities, and b) better understanding of fish population dynamics within the Sylvania Creek system.

Since the natural falls and Lake Sylvania Dam provide two substantial historic barriers to anadromous fish migration, the reaches of stream above the dam are exclusively resident trout habitat.

The East Fork of Sylvania Creek had a total cutthroat population estimate of 2,972 for the 2.74 miles (14,439 feet) of Type F water. From the Habitat Survey for this creek, we determined there was 8,614 square meters of surface area, with an average of 28.6% pools. The cutthroat trout density was estimated to be 0.345 fish/square meter. The average size trout counted was 6.32 cm (2 1/2"). Only 1/2% of the total trout population on the East Fork (16 trout) were estimated to meet the 8" state minimum catch limit.

The West Fork of Sylvania Creek had a total cutthroat population estimate of 313 fish in the 3.85 miles (20,321 feet) of Type F water. From the Habitat Survey for this creek, we determined there was 22,044 square meters of surface area, with an average of 81.7% pools. The cutthroat trout density for the West Fork was estimated to be .014 fish/square meter. The average size trout counted was 11.49 cm (4 1/2"). A total of 14.7% (46 trout) were estimated to meet the 8" state minimum catch limit.

The bullhead population found on the East Fork was .774 fish/square meter, and on the West Fork, the bullhead population was .281 fish/square meter. We also found a lot of lampreys and crayfish in our sampling on both the East Fork and West Fork.

For the Type Np water in the Sylvania Creek Watershed previously believed to have no fish, we found good cutthroat populations in 72% of the creek habitat. In fact, in the beaver dams of the headwaters of two different Type Np creeks, a 9" and a 13" cutthroat was caught, representing the largest fish caught, sampled or even seen above Lake Sylvania in the entire system.

We were unable to adequately sample deep water, so most of the lower main-stem of Sylvania Creek (3.42 miles, 18,078 feet), the 126 beaver dams, 30-acre Lake Sylvania (approximately 110,992 square meters surface area, 40-feet deep), and the large old log pond on the lower main-stem of the creek below the dam were not inventoried, even though these units represent significant and integral parts of the entire system.

The total length of Sylvania Creek available for anadromous fish is 4.7 miles (24,885 feet). The first 3,869 feet are tidally influenced and run through traditionally agricultural pastureland. Flat agricultural cow-pasture continues upstream for another 7,172 feet, with the streambed cut down through the floodplain with 5 to 10-foot vertical banks, and an average creek depth of 5 feet. Timber RMZ (riparian management zone) established about 1940 begins at this point and has been maintained along the rest of the creek all the way to the end of the anadromous section. The salmon reaches of Sylvania Creek end in a large pool (75' wide, 31' long, 1-5' deep) at the bottom of a 63-foot vertical rock waterfall, a natural fish barrier.

Lower Sylvania Creek is estimated to have 63,880 square meters of surface area. We conducted a habitat survey of the last 4,208 feet of the creek to physically measure habitat units and found 72% pools. We believe this would be typical all the way to the mouth of the creek. We also found tremendous amounts of LOD (large organic debris) in the creek system.

On August 3, 1994 Roger Peters and Larry Dominguez of the U.S. Fish & Wildlife Service walked the entire lower creek segments and believed that Sylvania Creek could be acting as a wall-base channel of the Wynooche River, and mainly used as rearing habitat. The only way of tracking fry and smolt migration would be to install one or a series of fry-traps in the creek. Three factors most important to Coho and steelhead production are: physical habitat quality, food availability, and presence of competing fish species.

**Physical Habitat Quality:** Sylvania Creek has many extremely attractive habitat qualities for anadromous fish, including much LOD, undercut banks with lush vegetation, mature timber RMZ, deep water with a high percent of pools and many large beaver ponds. Lake Sylvania Dam tends to filter out most of the typical headwater sediments, and keep the lower reaches fairly clear of siltation.

The only real habitat drawback appears to be the absence of good riffle area, and very low spawning gravel area. The native soils are gravel-poor, so recruitment is non-existent. The creek typically has a mud bottom.

**Food availability:** No study was made of the food supply, however we believe there is a tremendous amount of food because of the lush variety of vegetation, LOD, abundance of crayfish,

lots of cadis fly, bugs, and insects. The coho fry measured during shocking were large (much larger than the fry experienced on the Clearwater River) and appeared bright, fat and in good health.

**Competing Species:** We found all of the species that we thought we would find in lower Sylvania Creek: coho salmon, cutthroat trout, and steelhead. We also found chub (suckerfish) and squawfish. We also noted healthy populations of predatory birds including kingfishers, blue herons, and ducks.

