

OREGON SMOKE MANAGEMENT
ANNUAL REPORT
1998

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OREGON DEPARTMENT OF FORESTRY

SMOKE MANAGEMENT 1998 ANNUAL REPORT

1998 SUMMARY

- **Acres burned** – In western Oregon has leveled out. The 47,494 acres treated with fire was a 4% increase from 1997. In eastern Oregon 128,654 acres were treated in 1998, compared to a 10-year average of about 105,000 acres.
- **Intrusions** – Once again set a new low. Only three intrusions into designated areas occurred in 1998.
- **Smoke impact** – included one heavy intrusion. One event lasted six hours; the other impacts were four hours or less. One moderate intrusion affected a Northeast Oregon protected community.
- **Emissions** -- In western Oregon changed little and remain well below the emission goal set for the year 2000. In eastern Oregon emissions increased somewhat.
- **Visibility** – Visibility impairment of the Class 1 wilderness areas rose somewhat but was still well below historic levels. Visibility was impaired at the three Cascade recording sites sixteen percent of the time.

INTRODUCTION

The Oregon Smoke Management Plan was developed as a voluntary program in 1969 and adopted as a regulatory program by the State Forester and the Environmental Quality Commission (EQC) in 1972. The plan has gone through several major revisions since then. The last major revision to the plan occurred in 1992.

The plan's purpose is to keep the smoke of forestland prescribed burning from being carried to certain "designated areas" and other areas sensitive to smoke. The plan is a framework through which emission reduction goals are being achieved. The State Forester administers the plan, in cooperation with landowners, land management agencies and air quality agencies. The plan applies to state, federal, and private forestland in Oregon. Mandatory smoke management constraints apply to burning in western Oregon, the Deschutes National Forest, and federal lands in the Blue Mountains of Northeast Oregon. Voluntary programs are in effect in the Klamath Falls and Lakeview areas and for private burning in

the La Grande and Bend areas, as shown in Figure 1A and 1B.

There are six principle objectives of the Oregon Smoke Management Plan. They are to:

1. Protect public health,
2. Minimize smoke intrusions into designated population areas,
3. Reduce emissions from prescribed burning,
4. Protect visibility in Class 1 wilderness areas during the summer months,
5. Maximize burning opportunities while minimizing emissions, and
6. Coordinate with other state smoke management programs.

1998 PROGRAM HIGHLIGHTS

Overview:

Prescribed burning in western Oregon continued to decline gradually. In 1998, there were 47,494 acres burned in the restricted area, as shown in Table 1. This is slightly more than the 45,641 acres treated in 1997 but well below the average for the last ten years. The 128,654 acres burned in eastern Oregon was considerably above the average of 105,549 acres for the last 10 years. The weight of material burned in the non-restricted area (1,730,481 tons) was also above the average and reflects the increase in forest health related burning.

PROGRESS TOWARD MEETING OBJECTIVES

Minimizing Smoke Impacts:

Minimizing smoke intrusions and protecting public health is a major objective of the Smoke Management Plan. In 1998, only three intrusions of smoke into designated areas occurred. This is the lowest number of intrusions since the program began and continues the trend to decreasing smoke impacts (see figure 3A). The 10-year average number of intrusions for the period 1989 through 1998 is 8 per year. One intrusion produced a heavy smoke impact. The other impacts during 1998 were moderate.

Smoke management also monitors smoke impacts on protected areas in Northeast Oregon. Only one intrusion into a Northeast Oregon protected area occurred, as shown in Table 2b. Analysis of data collected by nephelometers operated by the Forest Service and Oregon Department of Environmental Quality did not reveal any other identifiable impacts into NE Oregon protected areas.

Minimizing Emissions:

One of the goals of the Smoke Management Plan and the Visibility Protection Plan for class I areas is to reduce total suspended particulate (TSP) emissions from prescribed burning in western Oregon. Figure 4A shows the estimated TSP emissions resulting from prescribed burning on forestland in Oregon since 1979. There were

approximately 11,583 tons of TSP produced in 1998 in western Oregon compared to an average of 57,000 tons in the 1976-79 baseline period.

Estimates are not available for eastern Oregon prior to 1987 since burning information was not collected before then in the smoke management data system. Since 1987, burning has produced between 11,000 and 34,000 tons of TSP per year. There were approximately 32,376 tons produced in 1998.

Programs to increase prescribed burning in eastern Oregon in order to decrease fuel loading on federal forest land are developing. The goal of this increase is to reduce the frequency and severity of wildfires in the forests. Forest health type of burning has increased slowly over the last few years. Less burning occurred in 1998 than had been planned due to weather and forest conditions. An extremely wet spring delayed the beginning of burning. Once moisture conditions were favorable for burning, only a brief period of burning was possible before new, easily damaged, growth emerged on the trees.

It is expected that in the long term emissions from wildfires will be reduced as a result of planned burning. National forests have been analyzing the tradeoff effects of prescribed burning smoke impacts versus wildfire smoke impacts. The intent is to conduct necessary prescribed burning while complying with the smoke management plan, minimizing impacts, and maintaining air quality.

Emission estimates from wildfires on forestland in the state are shown in Figure 4B. Wildfire activity was near record low levels during 1998. This burning created 5,680 tons of TSP. As the chart shows, wildfire emissions are highly variable. The low emissions during 1998 reflect the reduced number of wildfires due to above average rainfall through most of the fire season.

Burning and Particulate Violations

There were no violations of either the annual or 24-hour PM10 (particulate matter 10 micrometers or less in diameter) air quality standards during 1998. This was the second consecutive year with no standards violations statewide. Special protection zones remain in effect around Medford,

Oakridge, Lakeview, LaGrande and Klamath Falls.

These are areas where additional discretion is used when conducting prescribed burning during the winter months. Emissions from woodstoves have created higher particulate concentrations in past years, so strategies were developed to minimize contributions from forestry related burning.

PM2.5 standards, adopted in 1997, are expected to have the greatest impact on the control of fine particles from combustion sources. Meeting the annual standard is projected to be a greater concern in Oregon than complying with the 24-hour standard. Estimates are that the existing annual concentrations are closer to exceeding the standard than are 24-hour concentrations. It is anticipated that any pollution control strategies needed to comply with the standards will be developed in conjunction with regional haze rules EPA expects to adopt in 1999.

The PM2.5 standards are 15ug/m³ for the annual average and 50 ug/m³ for the 24-hour average. The degree to which existing air quality in Oregon complies with these standards will not be known until monitoring occurs during the next several years.

On April 15th, 1998 an unusually intense dust storm began in the western China. Dust from this event was transported across the Pacific Ocean, reaching the Pacific Northwest around April 26th. Very little impact was noted on nephelometer readings which remained near background levels. However, the dust created hazy conditions throughout the region. As a result, land managers voluntarily curtailed burning to prevent exaggerating the haze. The dust finally dissipated during the first few days of May.

Protection of Visibility:

The visibility protection program safeguards selected wilderness areas and national parks from visibility degradation during the summer. This program prohibits burning in locations that could impair visibility in the Federal Class I wilderness areas during the summer except under certain weather conditions.

During the late spring of 1998, most of Oregon experienced abnormally heavy precipitation (Figures 13A and 13B). Due to excessively wet conditions during the spring, an exemption from

the Visibility Protection Plan ban on burning was approved. The exemption permitted burning Monday through Thursday from July 6 through July 23.

Table 3 summarizes the burning conducted during the visibility protection period. Seventeen units were burned in the Coast Range for a total of 652 acres. In the Cascade Range, 372 acres were burned in 23 units during the exemption period. No Cascade Range units were burned outside of this period.

During the visibility protection period visibility impacts in the Class 1 areas from all sources occurred 16% of the time, as shown in figure 5. Only seven hours of moderate impact were recorded at the monitoring sites during the July forestry burning exemption period.

PROGRAM SUMMARY

Audits:

The Oregon Smoke Management Plan requires an annual audit of approximately one-percent of the slash burns conducted in the restricted area. Approximately one-half of the audits are conducted on the day of the burn and one-half are conducted before the burn. The purpose of these audits is to help monitor the effectiveness of the Oregon Smoke Management Program.

Pre-burn audits were conducted on randomly selected, registered units before burning. Ten pre-burn audits were desired and 13 were completed. Burn day audits were conducted on the day the units were burned. These units were also randomly selected by the auditors. Nine burn day audits were desired and seven were completed.

Overall, the audit program had another successful year. All audited units were burned in a manner consistent with the burn permits, burn plans and written and verbal instructions in regard to air quality. The great majority of units audited were very close in reported tonnage burned vs. audited consumption.

Forest Health in Northeast Oregon

ODF issues daily forecasts and smoke management instructions during Northeast Oregon prescribed burning seasons. Federal agencies use these

instructions to conduct burning, track the amount of prescribed burning conducted in the area, and monitor smoke behavior resulting from burning. All agencies participate in smoke and particulate monitoring to minimize smoke impacts. Communities identified for protection include Baker City, Burns, Enterprise, John Day, La Grande, and Pendleton. Federal agencies report prescribed burning plans and accomplishments into the smoke management data system daily.

Northeast Oregon Emissions and Fuels Management

Forest health burning on federal land in northeast Oregon decreased to 36,585 acres in 1998; down from the 58,480 acres treated in 1997. However, this is a long-term fuels management program and annual variations due to weather and forest conditions will occur. Overall, the expected trend is for an increase in burning. One of the expectations of the fuels management program though is that there will be a decrease in the particulate emissions produced from wildfire as an offset to the increased emissions from prescribed burning.

A PM10 emission cap was incorporated into the Smoke Management Plan in 1994. The cap affects burning in northeast Oregon national forests. The emissions cap on such burning was the first in the country. It was developed to address the concern about air quality impacts that may result from the fuels management program. The annual PM10 emissions from the Malheur, Ochoco, Umatilla and Wallowa-Whitman national forests are limited to 15,000 tons per year. The forests determine any allocations of the emissions to each forest within this limit.

