

Oregon Smoke Management Annual Report

1999



"STEWARDSHIP IN FORESTRY"

OREGON DEPARTMENT OF FORESTRY
PROTECTION FROM FIRE PROGRAM
METEOROLOGICAL SERVICES SECTION

OREGON SMOKE MANAGEMENT
ANNUAL REPORT
1999

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TABLE OF CONTENTS

Page

1999 Summary1
Introduction1
1999 Program Highlights2
Progress Toward Meeting Objectives2
 Minimizing Smoke Impacts2
 Minimizing Emissions2
 Burning and Particulate Violations.....3
 Protection of Visibility3
Program Summary4
 Audits4
 Forest Health in Northeast Oregon4
 Northeast Oregon Emissions and Fuels Management3
 Meteorological Services4
Program Accomplishment Data.....5

FIGURES

1A Smoke Management Regulated Areas6
1B Class 1 Visibility Areas6
2A Intrusion Density8
2B Length of Intrusion8
3A Intrusion Summary9
3B Accumulated Intrusion Hours9
4A Forest Land Burning Emissions (Reductions).....11
4B Forest Land -- Related Burning Emissions11
5 Visibility Impairment Frequency13
6 Historical Accomplishment -- Total Acres Burned (western Oregon)14
7 Historical Accomplishment -- Total Tons Burned (western Oregon)14
8A Monthly Prescribed Burn Acres Burned.....15
8B Monthly Oregon Precipitation.....15
9 Piled vs. Broadcast vs. Underburn Acres Burned -- Restricted Area16
10 Piled vs. Broadcast vs. Underburn Acres Burned -- Non-Restricted Area16
11 1999 Acres Treated by Owner Class25
12A Acres Burned by Owner Class (western Oregon).....26
12B Tons Burned by Owner Class (western Oregon).....26
13A Mixing Height Distribution – Salem27
13B Mixing Height Distribution – Medford27

TABLES

1 1990 -- 1999 Accomplishment Summary7
2A Smoke Intrusion Summary -- 199910
2B Protected Area Smoke Intrusion Summary -- 199910
3 Class 1 Area Visibility Protection Period Burning Summary12
4A Burn Summary by District -- 1999 (Restricted Area).....17
4B Burn Summary by District -- 1999 (Non-Restricted Area)17
5A Tons Burned by Month by District -- 1999 (Restricted Area)18
5B Tons Burned by Month by District -- 1999 (Non-Restricted Area)19
6A Acres Burned by Month by District -- 1999 (Restricted Area).....20
6B Acres Burned by Month by District -- 1999 (Non-Restricted Area).....21

7A	Tons Burned by Month by County -- 1999 (Restricted Area)	22
7B	Tons Burned by Month by County -- 1999 (Non-Restricted Area)	23
8A	1999 Burn Data by Owner Type (Restricted Area)	24
8B	1999 Burn Data by Owner Type (Non-Restricted Area)	25

OREGON DEPARTMENT OF FORESTRY SMOKE MANAGEMENT 1999 ANNUAL REPORT

1999 SUMMARY

- ***Acres burned*** – Western Oregon burning was similar to 1998. The 48,292 acres treated with fire was less than a 2% increase from 1998. In eastern Oregon 143,876 acres were treated in 1999, compared to a 10-year average of about 98,600 acres.
- ***Intrusions*** – Increased from recent years. The eight intrusions are one above the ten year average.
- ***Smoke impact*** – included two heavy intrusions. One event lasted more than six hours; half of the impacts were two hours or less. One light 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 were less than 50% of 1998 emissions.
- ***Visibility*** – Visibility impairment of the Class 1 wilderness areas decreased from 1998 and remains well below historic levels. Visibility was impaired at the three Cascade recording sites thirteen 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.