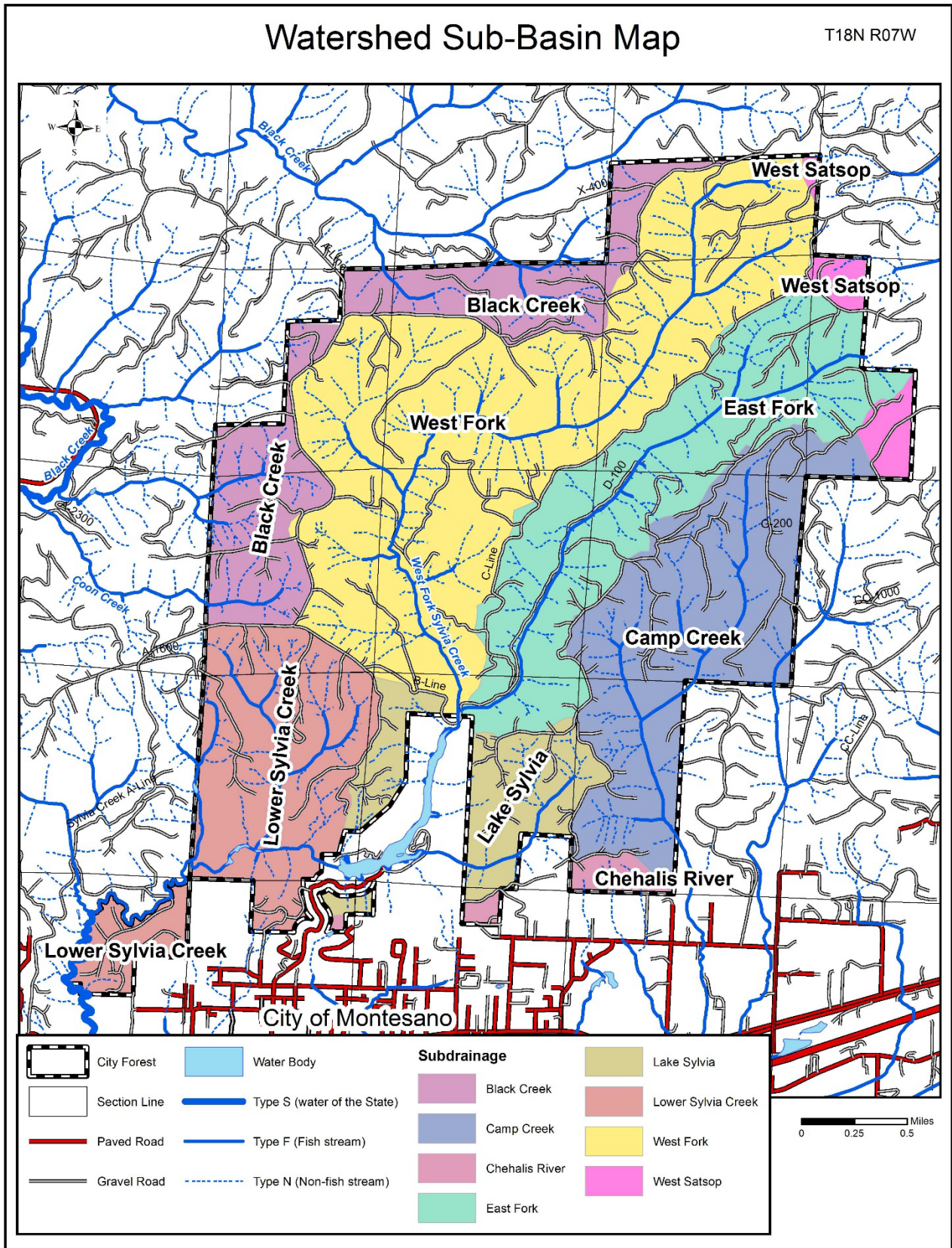
In the two segments of the lower main-stem of Sylvania Creek below the falls pool (4,208 feet, 10,804 square meters, 72% pools) our fish census follows:

<b>Species</b>	<b>Average # fish</b>	<b>Density</b>	<b>Average length</b>
Bullheads	852	.079	1 1/2"
Squawfish	645	.06	2 1/4"
Coho salmon	349	.047	3"
Cutthroat	72	.005	3 1/2"
Steelhead	17	.002	2"
<b>Totals</b>	<b>1,935</b>	<b>.193/square meter</b>	

The inventory of fish in the pool below the falls (220 square meters) is listed below:

<b>Species</b>	<b>Average # fish</b>	<b>Density</b>	<b>Average length</b>
Squawfish	81	.368	1 1/2"
Bullheads	38	.173	2"
Coho salmon	32	.145	3"
Steelhead	7	.032	4 3/4"
Cutthroat	5	.023	5 1/2"
Chubb	2	.009	8 1/2"
<b>Totals</b>	<b>165</b>	<b>.75/square meter</b>	

FIGURE 5. Subdrainage Map



### WILDLIFE:

Wildlife species found within the forest have never been inventoried nor closely monitored. The following mammals have been seen within the area, and “potential” population estimates based on sightings and typical density-by-habitat formulas (from Fish and Wildlife Dept.) are presented below:

Black Tailed deer (120)	Bobcat (6)
Roosevelt elk (12)	Porcupine (1)
Black bear (3)	Raccoon (100)
Beaver (180)	Mountain beaver (10,000)
Coyote (6)	Chipmunks (200)
Cougar (1)	Douglas squirrel (200)
Rabbit (1,500)	Skunk (seen)
Opossum (seen)	Otter (seen)
Weasel (seen)	

### BIRDS:

Bird species found within the forest have never been inventoried nor closely monitored. The following birds have been seen on the forest:

Mallard duck	Red-breasted sapsucker
Wood duck	Steller’s jay
Great blue heron	Common raven
Ruffed grouse	Western wood pewee
Blue grouse	Black-capped chickadee
Ring-necked pheasant	North American dipper
Red-tailed hawk	American robin
American crow	Winter wren
Turkey vulture	Varied thrush
Cooper’s hawk	Starling
Osprey	Red-winged blackbird
Band-tailed pigeon	Brewer’s blackbird
Nighthawk	Western tanager
Rufous hummingbird	Rufous-sided towhee
Belted kingfisher	Vesper sparrow
Pileated woodpecker	Red-shafted flicker
Downy woodpecker	



## RECREATION:

The following recreational activities are carried on in the forest, however no attempt has ever been made to measure or determine needs, units of existing use, discourage or encourage the recreational use of the forest.

Running & jogging	Sightseeing
Hiking (both trails & roads)	Motorcycle, ATV riding
Mountain biking (trails & roads)	Sledding (in snow)
Mushroom picking	Grouse hunting
Berry picking	Camping
Deer, elk & bear hunting	Target practice
Trout fishing	Horseback riding
Firewood cutting	

Lake Sylvia State Park has a 30-acre lake, 15,000 feet of shoreline, 118 picnic sites, 35 developed campsites, 2 primitive campsites, and a group campsite with 120-person capacity. There are two large comfort stations, a playground, swimming area and 2 miles of hiking trail around the lake.

The City forest has no developed camping areas nor recreational facilities other than approximately 20 miles of developed trails, 3.7 miles of utility corridors, and 40 miles of all-weather gravel road.