The PM10 emissions from the four forests for the past five years are shown in the table below. The reduction in acres burned in 1998 is also reflected in decrease in the amount of PM10 emissions. The 1998 total of 4950 tons is approximately 30 percent of the amount allowed under the cap. The fuels management program is just beginning, so trends in emissions as a result of the program should begin emerging in several years. The full effect of the program may not be seen for 10 to 20 years.

PM10 Emissions (Tons) from Northeast Oregon National Forests

	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>
Malheur	456	1,635	1,930	3,553	1,882
Ochoco	240	1,271	928	2,047	1,206
Umatilla	1,323	330	881	2,073	996
Wallowa-Whitman	731	549	603	1,590	866
Total	2,749	3,785	4,341	9,263	4950

Meteorology

Forecast responsibilities in 1998 included providing weather forecasts and burning instructions and advisories for western Oregon (restricted area), federal lands in northeast Oregon, and voluntary areas around Klamath Falls, La Grande, and Lakeview. ODF meteorologists provided assistance to the Klamath Falls and Lakeview woodstove smoke control programs. Through a cooperative agreement with DEQ they continued making the open burning forecast for the Willamette Valley north of Lane County during the period that field burning was not being conducted.

Other forecast services included weather support for forestry fertilization and insect and disease programs. Significant weather event (heavy rain, wind, etc.) notifications were also issued. Weather briefings are also supplied to the Oregon Emergency Management office as needed during emergency events.

This was the second winter ODF meteorologists provided debris flow watches and warnings for potential landslides in the Coast Range mountains caused by excessively heavy rains. One debris flow watch was issued on November 24 for heavy rain in the Coast Range.

PROGRAM ACCOMPLISHMENT DATA:

The tables and figures in this report highlight the results of the 1998 smoke management program. The data reflects the continuing decrease in burning in Western Oregon and the gradual increase in burning in eastern Oregon.

Figure 1B

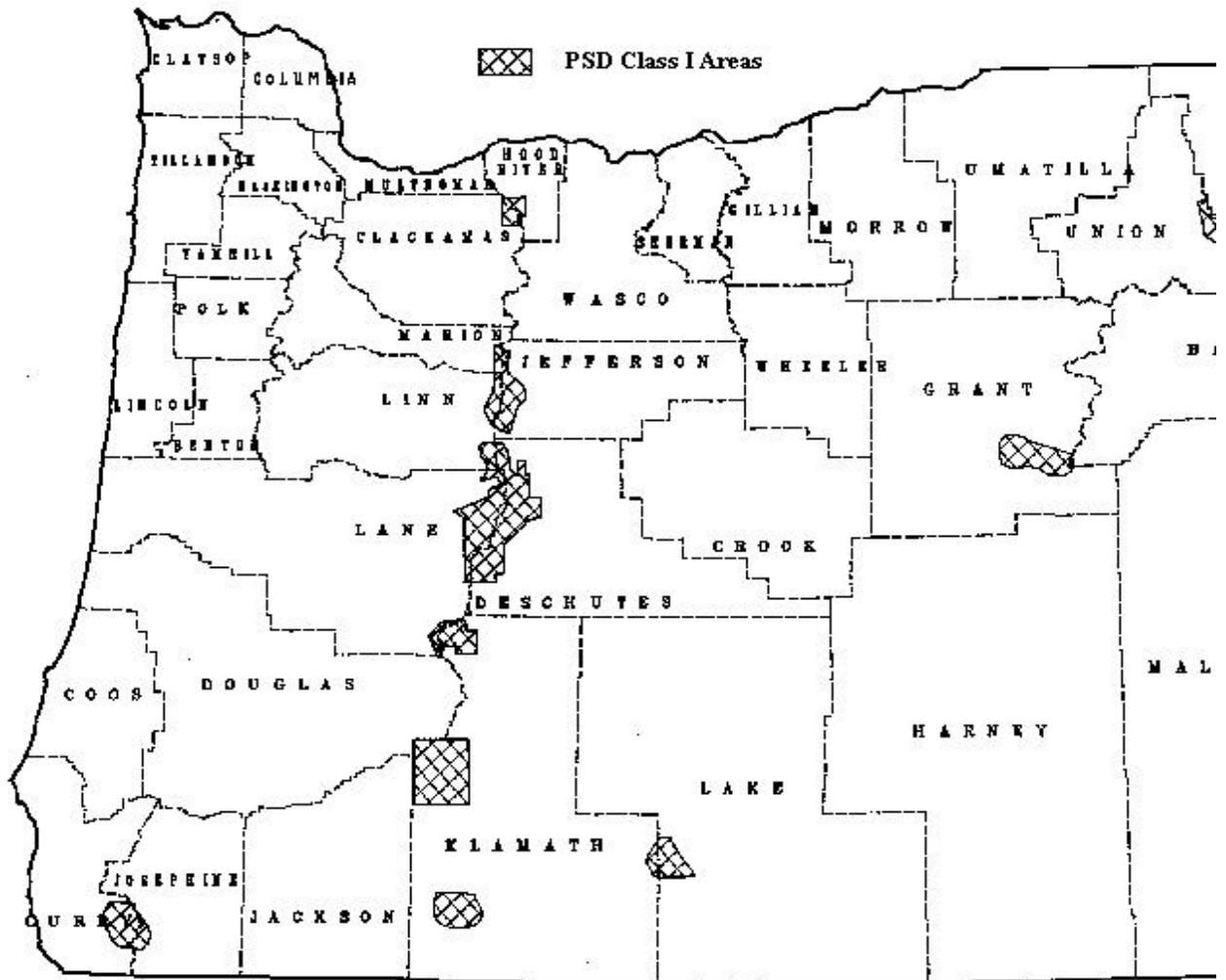


TABLE 1
1988-1997 ACCOMPLISHMENT SUMMARY

Burning totals within the restricted area:

Year	Total No. Units	No. Units Burned	Acres Burned	Tons Burned	No. Intrusions
1989	5,511	4,682	108,648	2,649,523	20
1990	6,541	4,012	84,746	1,930,279	14
1991	4,625	2,934	57,585	1,348,631	14
1992	3,686	2,568	48,039	1,168,032	10
1993	3,990	2,824	59,653	1,112,184	7
1994	3,351	2,260	38,366	824,523	7
1995	3,408	2,498	43,237	751,373	6
1996	3,041	2,205	38,755	766,414	6
1997	3,334	2,454	45,641	888,723	4
1998	3,092	2,313	47,494	809,729	3
Average	4,058	2,614	57,216	1,224,941	8

Burning totals outside of the restricted area:

Year	Total No. Units	No. Units Burned	Acres Burned	Tons Burned
1989	1,655	1,519	114,311	1,831,726
1990	1,414	989	79,146	841,472
1991	1,869	916	65,588	765,282
1992	1,528	1,110	76,154	1,060,863
1993	2,140	1,392	132,832	1,452,155
1994	1,749	867	66,360	868,346
1995	2,455	1,482	154,948	780,501
1996	1,699	880	98,799	740,972
1997	1,861	1,049	138,699	1,036,111
1998	1,379	742	128,654	1,730,481
Average	1,775	1,095	105,549	1,110,791