1999 PROGRAM HIGHLIGHTS

Overview:

Prescribed burning in western Oregon, after declining for a number of years has leveled off. During 1999, there were 48,292 acres burned in the restricted area, as shown in Table 1. This is slightly more than the 47,494 acres treated in 1998 and approximately 2,000 acres more than the average for the last ten years. There were 143,876 acres burned in eastern Oregon in 1999, a 12 percent increase over 1998. This continues the trend of increased burning east of the Cascades, primarily for forest health reasons. The amount of material burned in the non-restricted area (827,115 tons) remained below the ten-year average.

PROGRESS TOWARD MEETING OBJECTIVES

Minimizing Smoke Impacts:

Minimizing smoke intrusions and protecting public health is a major objective of the Smoke Management Plan. Burning is restricted on days with poor dispersion. A primary consideration for conducting burning is the "mixing height"; the depth through which smoke will disperse. The distribution of mixing height for the two upper air observing sites in Oregon is shown in Figures 13a and b.

In 1999, eight intrusions of smoke into designated areas occurred. While an increase from the record low number of intrusions reported in 1998, it is well below historical numbers (see figure 3A). Two intrusions produced heavy smoke impacts. Two other impacts during 1999 were moderate, while the remaining four intrusions produced light or unknown impact levels.

Smoke management also monitors smoke impacts on protected areas in Northeast Oregon. One intrusion produced a light impact into Baker City, 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 wilderness 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 12,900 tons of TSP produced in 1999 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 in the smoke management data system before then. Since 1987, burning has produced between 11,000 and 34,000 tons of TSP per year. There were approximately 15,400 tons produced in 1999.

Programs to increase prescribed burning in eastern Oregon in order to reduce fuel loading on federal forest land are developing. The goal 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 as the prescribed burning programs are put into action.

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 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 acres burned in 1999 were over 30 percent below the ten year normal but near the total of 1998. This burning created 16,134 tons of TSP. As the chart shows, wildfire emissions are highly variable, with much of the difference between 1998 and 1999 arising from the fact that more forested and less grass type fuels burned in 1999.

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 1999. This was the third consecutive year with no standards violations statewide. Special protection zones remain in effect around Medford, Oakridge, Lakeview, La Grande 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 were adopted by EPA in 1997 but are currently under review in Federal Court after a successful challenge by industrial groups. EPA has appealed the court ruling and the case is not expected to be resolved until the U.S. Supreme Court makes a decision on whether or not to hear the case. If the standards are upheld, they are expected to have the greatest impact on the control of fine particles from combustion sources, such as prescribed fire. 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.

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.

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.

Oregon experienced a late snowmelt at higher elevations and heavy spring precipitation. Due to these conditions, 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. During this exemption period, four units were burned within the protection area of the Cascades. This burning totaled 39 acres and 1,210 tons of material.

Table 3 summarizes the burning conducted during the visibility protection period. Six units were burned in the Coast Range for a total of 38 acres and 361 tons. In the Cascade Range, no burning outside of the exemption period occurred.

During the visibility protection period, visibility impacts in the Class 1 areas from all sources occurred 13% of the time, as shown in figure 5. No impacts from forestland prescribed burns during the exemption period were identified in available nephelometer data.

EPA adopted regional haze rules in 1999. These rules will require states to develop plans to ensure visibility in national parks and wilderness areas is protected. The rules are intended to ensure that man-made sources of pollution do not impair visibility in these areas. The rules are somewhat unique in that they address impacts from many types of sources, including fire, over a multi-state area. The goal is to have natural visibility conditions met by 2064.

Increased emphasis on impacts from fire, both prescribed fire and wildfire, is expected to be a significant element to the air quality plans that will be developed to meet the regional haze rule requirements. The trade-offs between the occurrence of wildfire and the use of prescribed fire and the smoke impacts of each is expected to generate much discussion as to how smoke management plans should be developed and managed. Interstate coordination is also expected to be a factor in the plans' development. Work has already begun to identify how much wildfire contributes to regional haze.