## SPECIAL FOREST PRODUCTS:

The following miscellaneous special forest products have been harvested from the forest in the past.

Burls from cedar & maple	Douglas fir Christmas trees
Blackberries	Ferns (sword & bracken)
Cedar shake-bolts	Firewood
Cedar flat-saw	Mushrooms
Cedar posts & rails	Noble fir Christmas trees
Cedar poles	Noble fir boughs
Cedar boughs	Salal
Cascara bark	Scotch broom
Douglas fir boughs	Wild plants (vine maple, foxglove, huckleberries, and tree seedlings)

The majority of the special forest products income has come from cedar salvage and salal picking. Most of the old growth ground cedar has now been harvested. Brush picking permits are issued intermittently, typically depending on the leadership of elected officials in office at the time.



## **MANAGEMENT ACTIVITIES**

### **LOGGING**

The City has had consistent and annual logging operations on the forest since the 1970s. The methods and harvest rates are described more fully in the sections of this plan dealing with "Harvest Rates" and in Tables 1 and 2.

Salvage logging of blowdown, fire-damaged and insect/disease-damaged trees has also been an integral part of our management activities whenever they occur. This activity is not planned or scheduled but represents a reaction on the City's part to natural events. It is the City's policy to salvage all timber volume that is cost-effective to salvage.

It is important to note that logging activities are the most important activities on the City Forest as they fund all other costs and activities and represent the main source of income from the forest. Without the logging and the plans for logging, most other management activities would not be needed and could not be carried out.

Annual logging plans are normally prepared a year ahead of time and are coordinated and controlled largely by log market projections. The annual plan is based on the ten-year strategic harvest plan which is updated annually.

### **ROAD CONSTRUCTION**

The City Forest's road system is pretty well built-out: all the mainline ridgetop haul roads are in place and most of the spurs are adequately and appropriately located. Occasionally additional temporary spurs must be built to adequately serve an individual harvest setting.

We have a policy of maintaining and preserving most roads once built for the purpose of ongoing management and fire protection.

### **ROAD MAINTENANCE:**

The Forestry Department reviews the roads and prepares an annual maintenance plan as needed for the entire road system. Normal components of the maintenance plan are: slide removal, wash-out repair, culvert cleaning, ditching and surface grading, roadside brushing, surface rock additions, and grass seeding. All roads are maintained to the current State regulated BMPs (Best Management Practices as detailed in the Washington State Forest Practices Act.)

The Forestry Department does most of the maintenance within its time and equipment constraints each year using city Public Works crew and equipment; any additional needs are contracted out from a "small works" contractor bid list or advertised for low-bidder.

### **SITE PREPARATION:**

Current policy on logging units is to log clean and then replant. After logging operations are complete the slash or brush levels are assessed and if determined to be an obstacle to

reforestation then the slash is grapple piled to prepare the logging site for tree planting. The piles are burned in the late fall with the landings. Herbicides are used when established vegetation would prevent successful reforestation, and only in accordance label guidelines and by licensed applicators.

### TREE PLANTING:

Consistent reforestation of logged areas is done in the spring planting season immediately following logging. All units are replanted within a year of cutting, at a normal rate of 300-400 trees per acres.

Planting work is offered out to contractors, with actual planting between January and April each year. Tree seedlings are purchased as needed either through contract growing or on the open market from the DNR, Weyerhaeuser, or other local tree nurseries. A mix of 75% Douglas fir (DF) and 25% western red cedar (RC) two-year-old trees are planted.

### PLANTATION BRUSH CONTROL:

The need for brush control in established plantations has been minimal because of excellent logging, site preparation and immediate replanting. However, when needed, brush control is accomplished by power saw or herbicide application.

### PRE-COMMERIAL THINNING (PCT):

Hemlock and red alder seed in heavily and naturally on many of our Doug fir plantations. We only thin if the stocking is over 600 trees / acre. We leave the best formed, largest trees regardless of species, so we tend to have mixed-species stands. If inventory cruising shows that stands need to be thinned, it is done between the ages 8 and 12 years old. The target stocking after our thinnings currently is 300 trees per acre.

### PRUNING

A pruning program was conducted from 1994 to 2002. The objective was to create stronger, knot-free, straight butt logs for future high-quality lumber. Pruning also helps maintain understory plant communities and creates a variety of wildlife habitat. It is most cost effective to wait until age 20, then prune off the lower 26 feet of limbs on the 200 best crop trees. This activity has not been continued since 2002 as market results have not yet shown a substantially sufficient return on investment for this cultural practice.

### FERTILIZATION:

No past or current activities. In research trials, hemlock has not responded positively to fertilization, and the natural nitrogen supply on high-site ground for Douglas fir makes fertilization unnecessary.

### SPECIAL FOREST PRODUCTS:

Permits are granted on a case by case basis as market conditions and interest makes it profitable.

### FIRE PROTECTION:

An annual fire protection plan is prepared. The Montesano Fire Department maintains a 300 gallon brush-unit containing several pumps and equipment as an initial attack unit for fires, and for use in our pile-burning activities each fall.

The City Forest is also covered by the DNR for fire protection; it is subject to forest fire protection assessments pursuant to RCW 76.04.610. The Washington State Department of Natural Resources provides fire protection for forestland associated with this parcel. Also, the rural fire district and large industrial adjacent neighbors help in the form of signage, patrols, etc.

Regular precautions are taken to shut down management operations on high hazard days, and to close the woods to the public during times of extreme hazard. The road network is an advantage for fire protection, and our history of slash burning to reduce fuel-loading helps minimize our potential for loss.

### ANIMAL DAMAGE CONTROL:

Mountain beaver trapping and bear feeding or depredation hunts are conducted on an "as needed" basis via contracted professionals in this field. We have a current program to protect and promote as much flat-tail beaver habitat as is available.

### INVASIVE SPECIES:

We currently have no knowledge of invasive animal species that are of concern. There are invasive plant species in the Forest that are on the County invasive species list. Most notable are scotch broom, tansy and knotweed. To help control these invaders the City actively mows and sprays its road right-of-way's and spot sprays weed concentrations in young plantations. Annual inspections along the Sylvia Creek riparian corridors are also done and any noted knotweed infestations are treated.