Figure 2A

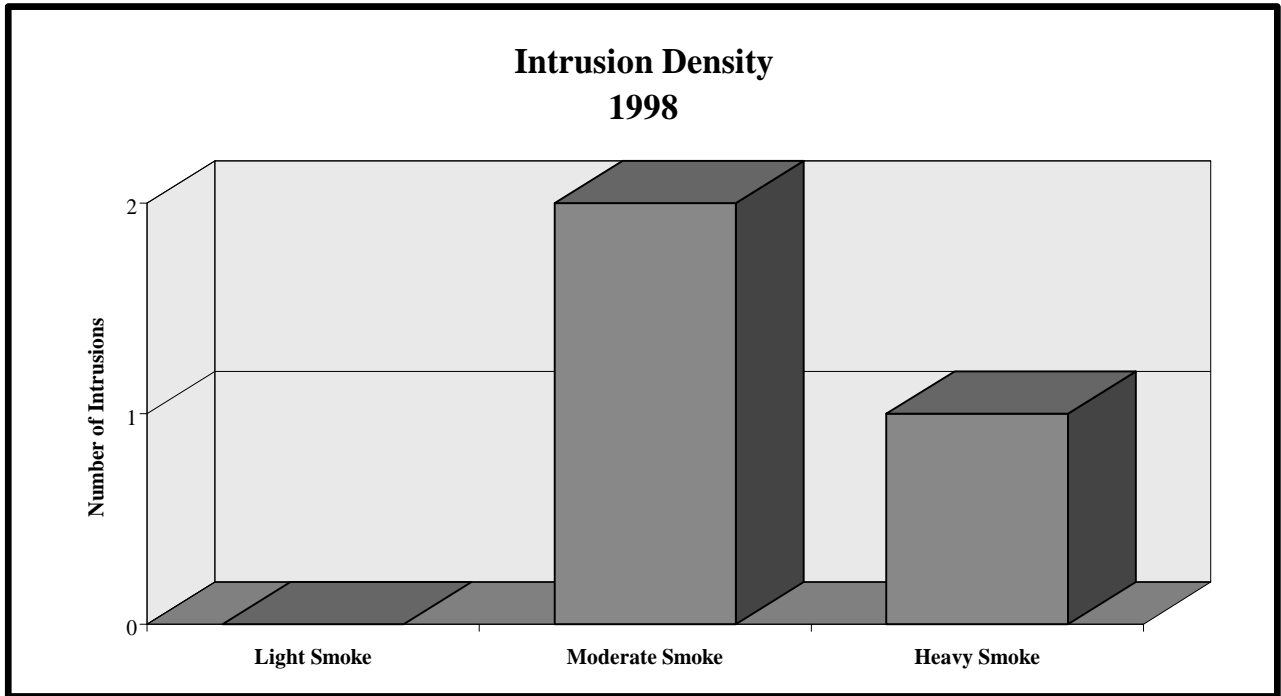


Figure 2B

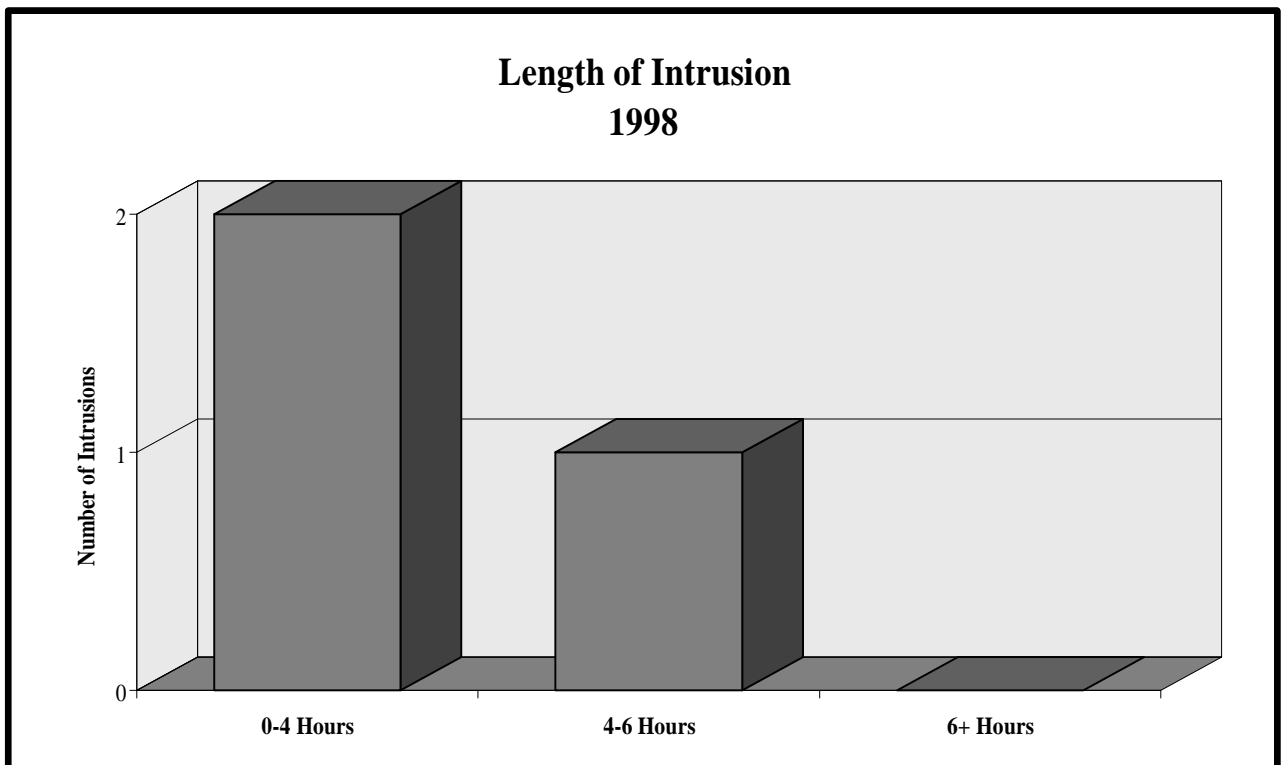


Figure 3A

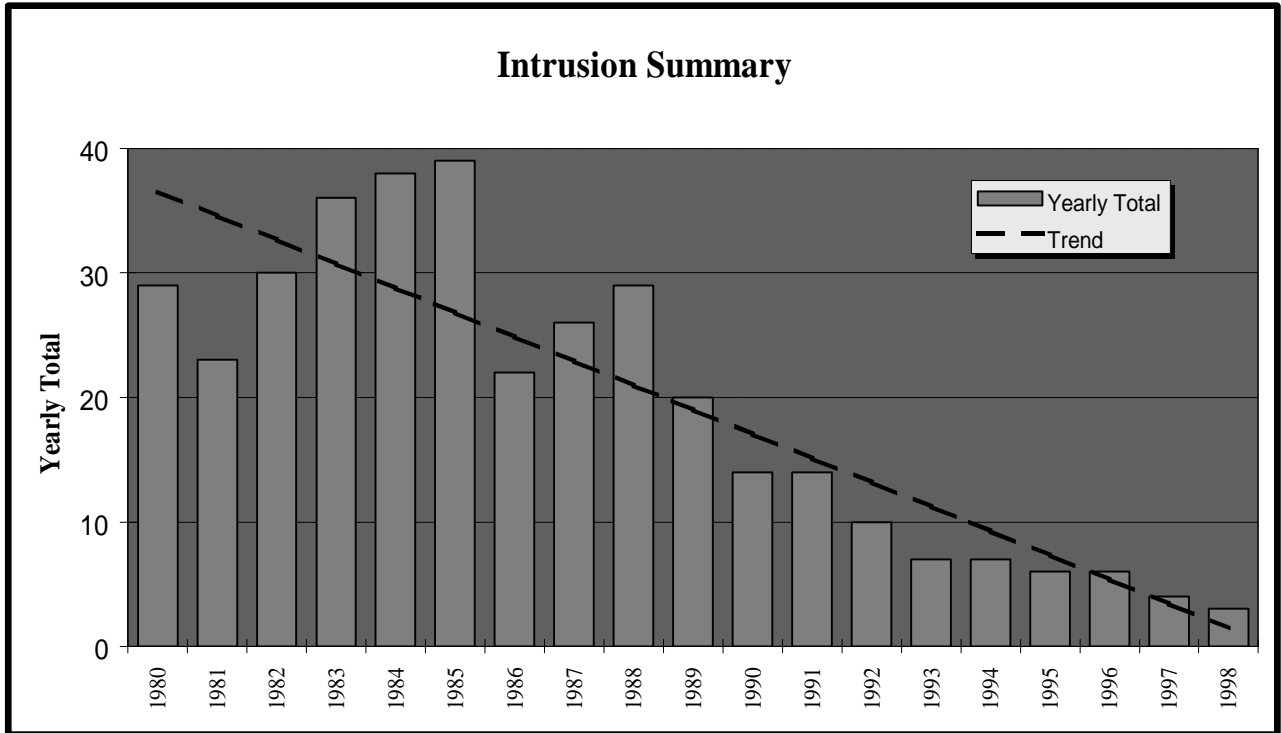


Figure 3B

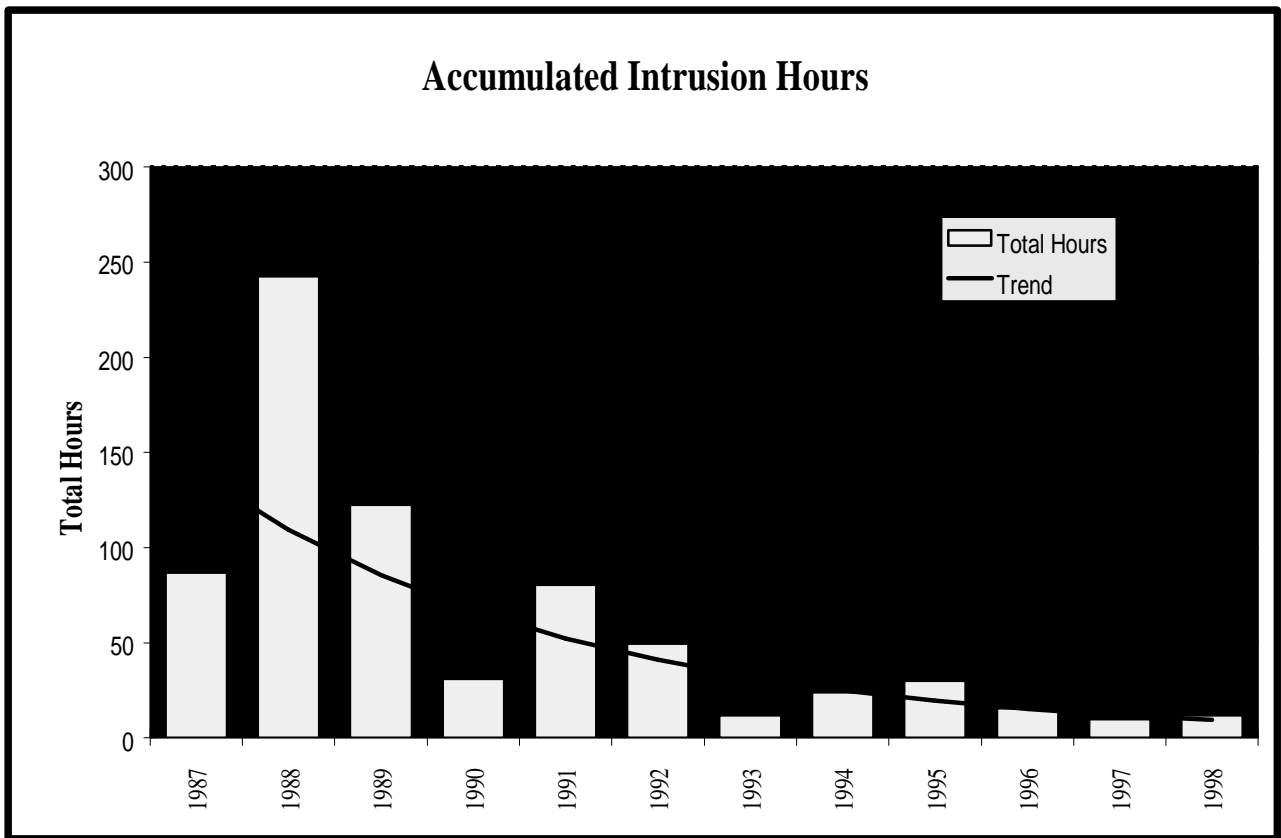


TABLE 2a

SMOKE INTRUSION SUMMARY – 1998

Restricted Area

Date	District/ Forest	Primary Area Affected	Unit #	Owner Class	Intensity	Length
June 4	DFPA	Grants Pass	97-730-70474-01	Private	Moderate	6 Hrs
July 14	West Oregon (Toledo)	McMinnville/ Forest Grove	98-553-34064-01	Private	Heavy	4 Hrs
July 15	West Oregon (Toledo)	Dallas	98-553-37238-04	Private	Moderate	2 Hrs