Air pollution control strategies will begin to be developed over the next three to eight years based upon monitoring and modeling efforts that are being undertaken. The groundwork for the strategy development has already begun through regional planning efforts between all western states. The strategies that are developed are expected to coincide with those plans that are developed to meet PM2.5 standards

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. Eleven pre-burn audits were desired and 11 were completed. Burn day audits were conducted on the day the units were burned. The auditors randomly selected units for burn day audits. Eleven 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 and Burning in Northeast Oregon

ODF issues daily forecasts and smoke management instructions during the prescribed burning seasons in Northeast Oregon. 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.

Forest health burning on federal land in northeast Oregon decreased to 30,513 acres in 1999; down from the 36,585 acres treated in 1998. This is a long-term fuels management program and annual variations due to weather and forest conditions will occur. Late snowmelt in 1999 hampered spring forest health burning at higher elevation. Overall, the expected trend is for an increase in burning.

One of the expectations of the fuels management program is that the increased particulate emissions from prescribed, forest health burning will be offset by a decrease in wildfire emissions.

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 six years are shown in the table below. The reduction in acres burned in 1999 is also reflected in decrease in the amount of PM10 emissions. The 1999 total of 3,897 tons is approximately 26 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

	Malheur	Ochoco	Umatilla	Wallowa Whitman	Total
199					
4	456	240	1,323	731	2,750
199					
5	1,635	1,271	330	549	3,785
199					
6	1,930	928	881	603	4,342
199					
7	3,553	2,047	2,073	1,590	9,263
199					
8	1,882	1,206	996	866	4,950
199					
9	1901	903	514	579	3,897

Meteorological Services

Oregon Department of Forestry meteorologists provide 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 Lakeview woodstove smoke control program.

Through a cooperative agreement with DEQ they are making the open burning forecast for the Willamette Valley north of Lane County during the period that field burning is 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.

Additionally, ODF meteorologists provide watches and warnings for potential debris flow landslides caused by excessively heavy rains in western Oregon. No advisories or warnings were required or issued in 1999.

An air stagnation advisory was issued by the Pendleton National Weather Service office on December 24. The advisory included the Columbia River basin and the foothills of the Blue Mountains.

This advisory was cancelled on December 31. No prescribed burning was conducted in or near the affected area during the advisory period.

PROGRAM ACCOMPLISHMENT DATA:

The tables and figures in this report highlight the results of the 1999 smoke management program. The data reflects the continuing decrease in burning in Western Oregon and the gradual increase in burning in eastern Oregon.

TABLE 1
1990-1999 ACCOMPLISHMENT SUMMARY

Burning totals within the restricted area:

Year	Total No.	No. Units	Acres Burned	Tons Burned	No. Intrusions
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
1999	3,010	2,302	48,292	866,964	8
Average	3,462	2,397	46,528	951,532	7

Burning totals outside of the restricted area:

Year	Total No. Units	No. Units Burned	Acres Burned	Tons Burned
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
1999	1,418	867	143,876	827,115
Average	1,592	936	98,641	918,482