## **PUBLIC ISSUES & MANAGEMENT CONCERNS**

How we shape the environment, for better or for worse, is a subject very much to social pressures. With endangered birds and fish, clean air and water regulations, export restrictions and job creation, almost everyone has an interest or an opinion about forest management in general.

The old way of management was to draw lines on a map: parks and trails on one side, development and harvesting on the other. Our challenge now is to integrate -- not asking how we can fence off nature, but how we can live in harmony with it. Our forest is too small to

handle any other way.

"Managing" the forest presupposes that we know what we're doing. In actuality we learn as we go but often it is from our mistakes. One thing we have done well and developed into a fine art is the growing of trees. The most cost effective and efficient program of planting, tending and harvesting timber has been refined through the years to a science. However, the web of life is complex, and everything is tied together. It is our long-term impact on other resources that we often do not understand.

One of the problems managers and policy-makers face is that we often don't have very good basic data on how nature works. But any policy we choose toward our forest, from hands-on to leave it alone, is a decision about what we want in the future. The forest is a very dynamic resource, and change is inevitable.

The following portion of the Forest Management Plan presents an historical and factual discussion of a number of issues and concerns relative to the management of the City Forest.

#### HARVEST RATES:

Harvest rates (volume of timber or acres of forest cut per year) may be based on forest industry needs, biological factors, financial considerations, social values or political persuasion. Since the City doesn't own a mill and social/political values are difficult to quantify, the harvest rate discussion here will be limited to biological and economic factors.

In the first Management Plan prepared in 1947 the sustained growth yield was estimated to be 3,000 mbf/year for the 5,000-acre city watershed ownership (mbf=thousand board feet; a board foot is a board 1" x 12" x 12"). In the 1973 Weyerhaeuser Plan an available cut was estimated to be 2,790 mbf/year. The U.S. Conservation Service's 50-year soil site index average for our forest soils is 136 for Douglas fir and 124 for western hemlock (the height to which each respective tree species can grow in 50 years). Thus, using soil productivity as a base, the average available volume growth is calculated to be 2,520 mbf/year (600 bd. ft./acre x 4,200 acres).

The factors that impact a sustainable harvest/rate decision are discussed below.

**Rotation Age:** It is the City's desire to manage the forest for a sustainable level of revenue output and environmental services. The shorter the chosen harvest rotation age, the more acres per year that can be harvested; and conversely, the longer the rotation age, the fewer acres per year are harvested. Most often the rotation age is chosen based on financial considerations such as the carrying cost, discount rate desired, rate of return on investment demanded, or the financial maturity of the timber stand.

Biologically, we could reasonably have a rotation age between 25 years and 100+ years. These are the extremes: 25 being the youngest age at which our timber stands would be able to yield saleable products and produce positive net revenue and 100 being the oldest age before the stands reach a point of negative growth due to stand decadence.

Private industrial tree farms in our region generally have a rotation age between 40 and 50 years. A rotation of 60 years is used on many State lands in Grays Harbor County. Grays Harbor County uses a 60-year rotation and City of Hoquiam uses a 65-year rotation. In 1997, we clear-cut hemlock stands that were 35 years old and 70 years old as part of our ice storm salvage program. A summary of this information is provided below.

Age	Trees/Acre	Ave Diameter	Ave Volume/Acre	Net Return/Acre
35	200	12"	20 mbf	\$5,572
70	175	18"	50 mbf	\$18,682

If 35 years was the chosen rotation age, we could cut an average of 127 acres/year (2,500 mbf) on a sustained basis. If 70 years was the chosen rotation age, we could cut an average of 64 acres/year (3,200 mbf) on a sustained basis.

In 2001, we completed an "internal rate of return" analysis of various alternative management options. On our forest, under optimal high-intensity management, the net harvestable volume doubles from age 40 to age 55, and as a result, the 55-year rotation with intensive management yielded the greatest internal rate of return (9.6%).

This "optimal" rotation length is only achievable on sites with less than 30% slope and that lend themselves to commercial thinning by tractor-based systems. Maintaining optimal growth is all about maintaining optimal tree spacing through thinning regimes. Steeper ground currently requires cable logging methods (as opposed to shovel or tractor logging which is practiced on flatter ground.) Cable logging, especially cable thinning logging, is more expensive and is more damaging to the residual stand. Thus, all our landscape does not lend itself to the "optimal" model for a 55-year rotation age. If the stand cannot be effectively thinned in timely manner then growth stagnates and the final harvest should be done earlier. It is important for the managing forester to spend a large proportion of his time cruising and modeling stand growth (inventory management) so that we can best optimize each stand's growth potential while still maintaining a reasonably even harvest rate and flow of revenue.

**Growth Rate:** A forest cannot sustain a harvest rate that is greater than the annual growth rate. Our cut-out experience and inventory cruises indicated that the average growth rate of our unmanaged second-growth stands was between 567 to 653 board feet per acre per year (2,382 to 2,743 mbf/year for the whole forest.).

**Management Practices:** Certain practices can actually increase the growth rate: immediate replanting, site preparation, use of genetically improved seedlings, species-specific replanting, stocking control, brush control, animal damage control (mountain beaver, deer, elk, bear), fertilization, and brushland rehabilitation.

With our intensive utilization of most of the practices above, mostly in managing stand stocking densities, an increase in growth and yield of 25% to 30% should be attainable from future managed timber plantations.

**Acreage Base:** Area removed from timber production for whatever reason cannot be used to calculate a harvest rate because it is simply not harvestable. Withdrawals may be for parks, campgrounds, roadways, wetlands, RMZ corridors, wildlife set-asides or other developments. Some withdrawals are legal mandates, while others are discretionary based on City Council policy.

In 1987 there was believed to be 32,800' of fish streams on the City Forest, which required a legal maximum buffer zone of 25 feet on each side of the stream. This converted to 38 acres of withdrawal area.