TABLE 2b

PROTECTED AREA SMOKE INTRUSION SUMMARY – 1998

Non-Restricted Area

Date	Forest	Area Affected	Owner Class	Intensity	Length
Oct 1	Wallowa-Whitman	Baker City	USFS	Moderate	2 Hrs

Figure 4A

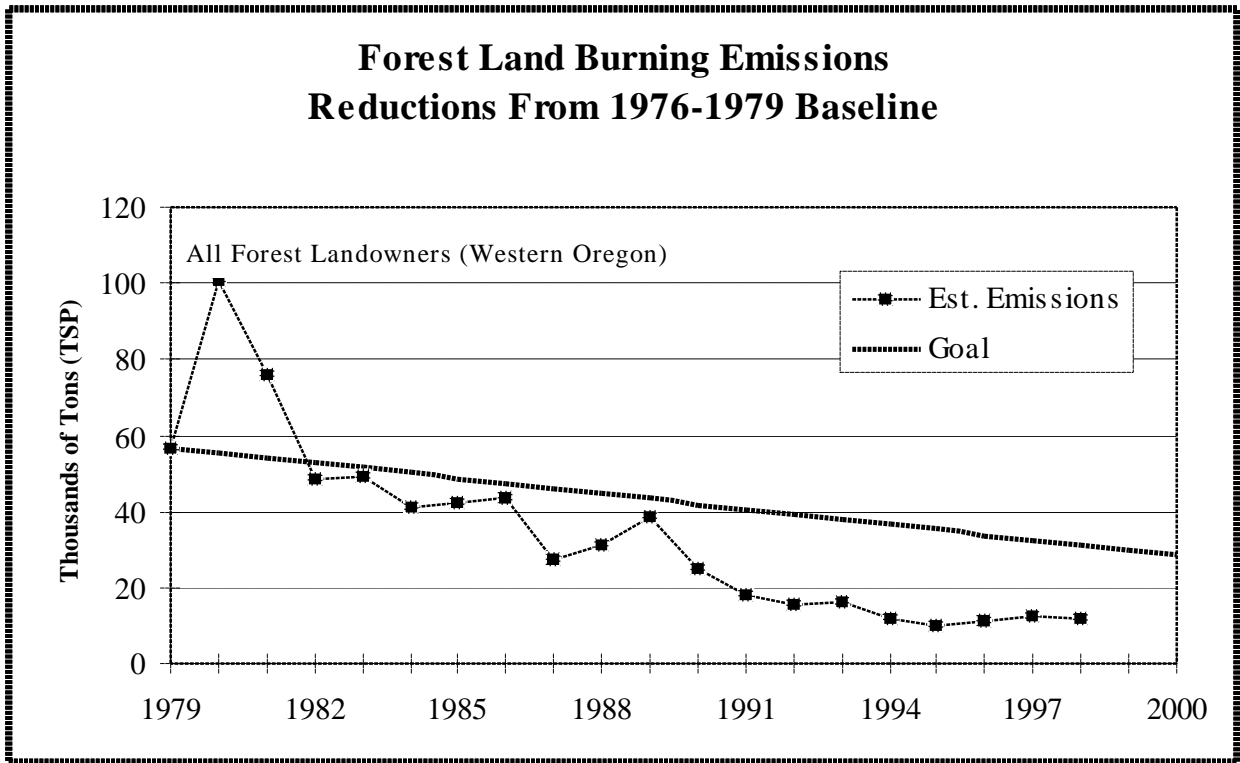


Figure 4B

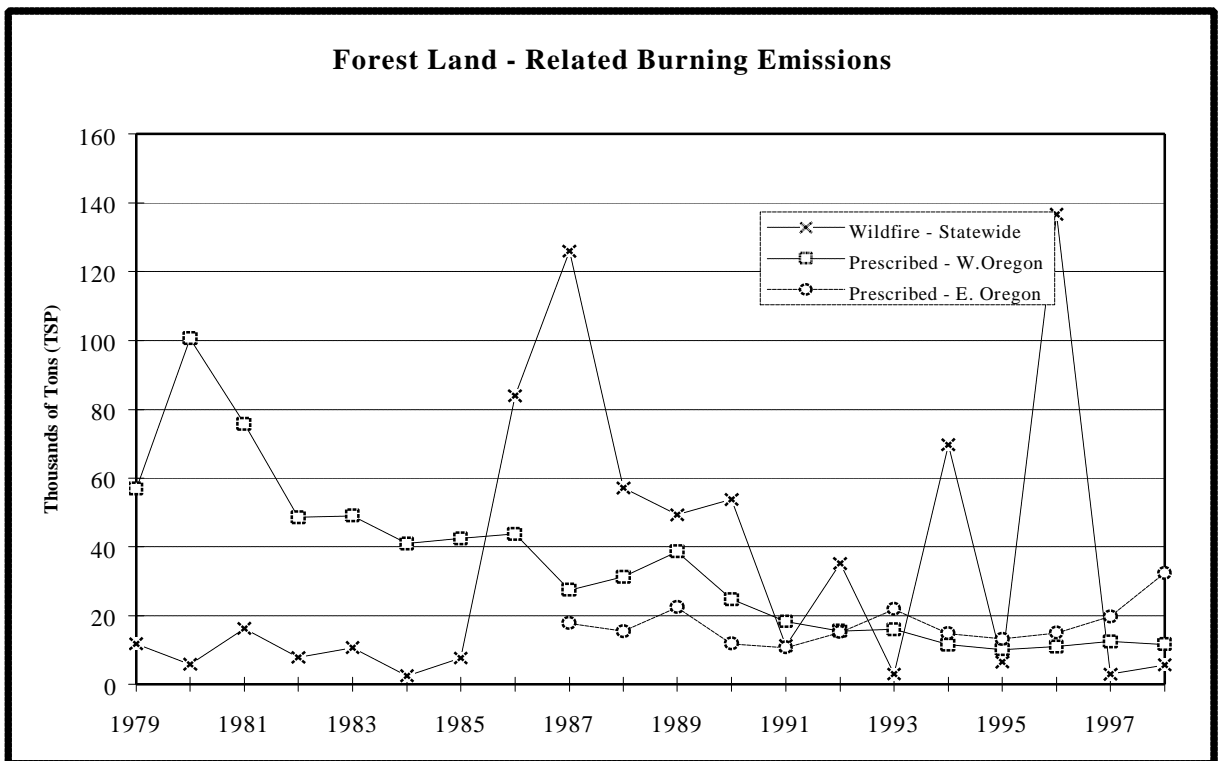


Table 3
Class 1 Area Visibility Protection Period Burning

Year	No. of Units	Cascade Range	Tons	No. of Units	Coast Range	Tons
		Acres			Acres	
1985	38	579	12,763	125	4,652	56,953
1986	91	1,494	42,809	62	1,504	17,573
1987	20	840	14,564	75	2,483	78,717
1988	11	178	7,107	71	1,921	53,153
1989	3	19	1,268	40	748	17,917
1990	3	50	1,736	48	1,349	39,975
1991	30	805	24,588	83	2,468	76,908
1992	1	32	1,260	1	1	120
1993	46	1,056	29,824	98	2,594	67,390
1994	0	0	0	10	428	9,921
1995	2	80	1,500	6	193	4,431
1996	0	0	0	9	665	14,568
1997	0	0	0	20	430	10,170
1998	23	372	12,418	17	652	9,158

Notes:

1. The Visibility Protection Period is defined to be from July 1 through September 15. Before 1992 the Visibility Protection Period was from July 4 through Labor Day.
2. The Cascade Range area includes the following districts and forests: Clackamas-Marion, East Lane, Linn, Mt. Hood NF, and the Willamette NF.

The Coast Range area includes the following districts and forests: Astoria, Forest Grove, Tillamook, West Oregon, West Lane, and the Siuslaw NF.

3. A change in tonnage consumption reporting was established in 1987. Prior year's data was adjusted to conform to the current procedure.
4. An exemption was granted to allow burning in the Cascade Range through July 26, 1998 due to extremely wet conditions during the spring. All Cascade burning was conducted during this exemption period.