In our 1994 comprehensive fish census, we found fish use in 65,586' of our streams, and we determined that a distance of 100' on each side of the stream provided much better RMZ habitat protection. This converts to 341 acres of withdrawal area. State law in 2000 required a 200' RMZ for fish bearing streams and a 50' buffer for non-fish bearing streams. Currently, our GIS (Geographic Information System) lists about 1,025 acres in RMZ and unstable slopes mandatory withdrawal areas, and this amount still grows annually as new timber sales are laid out under the new rules and more rivulets are encountered which must be buffered.

**Mature Timber:** After a certain age and tree density the growth rate slows and is less than optimum for the site occupied. As timber stands age they eventually reach the point of negative growth. Negative growth occurs when the loss of wood through decay, insects and windfall is greater than new growth. Any timber stands growing at less than the optimum growth rate reduces the overall average growth.

**Natural Catastrophe:** Natural devastation in the form of volcanic eruption (Mt. St. Helens), earthquake, wildfire, windstorm, snow or ice storm, landslide/mass movement, or insect epidemic can diminish or wipe out the total available wood supply and alter growth rates. The City has experienced several of these events over the last fifty years: 1962 Columbus Day windstorm, 1980 Mt. St. Helens eruption, the 1996 Christmas Snow/Ice storm and the December 2<sup>nd</sup> 2007 windstorm. It appears there was also a severe snow/ice storm around 1947.

Obviously, a natural devastation is not scheduled, nor planned. The best we can do is respond in an appropriate manner, then adjust our management plans as needed. We have done this in the past.

The most destructive losses to our tree farm program would be from a wildfire. That is one reason a coordinated fire prevention plan is necessary. The 1975 City Council believed the "forestry staff person was like getting a form of insurance for the city" against preventable and manageable catastrophes. August of 2017 was our first wildfire in recent history. About an eighth of an acre of recently logged and planted ground along the Aline was burned. This was evidently caused by a careless human, was reported early, and put out quickly by a united effort of the Montesano Fire department, Fire District 2, and the Washington Department of Natural Resources.

**Summary:** By way of summary, the City Forest has a total acreage base of 5,387 acres of which 130 acres are presently in roads; 22 acres are in utility corridors; and 1,025 acres are in RMZ/unstable slopes. Therefore, the maximum available acreage base for determining harvest rates is a little over 4,200 acres. With a 50-year rotation, and under optimal circumstances, the forest could average 85 acres of harvest per year (3,400 mbf/year) on a sustainable basis.

The 1996 Christmas Snow/Ice Storm required salvage logging operations of 500 acres in clear-cuts and 400 acres of partial cuts in 1997 for a total volume of 16,569 mbf. As a result, the City had only 1,025 acres of mature timber available to log on a sustainable basis for the next 18 years (55 acres/year or 2,200 mbf/year). Similarly, the 2007 windstorm blowdown salvage required the accelerated logging of 200 acres clear-cut and 700 acres of individual trees salvage.

It should be obvious from this discussion that a harvest rate determination is not an exact science and that harvest plans must be adjusted regularly in accordance with the vagaries of nature.

### **FINANACIAL CONSIDERATIONS:**

The historical intent behind the purchase of the City Forest was that it "would provide consistent revenue return on a sustained basis." Past management has focused on harvesting timber at a sustainable rate, likened to withdrawing the interest each year on a savings account, but never depleting the principle.

It is also clear that predictions of future financial benefits have always been extremely conservative. In 1947 the first management plan predicted annual revenue returns of \$12,000 each year for a 3,000 mbf/year harvest. In 1956, it was projected that the forest could average \$42,000/year indefinitely.

In 1975 there was a proposal before the Council to sell the forest (valued at \$10,000,000), place the proceeds in a trust fund at 8 1/2% and use the interest each year (\$850,000) for various projects.

It was believed at that time that the most money that could be grossed from the forest in any given year was \$500,000 (and this could not be done year after year).

It was noted that handling of the trust fund could be done for \$25,000/year while it was costing much more to manage the forest. It was also suggested that by reinvesting \$200,000/year of interest back to the principal, in 10 years the principal would be \$12,000,000 and yield an interest of over \$1,000,000/year at 8 1/2%.

Obviously, the City Council chose not to sell the forest at that time. The gross and net revenue generated by our management program since then is shown in Table 1. However, administrative costs, which currently average \$150,000/year, have not been removed from this figure.

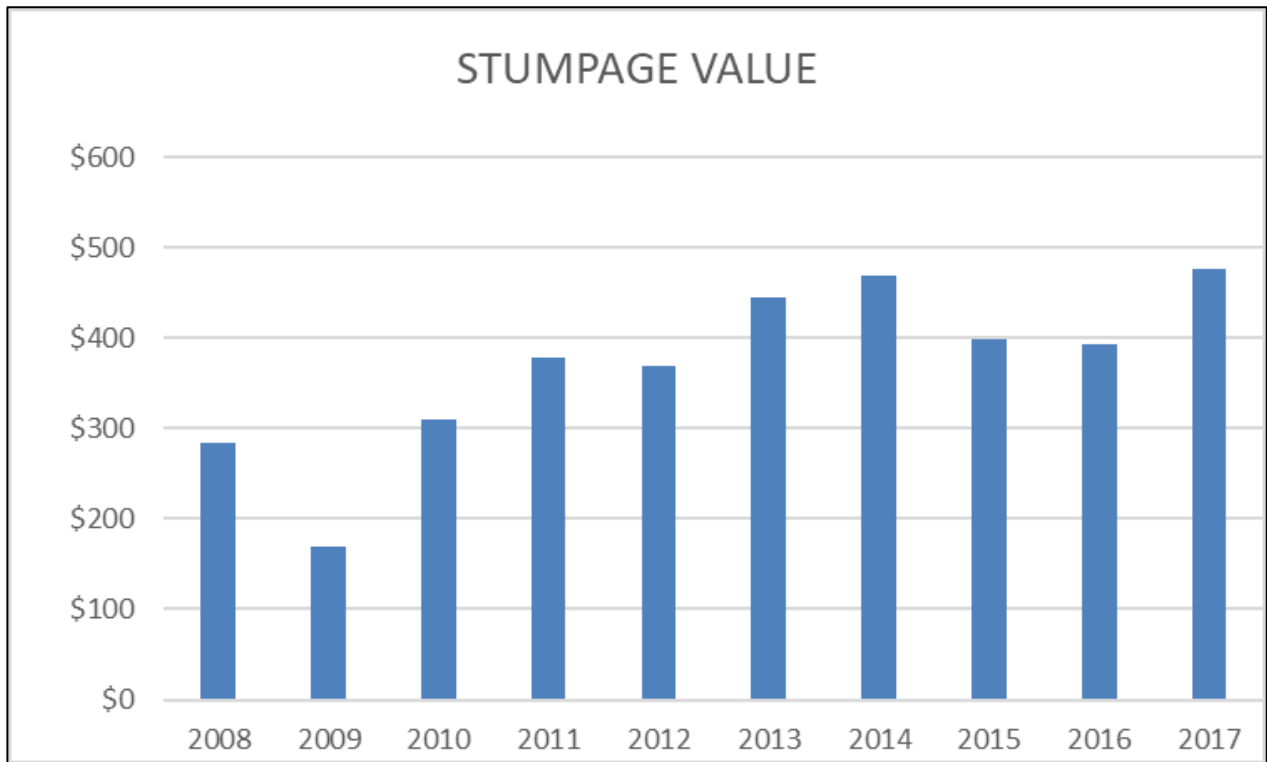
Financial management of our timber stands requires a knowledge of log prices (which usually change quarterly) and stand quality and volumes. There is also a certain amount of "crystal ball" and predictive skill utilized to make future projections that is not unlike stock market management. The objective of any decision is to sell high and maximize returns to the city. In order to accomplish this goal, "high" has to be defined: a substantial amount of the forester's time has traditionally been spent in the area of log sales and market tracking in order to provide this professional advice to the council.

In terms of future financial management of the forest, a stumpage value of \$500/mbf will bring double the value of a harvest made at \$250/mbf. A reasonable policy to maximize returns, would be to log a greater volume in high-price times (10% above the 10-year average) and little or no volume in low-price times (10% below the 10-year average). The current ten-year average stumpage price is about \$370.00/mbf. (This has been calculated as an average of the Douglas fir and western hemlock prices.) A graph of stumpage prices over the past 10 years is shown in figure 6.

It is not the intent of this forest management plan to delve into the politics of city government. However, a key point to be made and remembered is that we are managing a renewable natural resource that is indefinitely sustainable and may be used to generate finances annually as long as it is managed properly, and the sustained yield of the property is not exceeded. It is strongly encouraged that the City always employs the services of a certified professional forester to manage its forestland assets.



FIGURE 6. Ten-Year Stumpage Values Graph (\$/MBF)



Average Douglas fir – western hemlock stumpage prices by year 2008-2017. Stumpage prices are net value returned to the “stump.” This is calculated by subtracting the logging and hauling and administrative costs of the harvest from the delivered price at the mill. The Ten-Year Average stumpage price for this period was \$369.26 per Thousand Board Feet (\$/MBF).

## HARVEST METHODS:

Each harvest method results in a different stand structure, different management implications, costs and issues. Each different harvest method favors one species of tree and wildlife at the expense of another.

**Clearcut:** In clearcutting, all timber of all sizes and species is harvested. The site is prepared and a new crop of trees is planted all at the same time — typical of most agricultural crops.

This method is the most efficient cutting method and results in least management costs and the highest dollar return. It results in even-age stands and is the prevailing method for regenerating and growing Douglas fir. This has historically been the method used on the City Forest.

The present cost for using this method of harvest is typically about \$180/mbf for the City of Montesano. Administrative costs and future management costs are kept low, and the returns to the City are maximized because all available trees are harvested and paid for.

The negative aspects of clearcutting are the "shock" of dramatic change, temporary ugly aesthetics, increased peak stream flows and run-off, greater landslide mass movement risk and less diversity for plants, birds, and wildlife.

**Partial-Cut:** In a partial cut, some of the mature trees are left standing, the rest are harvested. The number of trees left may vary from a few (10/acre in the Grouse Ridge Seed Tree Sale in 1992) to many (50/acre in the West Fork Thinning Unit in 1995).

Partial cutting turns most all of the negative aspects of clearcuts into positives: much less dramatic change, more park like beauty, less impact on stream flow, less landslide risk and greater plant, bird and wildlife habitat diversity.

Partial cutting tends to favor hemlock which thrives in the shade and root competition of the older trees left, and results in much greater administrative costs, operating costs, and reduced returns to the City. Unfortunately, our experience with partial cutting on the City Forest has been with poor results. Due to the heavy rainfall and high winds in this region, partial cut stands are quick to succumb to wind throw.

**Commercial Thinning:** This cutting method is like a partial cut, only in younger age stand types where future partial cuts or a clearcut is anticipated. Generally, commercial thinning will be made in stands 25 to 35 years old. Positives of thinning are:

1. Utilization of trees otherwise lost to natural competition.

2. Concentration of growth on best quality and species of leave tree.
3. Increased growth rate per acre over an extended period of time yielding a greater final log volume from the site.
4. Generation of financial returns earlier in the life of a stand.

Negatives of thinning can be increased logging costs due to small piece size, compaction of soil resulting in possible 10-15% future productivity loss, root and stem damage on leave trees, and increased administrative and management costs. Thinning, like partial cutting will favor the regeneration of hemlock.

We did not commercial thin prior to 1997. During our Snow/Ice Salvage Logging in 1997 and 1998, the City had several contracts that included salvage thinning in 25 to 35-year-old timber stands. Logging costs were \$225/mbf. An average of 11 mbf/acre was harvested (60% of the stand).