Figure 5

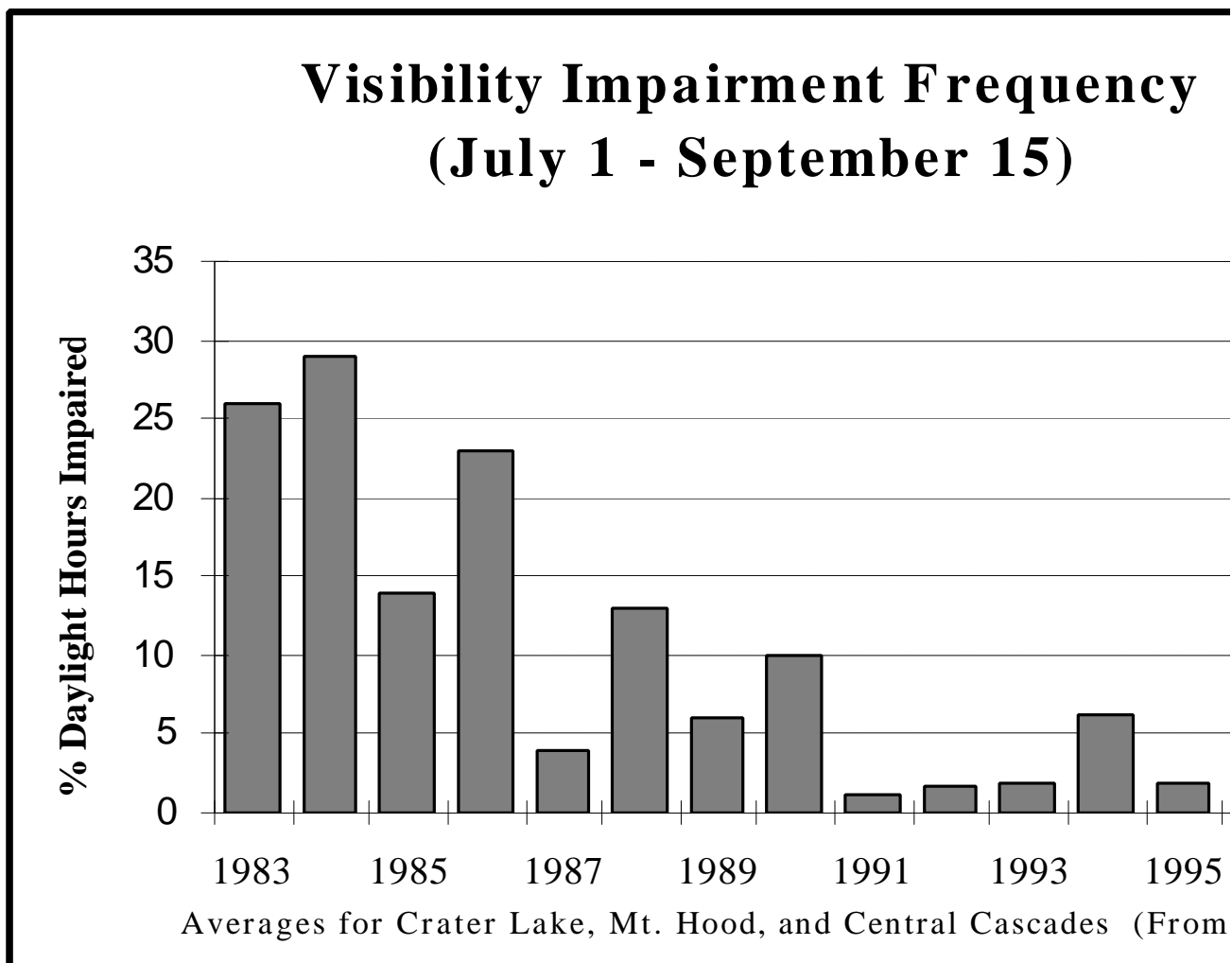


Figure 6

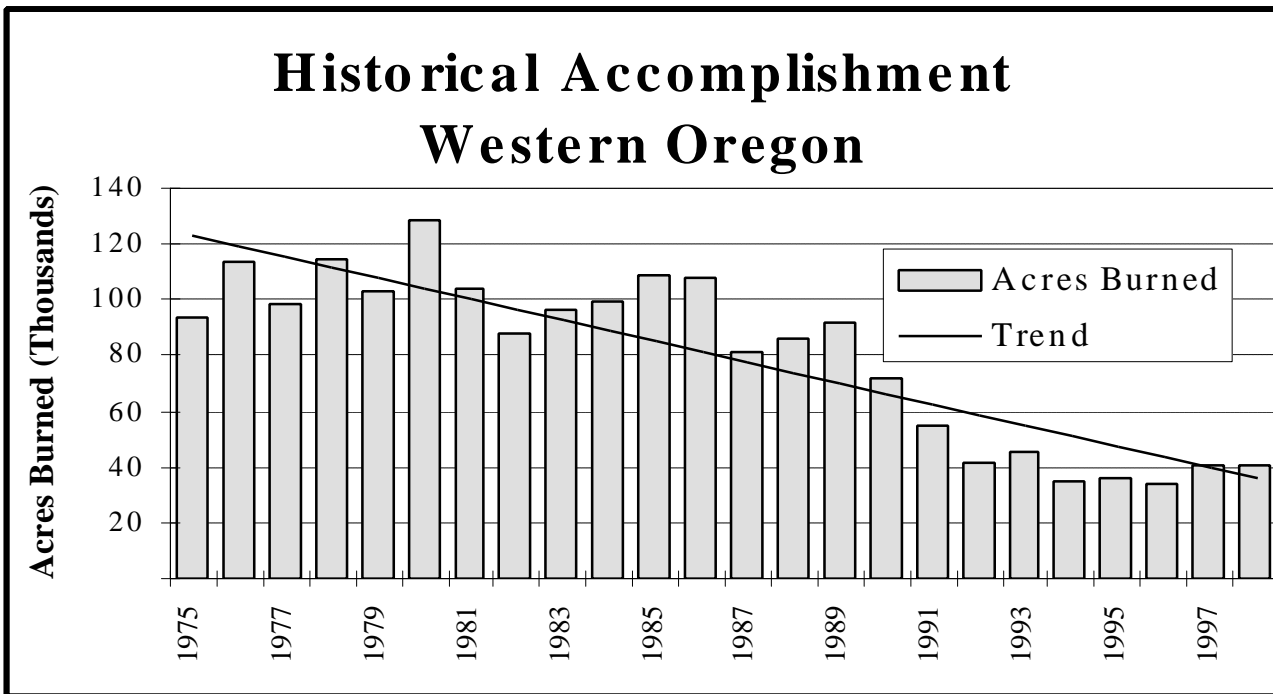


Figure 7

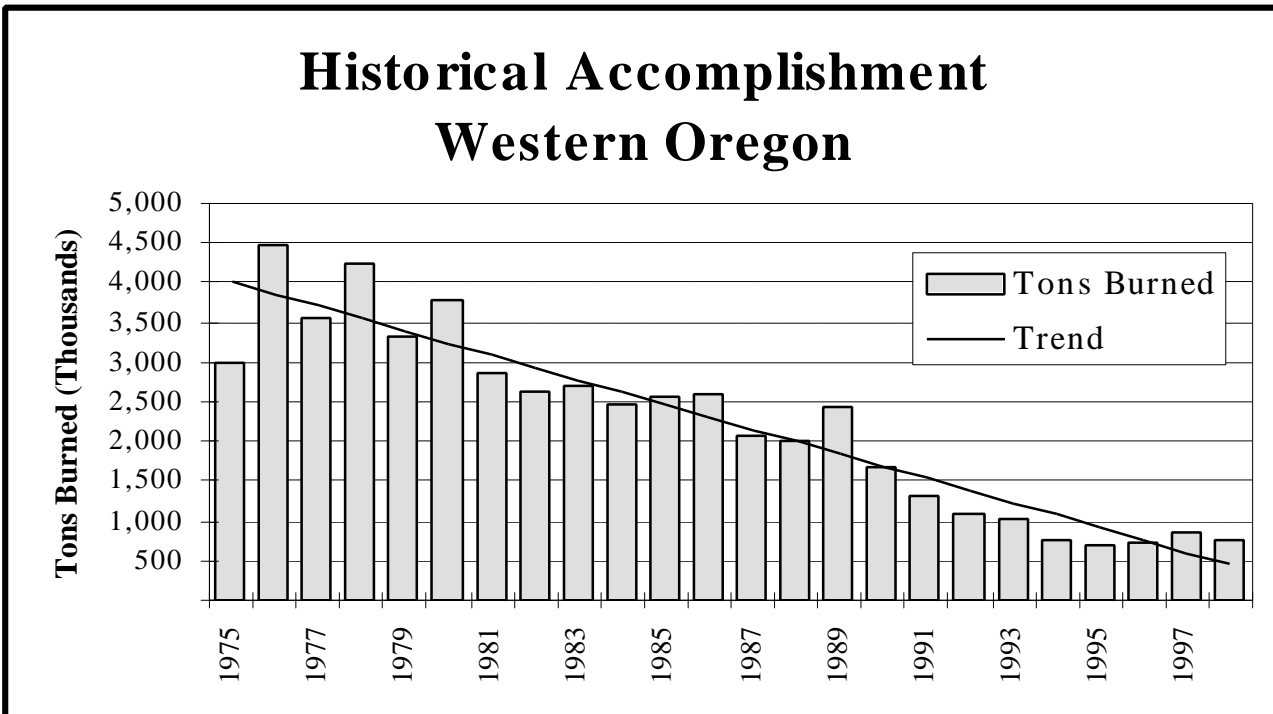


Figure 8A

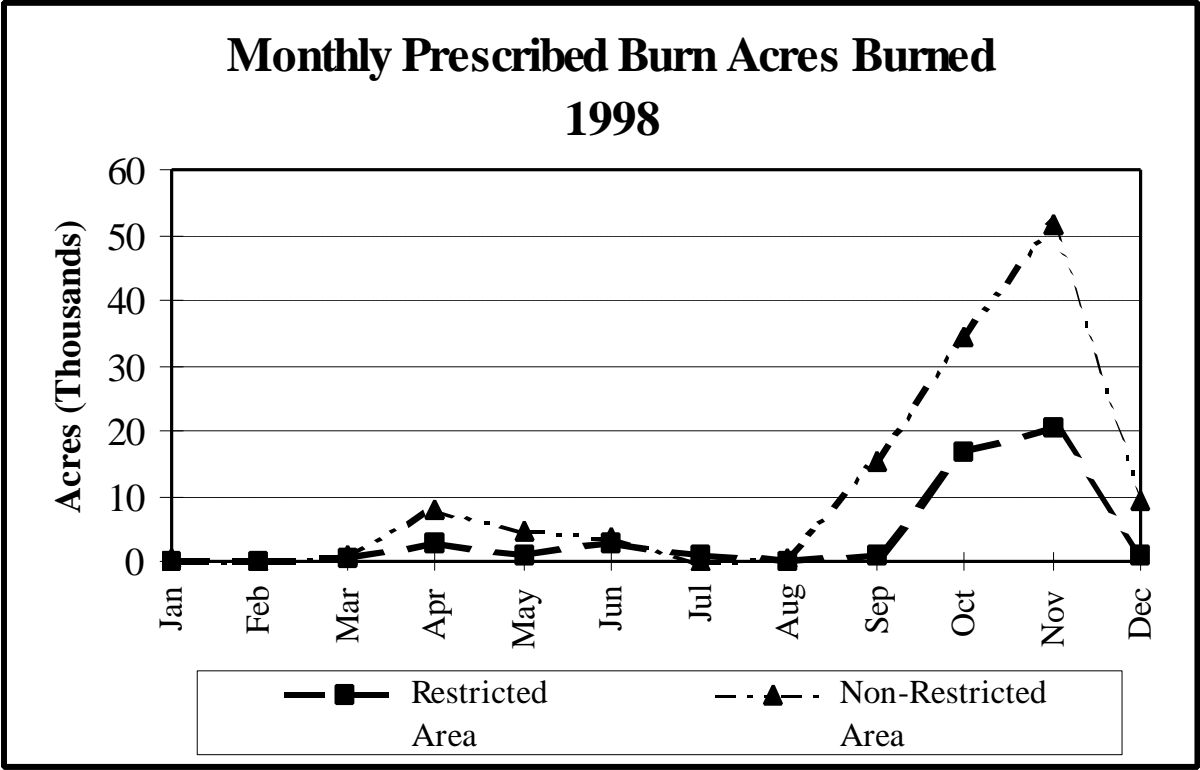


Figure 8B

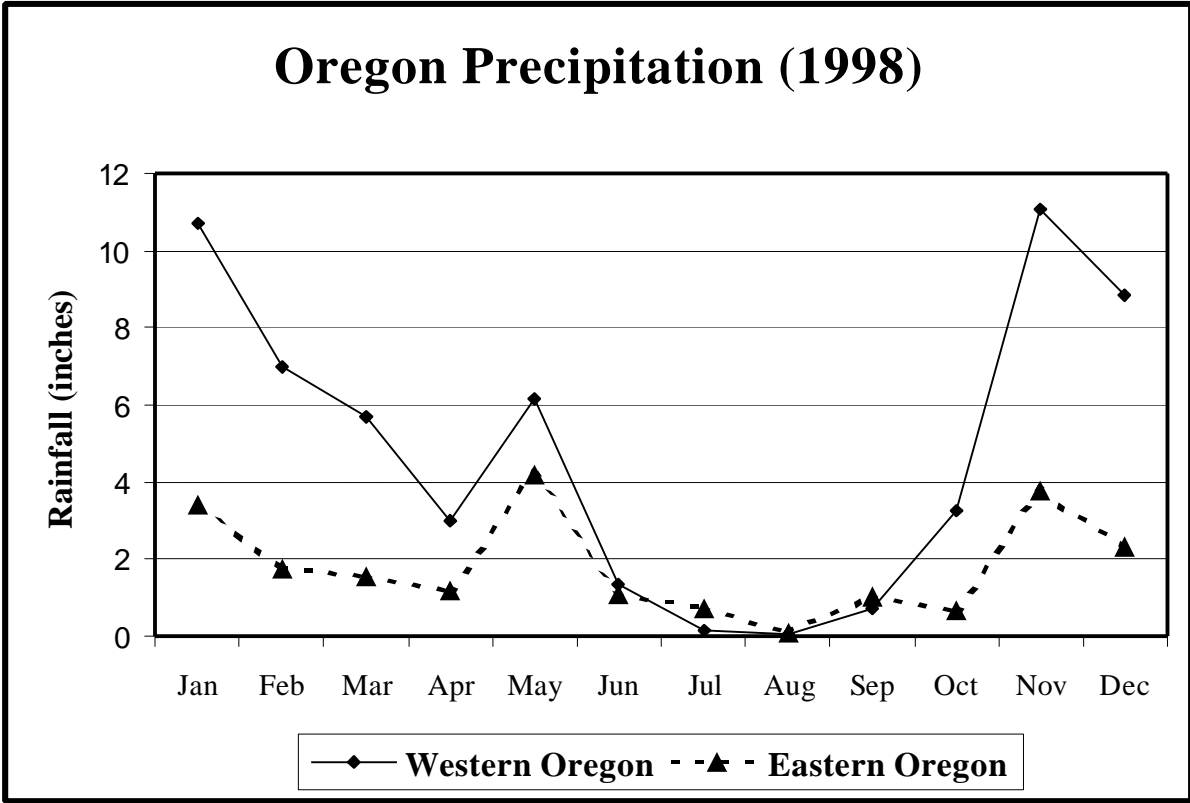


Figure 9

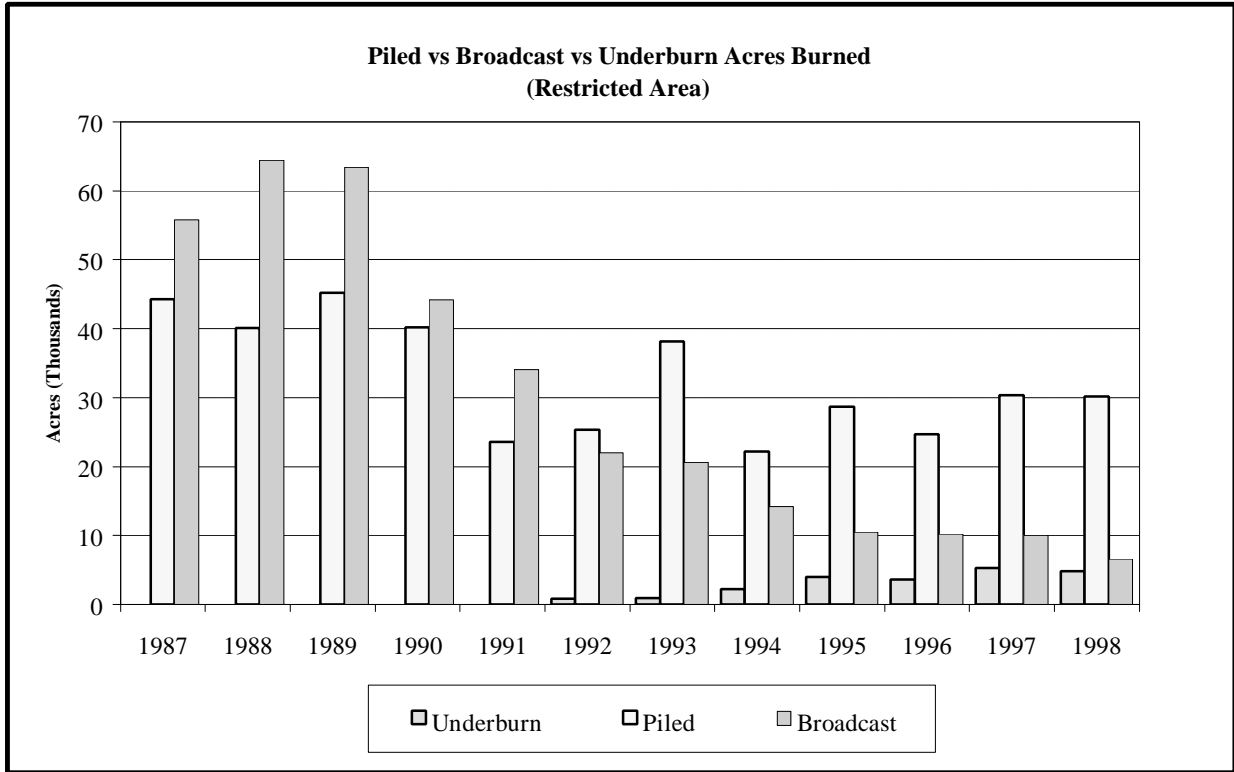


Figure 10

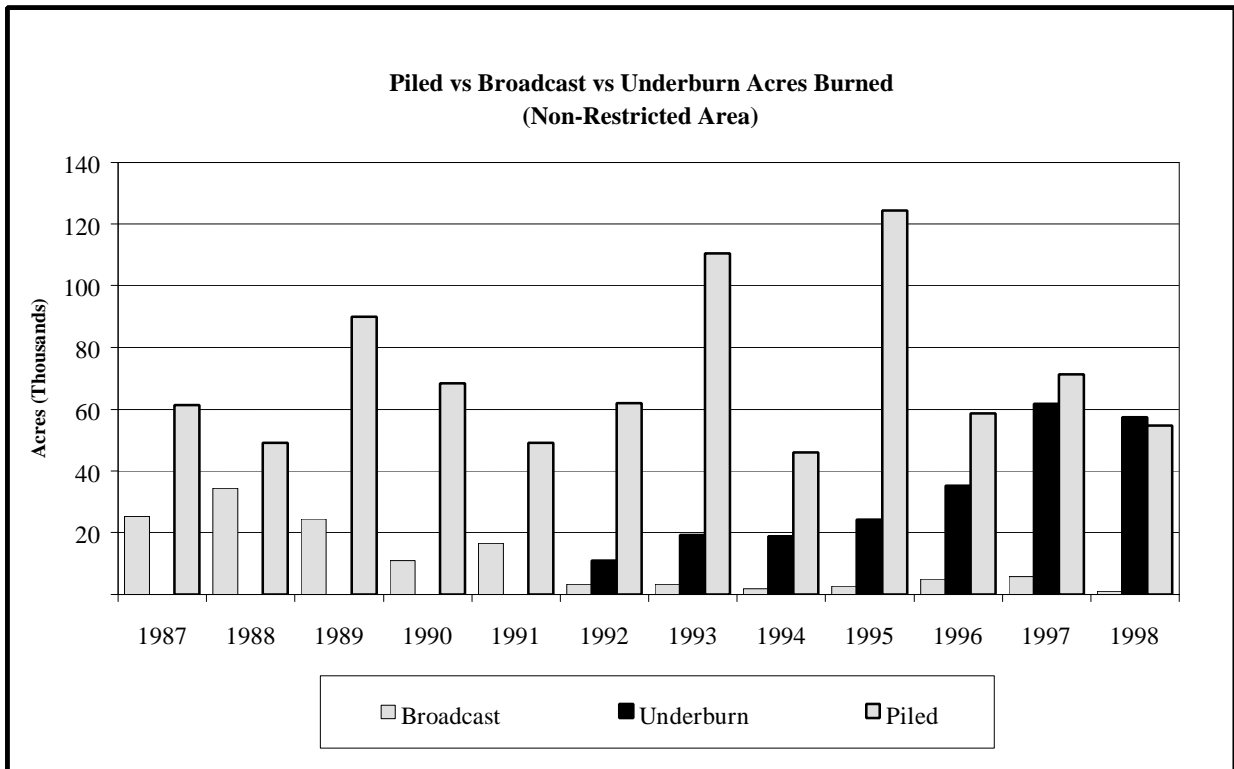


Table 4A
BURN SUMMARY BY DISTRICT -- 1998
(Restricted Area)

District/Forest	Units Burned	Acres Burned	Tons Burned
Astoria	35	1,099	33,871
Clackamas-Marion	25	573	14,615
Coos FPA	406	6,264	177,600
Douglas FPA	193	2,724	43,584
East Lane	142	2,853	66,472
Forest Grove	107	2,512	51,284
Linn	89	3,427	74,490
Southwest	265	5,697	38,816
Tillamook	13	471	1,934
West Lane	197	3,981	61,294
West Oregon	214	6,295	114,046
Klamath NF	6	79	2,706
Mt Hood NF	12	450	9,393
Rogue River NF	63	916	7,077
Siskiyou NF	24	425	5,226
Siuslaw NF	8	441	3,408
Umpqua NF	47	1,421	20,275
Willamette NF	78	952	33,941
Deschutes NF	389	6,914	49,697
TOTAL	2,313	47,494	809,729

TABLE 4B
BURN SUMMARY BY DISTRICT – 1998
(Non-Restricted Area)

District/Forest	Units Burned	Acres Burned	Tons Burned
Central Oregon	94	26,666	1,032,813
Klamath-Lake	118	15,461	309,233
Northeast	83	10,020	20,770
Walker Range	11	15,130	7,996
Fremont NF	17	16,785	98,442
Malheur NF	95	10,600	80,397
Ochoco NF	82	10,065	45,161
Umatilla NF	27	7,473	53,926
Wallowa-Whitman NF	138	8,927	51,479
Winema NF	77	7,527	30,264
TOTAL	742	128,654	1,730,481

Table 5A
Tons Burned by Month by District
1998
(Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Astoria			16	196	5	2,170				4,624	
Clack-Marion					376	2,929	2,673			8,130	
Coos	4,922	1,495	1,625	11,330	2,654	22,774	5,128			41,960	
Douglas		69	55	2,397		2,124			20	24,013	
East Lane										34,138	
Forest Grove	595	417	254						1,280	21,604	
Linn							3,595			65,135	
Southwest			1,045	1,418	285	150				2,437	
Tillamook					300					1,234	
West Lane		17	515	1,541	311	3,216				34,944	
West Oregon	360			7,385	176	5,460	5,990		3,348	69,101	
Klamath NF						1,910				796	
Mt Hood NF					820	300				80	