Since 1998 the City has planned and conducted commercial thinning operations on 686 acres of young, predominantly Douglas fir stands, netting about \$450 per acre from the thinning.

#### FOREST HEALTH:

Generally, The City Forest is a healthy forest; it has very little instance of disease or insect infestation.

There are minor pockets of laminated root rot located mainly along the X-Line in the far north of the holding. These are not wide spread enough to take action over. During a series of overly wet winters, we have at times developed some Swiss needle cast in younger plantations; but, as El Nino weather patterns return the fungus diminishes again into background levels.

Animal browse (deer, elk and rodent) in younger plantations has at times been evident, but again taking little toll overall on the growing stock. Bear damage is the most serious health issue in the forest. In spring, bears will strip the bark off young trees in order to feed on the sugars in the cambium. About every five years the damage has been severe enough to warrant a depredation hunt to remove the one or two animals that are causing the damage.

#### SEDIMENTATION:

The City Forest has the potential for sedimentation problems similar and typical to other coastal logging watersheds in a high rainfall area. Forest roads and logging have the potential to produce stream sedimentation at an accelerated rate. Roads are known to be a significant contributor of sediment from slide or washouts, ditchline and cut bank erosion and increased sediment production during the wet season from heavy log hauling use.

Unstable areas fail regardless of management intensity. However, some of our past

management practices such as broadcast burning have resulted unknowingly in increased sediment production. Prior to 1992, 100% of the logging units in our forest were broadcast burned. This practice eliminated all ground cover and surface protection which resulted in a larger volume of run off and higher peak flows.

Sedimentation has resulted in the filling in of Sylvia Lake, reducing its capacity, depth and size. Sedimentation has also reduced some spawning capacity of the streams and is believed to have a negative influence on fish food production and availability.

Since 1992, our primary method of site preparation for planting has been to pile and burn the slash on the gentle slopes under 30%. On steeper slopes no burning is done.

The City has taken the following steps to reduce stream sedimentation from the City Forest operations since 1992: 1) locate roads along ridges (80% of the road system), 2) grass seed all cut/fill slopes in new road construction, 3) wide unlogged, natural buffer zones (100 — 150 feet) on each side of all Type F streams, 4) oversizing of culverts, 5) use of downspouts on culvert out falls, 6) willow staking and seeding of unstable hillsides, 7) reconstruction or abandonment of older sub-standard roads, 8) limit wet season log hauling, 9) increased road grading and ditch cleaning program, 10) disconnect road ditchlines from live streams, 11) reduce distance between relief culverts on steep grades and 12) reduce broadcast slash burning.

The 1999 “Forest and Fish” legislation has done much to alleviate sedimentation and improve road maintenance BMPs. The City Forest’s Road Maintenance and Abandonment Plan was completed and signed-off by the DNR in 2012, signifying that all fish stream crossings are fish passible and that the entire road system meets current Forest Practices Act standards.

### FISH and WILDLIFE:

The City of Montesano has not received income from any fish or wildlife species. It has been assumed that the species present were capable of moving around the forest as habitat changed, adapting and surviving. Obviously, any species here today has survived the clearcutting process and adapted to second growth timber. The same species exist today as they have historically. We have no endangered species and have not eliminated any species.

The Forest has only been opened to public access since 1978, prior to 1978 there was no hunting and no public access to the tree farm. Since then, hunting for grouse, deer, bear, elk and cougar has been consistent and heavy. However, no inventory, patrol or attention has been paid to number of hunters, animals harvested or animals left over. The same applies to fish and fishermen.

Since 1987 we have had some management programs that we believed were good for wildlife

and fish, including extra-wide streamside buffer strips, special forage seeding along all newly constructed roads, snag retention, and smaller-size clear-cuts spatially distributed to provide maximum "edge", a variety of cover and diverse habitats, as well as tree pruning and tree thinning programs.

In 1992 we began a habitat restoration and enhancement program in our streams to increase fish production. Since then we have constructed instream log and rock weirs, stabilized stream banks, added root-wads and LOD, and built three salmon spawning beds. We also inventoried beaver dams, planted trees in RMZs and conducted a ten-year fish census. It is too early to quantify the impacts of these programs; however, fish populations and fish size have increased.

One concern that has not been addressed is wildlife poaching. It is believed that this could be a problem, but no facts, records or attempt has been made to quantify the problem or provide a solution. Access to the Forest is open and available from at least two major roads. Gates provide a measure of control on some secondary roads and appear to provide protection for animal populations behind the gates.

#### RECREATION OPPORTUNITIES and ACCESS:

Unrestricted public access since 1978 has allowed excellent recreation opportunities for many City residents as well as out-of-town visitors. Recreational uses in the forest have not historically been heavily advertised nor promoted, but recent Mayor and Council have been favorable towards this use and encourage it. In 2017, the Council adopted a Forest Trails Management Plan prepared by the 2017 summer forestry interns. The forest trails are also specifically mentioned in the newly adopted City Parks and Recreation Plan.

There is some concern over conflicts over competing uses of the forest, as well as a fear that management costs would increase, and logging revenues decrease with increased use by a variety of user groups. However, increased usage by almost all user groups has necessitated some important management decisions. The problems don't seem to go away by ignoring them.

Increased problems with open public recreation and unrestricted access include: road damage, lost persons, fires, vandalism (of signs, equipment and trees), littering and garbage dumping, theft (of logs, firewood, and special forest products), wildlife poaching, illegal drug operations (marijuana and meth), and potential liability concerns.

Prior to 1992, there were few signs of any sort in the forest. In 1992, the Forestry Department combined with Weyerhaeuser to put road numbers on all of the roads, as well as directional and mileage signs in strategic locations. In 2010 the City and the State Parks Commission signed an MOU to jointly manage and sign the trail systems in the drainage. In 2011 an RCO grant aided in the reconstruction of portions of the Forestry Interpretive Trail (including interpretive signs). In

2017 the new trail management plan initiated a three-year plan to totally revamp and upgrade the trail signage system.

Forest maps of roads and trails became available in 2000 and have been a popular item. They are now available in print form at city hall and online at the City website: <http://cityofmontesano.com/department-directory/forestry/>

All the main roads are open to public use. There are a total of 14 access control gates placed around the forest on major secondary roads which limit motorized access to portions of the forest.

### PROTECTION of SPECIAL RESOURCES and BIODIVERSITY:

#### Unique, Special and/or Important Sites:

The Lake Sylvia State Park located at the base of the City Forest is a historical landmark. It was originally settled in the 1860s by pioneer Michael F. Luark, who, in 1869, built a small water-powered sawmill over the falls below the dam which operated until 1885. The holes in the sandstone are still evident where the building piers were set. Later, in the early 1900s, a cedar shingle mill operated along Sylvia Creek about a half mile below the falls (Sylvia Shingle Co.). The entire Sylvia Creek drainage was logged in the early 1900s, the logs being shipped via railroad. Portions of the old logging railroad grade and structures are now part of the West Fork Trail and the Sylvia Creek Forestry Trail, which has a dozen interpretive stations describing the area's rich timber history, past and present forest practices, and environmental attributes.

It should be noted in this document that Montesano is the "Home of the Tree Farm." The Weyerhaeuser Corporation was one of the main driving forces behind the formation of the American Tree Farm System (the first and oldest program to certify sustainable managed forestland). In 1941, it's Clemons Tree Farm (which surrounds the Montesano area) was given Tree Farm #1. The Sylvia Creek Forestry Trail was built in 1991 as a special tribute to the 50<sup>th</sup> anniversary of the American Tree Farm System.

#### Threatened and Endangered Species:

Spotted Owls, Marbled Murrelets are the main listed T&E species in our region. The barred owl resides in and around the City Forest and probably keeps the spotted owls away. In the early 2000s, protocol surveys were done for murrelets but none were encountered.

**Forests of Recognized Importance (FORI):**

The Sylvia Creek watershed is very similar to most of southwest Washington. It does not constitute a Forest of Recognized Importance as described in certification Standard 7 of the American Tree Farm System (ATFS).

**Biodiversity:**

Maintaining habitat and environmental biodiversity is difficult in even aged forestry or tree farming. Our compliance with the Washington State Forest Practices Act requires that over 20% of the City Forest land base is be in dedicated mandatory set-asides, receiving only extensive management; we feel that we are providing a balanced mix of habitat structure and environmental services through this large component of non-tree farmed ground.

## ACTION PLAN

### TIMBER MANAGEMENT GOALS:

- a. Prepare and maintain a 10-year plan for commercial thinnings and for final harvests.
- b. Rotation age should be from 40 to 60 years depending on stand quality, species and location, with an average mature harvest age of 45-50 years.
- c. Clear-cutting with 80-acre maximum unit size is the preferred regeneration harvest method.
- d. Partial cut harvests may be used with Douglas fir stands in sensitive areas or to meet habitat considerations.
- e. The goal in reforestation is the following mixture of species: 70% Douglas fir, 15% hemlock, 15% cedar, spruce and alder.
- f. All clear-cut units should be planted within one year following logging at a rate to establish a minimum of 300 trees per acre.
- g. Competing brush species and animal damage to forest stands should be controlled as necessary to maintain target stocking of 300 trees per acre to age 25.
- h. Precommercial thinning in stands from age 8 to 12 years should be used to reduce stocking to 300 trees per acre when existing stocking is over 600 trees per acre.
- i. Best Management Practices should be used in all operations along with current technology.
- j. Commercial thinning (cut-to-length) should be used in 25 to 35-year-old stands when ground conditions and the log market allows, with an undamaged stand of 150 to 180 trees/acre remaining.
- k. A winter storm damage salvage program should be used wherever it is profitable and can be accomplished in a sensitive manner.
- l. An annual fire protection plan should be prepared and implemented.
- m. Consultation with Lake Sylvia State Park management will be made for all City Forest operations in the vicinity of the park.
- n. Communication and notification of any adjacent landowner should be made when a City Forest operation adjoins their property.
- o. An annual financial standard in net dollars per acre should be calculated as follows:  
(total annual \$ income) minus (total annual \$ forest operating expenses) divided by total tree farm acres
- p. A 5-year average financial standard should be calculated using the annual standards for each of the last 5 years.
- q. The 5-year average harvest level should not exceed the sustained capacity of the forest at any time.



### FISH & WILDLIFE MANAGEMENT GOALS:

- a. Maintain a mix of habitats capable of supporting diverse and healthy wildlife populations: defined by habitat acreage.
  - 0-9 years, regeneration (500 acres)
  - 10-24 years, closed single canopy (400 acres)
  - 10-24 years, understory with herb/shrub layer (400 acres)
  - 25-50 years, mixed closed and open canopies (1,250 acres)
  - Over 50 years, older forest structure (500 acres)
- b. Leave snags and wildlife trees consistent with the rules established in the Washington State Forest Practices Act.
- c. Riparian areas should be maintained in an unmanaged, long-term protected status. RMZ and buffer zones consistent with Forest & Fish regulations should best meet this goal.
- d. Maintain conifer species in riparian areas.
- e. Non-motorized access areas or zones in the forest should be maintained.
- f. Maintain passage for fish in all life stages at water crossings.
- g. Balance harvesting by individual watershed basins.
- h. Reduce stream sedimentation by maintaining the road surfaces and cross drain system.
- i. Encourage flat tail beaver presence with “no trapping” policy.

### RECREATION GOALS:

- a. Maintain an inter-connected trail system with Lake Sylvia State Park.
- b. Identify areas for non-motorized recreation, sign and encourage.
- c. Prepare and make forest road and trail maps available to public.
- d. Install informational signs regarding forest use in appropriate locations.
- e. Create and maintain a specific trail management plan.
- f. Acquire properties or recreational use easements through adjacent properties where trails currently exist and are used by the public.
- g. Improve the walking access between the City and the State Park and trail systems.