Rogue River NF				1,144		266				665	
Siskiyou NF				3,393	400	250			509	161	
Siuslaw NF								64	3,184	90	
Umpqua NF			781	912	1,725	2,457	1,661			9,234	
Willamette NF				817		3,425	6,150			17,477	
Deschutes NF			176	2,338	1,890	23,310			910	3,435	
District Total	5,877	1,998	3,510	24,267	4,107	38,823	17,386	0	4,648	307,320	239,
Forest Total	0	0	957	8,604	4,835	31,918	7,811	64	4,603	31,938	36,
Grand Total	5,877	1,998	4,467	32,871	8,942	70,741	25,197	64	9,251	339,258	276,

Table 5B
Tons Burned by Month by District -- 1998
(Non-Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Central Oregon	176			8,910						160,875	7
Klamath-Lake				4,200						254,509	
Northeast		200	1,270	109	2,925	107	205			6,171	
Walker Range										470	
Crater Lake NP											
Fremont NF				22,742	2,000	11,425			2,000	60,275	
Malheur NF	750	86		5,000		8,409			20,864	19,677	
Ochoco NF			794	3,972	400			480	8,500	15,336	
Umatilla NF				880	7,935	1,761			34,240	9,086	
Wallowa-Whitman NF			40	1,437	1,573	69			19,757	19,013	
Winema NF				3,650		4,050				1,170	
District Total	176	200	1,270	13,219	2,925	107	205	0	0	422,025	827
Forest Total	750	86	834	37,681	11,908	25,714	0	480	85,361	124,557	68
Grand Total	926	286	2,104	50,900	14,833	25,821	205	480	85,361	546,582	895

Table 6A
Acres Burned by Month by District -- 1998
(Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Astoria			1	9	2	107				92	77
Clack-Marion					24	104	120			305	20
Coos	35	33	67	658	158	987	188			1,149	2,74
Douglas		2	5	190		129			1	1,446	88
East Lane										1,532	1,32
Forest Grove	17	45		10					40	1,093	88
Linn							119			2,873	43
Southwest			252	322	53	10				276	4,74
Tillamook					3	418	50				
West Lane		12	27	104	51	130				2,003	1,65
West Oregon	18			534	12	318	316		156	3,832	1,10
Klamath NF						35				44	
Mt Hood NF					5	20				8	25
Rogue River NF				311		89				101	39
Siskiyou NF				166	3	14			230	7	
Siuslaw NF								32	384	7	1
Umpqua NF			17	81	150	76	52			632	40
Willamette NF				43		107	133			366	30
Deschutes NF			60	408	330	840			110	508	4,65
District Total	70	92	352	1827	303	2203	673	0	276	16,185	14,55
Forest Total	0	0	77	1009	488	1,181	185	32	724	1,673	6,03
Grand Total	70	92	429	2,836	791	3,384	858	32	1000	17,858	20,58

Table 6B
Acres Burned by Month by District – 1998
(Non-Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Central Oregon	150			495						2,928
Klamath-Lake				60						10,226
Northeast		53	540	129	862	37	153			1,758
Walker Range										900
Crater Lake NP										
Fremont NF				3,367	2,000	2,285			2,000	7,133
Malheur NF	96	25		1,250		667			3,427	2,687
Ochoco NF			174	1,130	116			480	3,700	2,654
Umatilla NF				310	1,361	116			4,455	1,217
Wallowa-Whitman NF			10	137	367	26			1,918	3,066
Winema NF				820		424				1,731
District Total	150	53	540	684	862	37	153	0	0	15,812
Forest Total	96	25	184	7,014	3,844	3,518	0	480	15,500	18,488
Grand Total	246	78	724	7,698	4,706	3,555	153	480	15,500	34,300

TABLE 7A
TONS BURNED BY MONTH WITHIN COUNTY -- 1998
(Restricted Area)

COUNTY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Benton	0	0	0	0	0	1,126	230	48	400	23,143
Clackamas	0	0	0	0	820	1,066	2,673	0	0	365
Clatsop	0	0	16	196	5	2,170	0	0	0	11,362
Columbia	595	0	0	0	0	0	0	0	0	13,019
Coos	4,922	1,517	789	9,668	1,143	14,831	4,864	0	0	32,202
Curry	0	0	932	6,943	40	0	0	0	243	7,873
Deschutes	0	0	472	1,495	0	0	0	0	0	1,225
Douglas	0	69	1,080	5,723	2,880	10,887	1,925	0	20	38,592
Hood River	0	0	0	0	0	0	0	0	0	15
Jackson	0	0	492	1,435	0	2,176	0	0	0	3,929
Jefferson	0	0	0	1,250	150	1,307	0	0	910	1,006
Josephine	0	0	589	1,091	245	400	0	0	266	162
Klamath	0	0	0	1,394	130	24,132	0	0	0	1,457
Lake	0	0	0	444	0	0	0	0	0	0
Lane	18	17	535	2,587	271	6,714	1,498	75	3,080	73,260
Lincoln	360	0	0	6,609	0	620	5,490	16	2,188	22,751
Linn	0	0	0	0	0	1,069	6,009	0	0	82,491
Marion	0	0	0	817	376	1,863	2,238	0	0	7,716
Multnomah	0	0	0	0	0	0	0	0	0	0
Polk	0	0	0	1,837	0	1,730	0	0	0	17,550
Tillamook	0	0	0	0	300	20	320	0	29	3,381
Wasco	0	0	0	0	0	300	0	0	0	0
Washington	0	0	0	254	0	0	0	0	0	1,388
Yamhill	0	417	0	564	176	2,113	0	0	2,920	11,510
TOTAL	5,895	2,020	4,905	42,307	6,536	72,524	25,247	139	10,056	354,397

TABLE 7B**TONS BURNED BY MONTH WITHIN COUNTY -- 1998
(Non-Restricted Area)**

COUNTY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Baker	0	0	1,000	42	828	0	0	0	6,870	7,176	8,636
Crook	176	0	794	14,148	220	0	0	0	2,500	10,530	7,136
Deschutes	0	0	0	0	0	0	0	0	0	0	13,689
Grant	750	86	0	12,000	10,440	8,026	0	0	14,254	170,230	16,013
Harney	0	0	0	1,600	40	3,033	0	0	6,000	6,627	21,072
Hood River	0	0	0	0	0	0	0	0	0	2,444	9,136
Jefferson	0	0	0	0	0	0	0	0	0	0	200
Klamath	0	0	0	120	0	0	0	480	0	0	520
Lake	0	0	0	67,314	1,350	42,583	0	0	0	235,729	56,666
Morrow	0	0	0	0	2,000	0	0	0	2,000	33,635	3,118
Umatilla	0	0	0	80	711	0	0	0	32,840	1,416	775,156
Union	0	0	0	800	1,074	1,761	0	0	0	7,595	939
Wallowa	0	200	270	54	356	176	5	0	234	6,374	1,581
Wasco	0	0	40	1,450	3,314	0	200	0	17,587	7,579	6,022
Wheeler	0	0	0	0	0	0	0	0	0	0	49,878
TOTAL	926	286	2,104	97,608	20,333	55,579	205	480	82,285	489,335	969,762

TABLE 8A
BURN DATA BY OWNER TYPE -- 1998
(Restricted Area)

District/Forest	Private			State			Federal Except USFS			Ur
	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons	
Astoria	34	854	27,565	1	245	6,306				
Clackamas-Marion	16	413	10,735	1	12	111	8	148	3,769	
Coos FPA	360	5,794	163,597	18	122	3,820	28	348	10,183	
Douglas FPA	151	2,159	33,857				42	565	9,727	
East Lane	135	2,589	60,821				7	264	5,651	
Forest Grove	106	2,430	49,810	1	82	1,474				
Linn	80	3,258	68,845	1	50	2,050	8	119	3,595	
Southwest	82	1,159	9,252				183	4,538	29,564	
Tillamook	13	471	1,934							
West Lane	194	3,901	60,737				3	80	557	
West Oregon	198	5,841	102,414	8	324	8,554	8	130	3,078	
Klamath NF										
Mt Hood NF										
Rogue River NF										
Siskiyou NF										
Siuslaw NF										
Umpqua NF										
Willamette NF										
Deschutes NF										
TOTALS	1,369	28,869	589,567	30	835	22,315	287	6,192	66,124	

TABLE 8B
BURN DATA BY OWNER TYPE -- 1998
(Non-Restricted Area)

District/Forest	Private			State			Federal, except USFS		
	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons
Central Oregon	78	25,832	1,017,916	13	339	5,987	3	495	8,910
Klamath-Lake	98	4,277	18,777	4	19	140	16	11,165	290,316
Northeast	83	10,020	20,770						
Walker Range	11	15,130	7,996						
Crater Lake NP									
Fremont NF									
Malheur NF									
Ochoco NF									
Umatilla NF									
Wallowa-Whitman NF									
Winema NF									
TOTALS	270	55,259	1,065,459	17	358	6,127	19	11,660	299,226

Figure 11

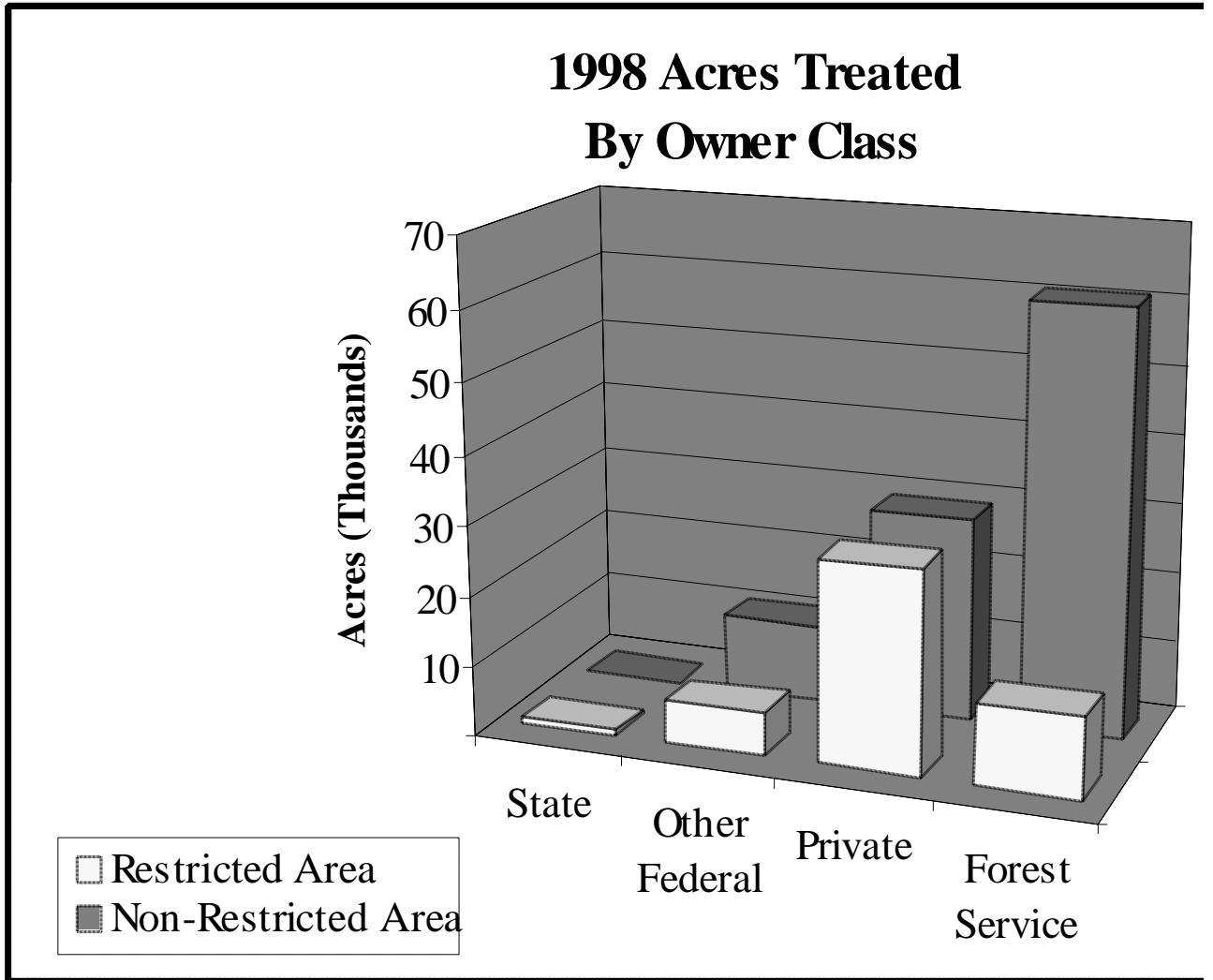


Figure 12A

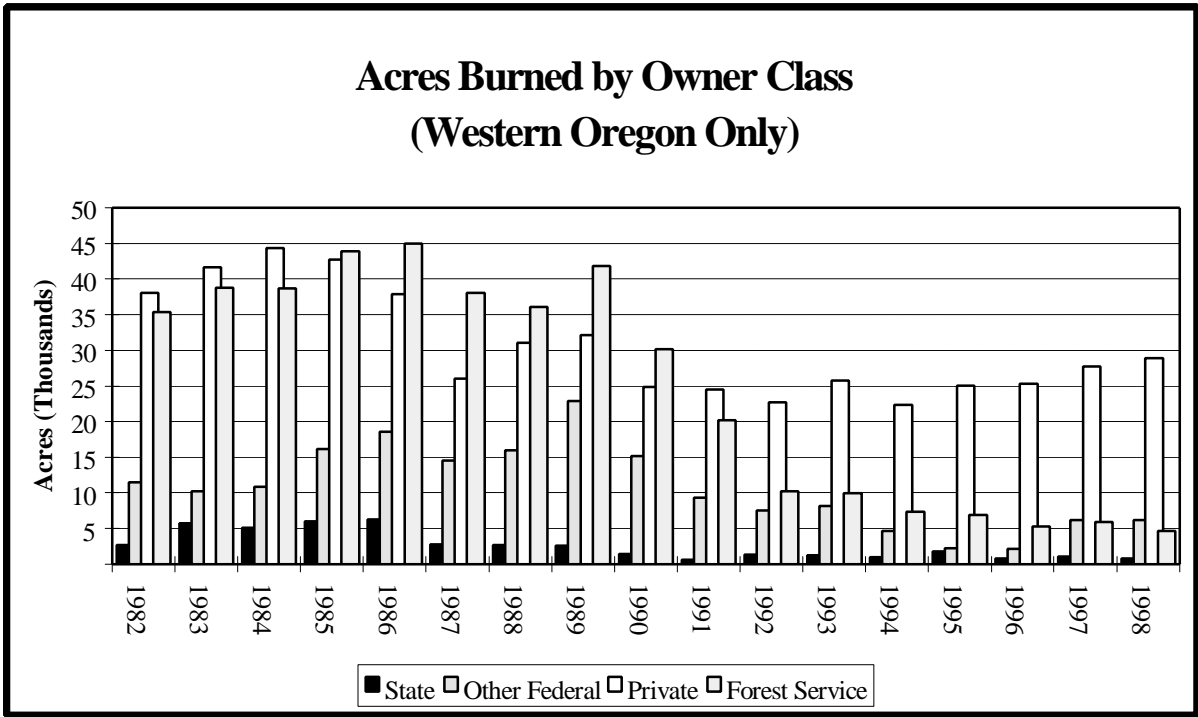


Figure 12B