Figure 2A

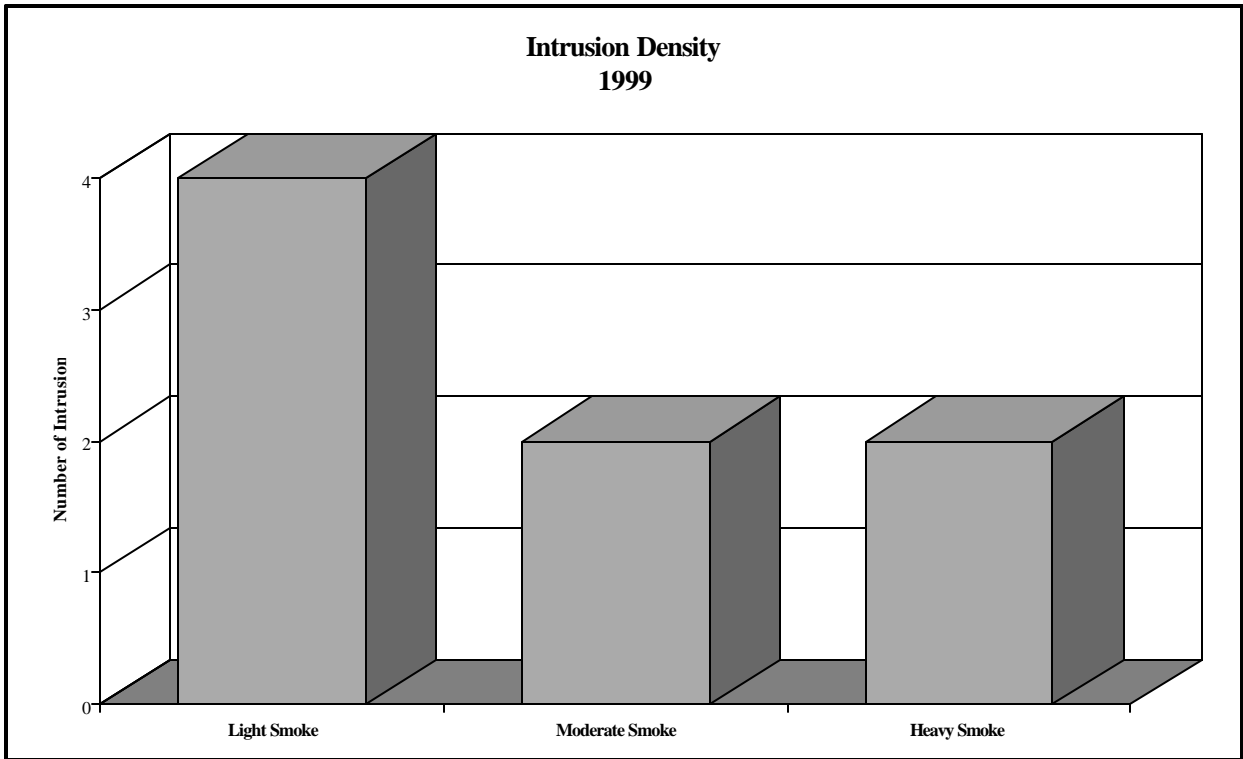


Figure 2B

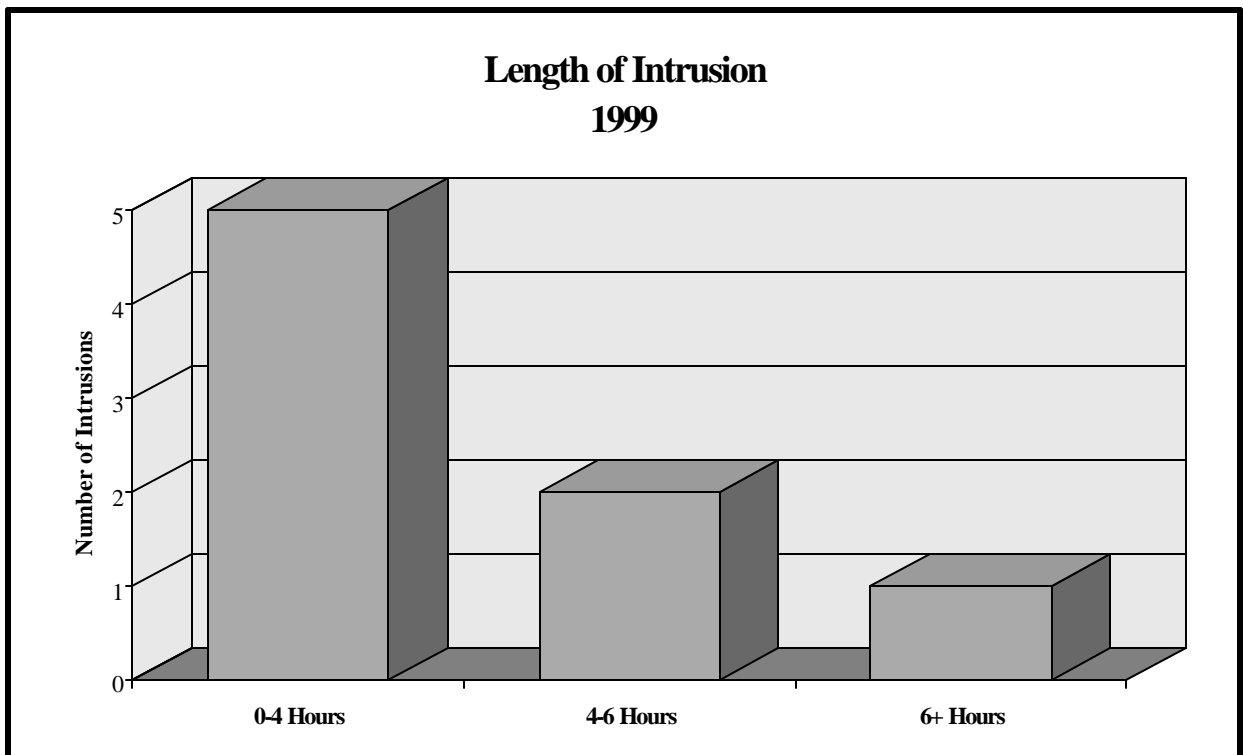


Figure 3A

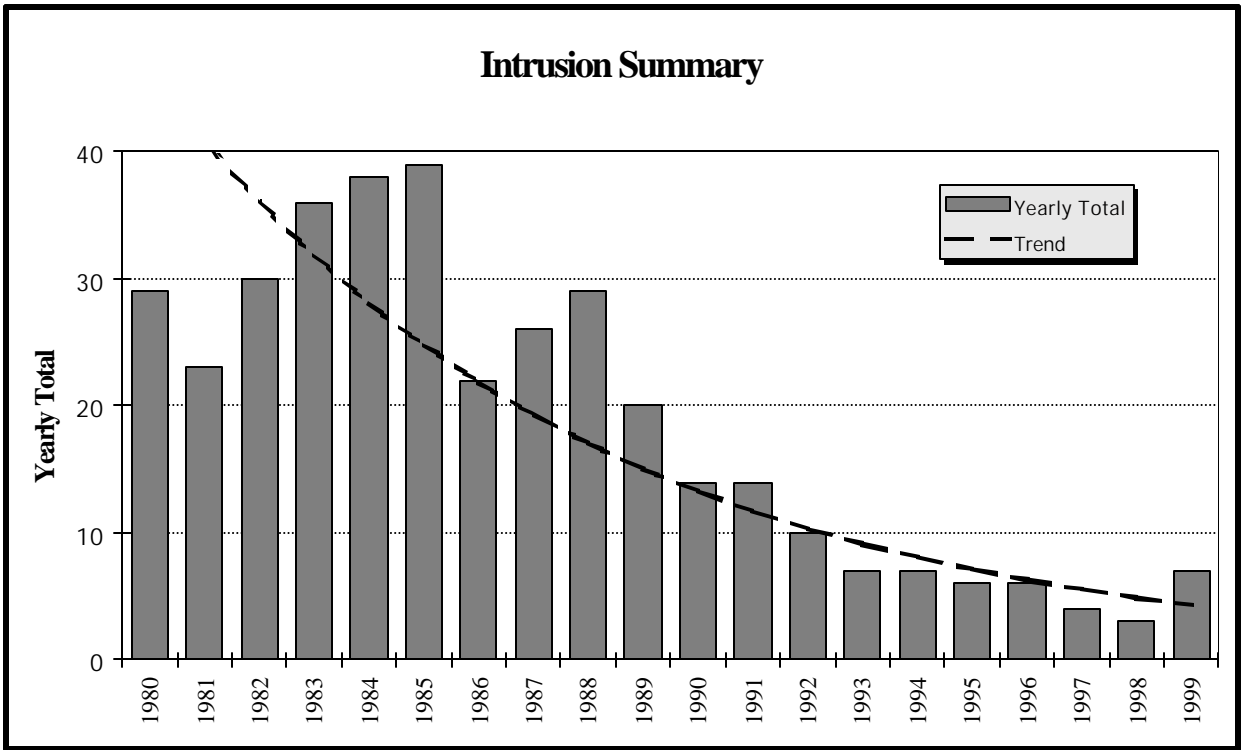


Figure 3B

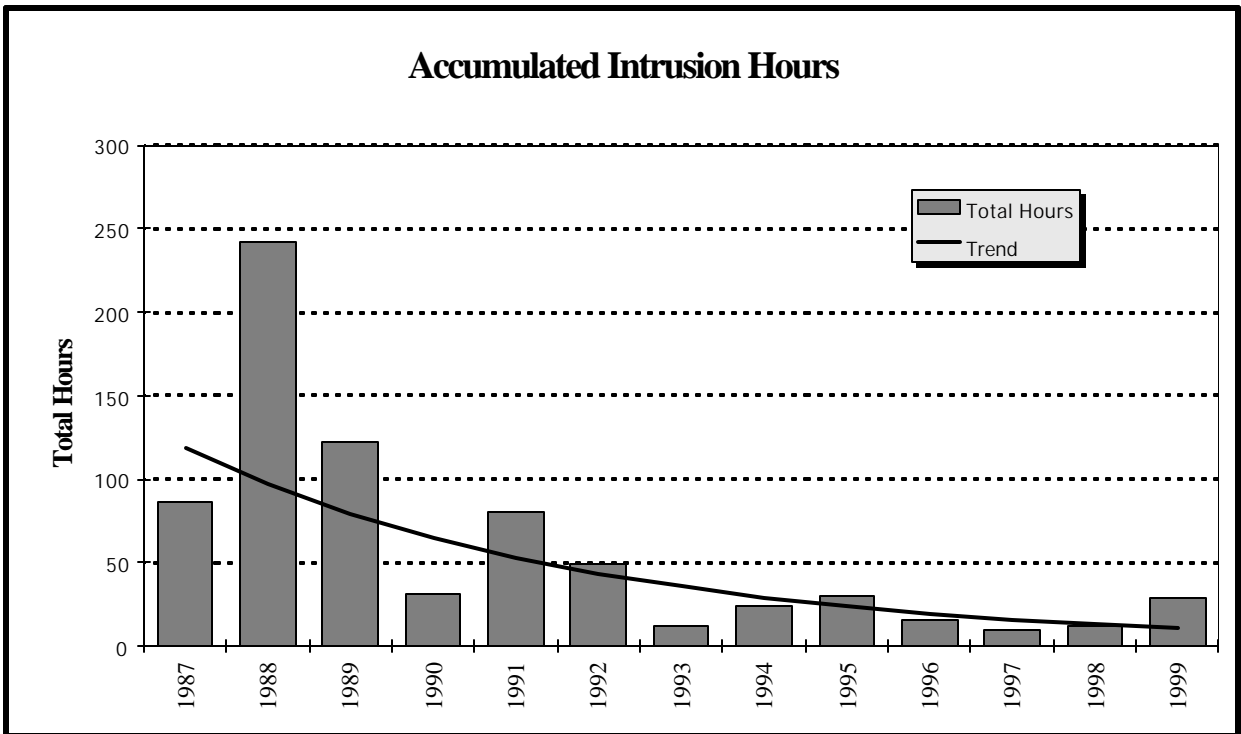


TABLE 2a

SMOKE INTRUSION SUMMARY – 1999

Restricted Area

Date	District/ Forest	Primary Area Affected	Unit No.	Owner Class	Intensity	Length
Apr 15	West Oregon	Lincoln City	99-552-30124-00	Private	Light	2 Hrs
Apr 24	CFPA	Roseburg	98-740-60772-01	Private	Light	2 Hrs
May 24	CFPA and West Lane	Roseburg	97-781-51627-00 97-740-61762-00	Private BLM	Moderate	1.25 Hrs
Jun 10	CFPA	Grants Pass and Medford	98-740-61832-00	Private	Heavy	7 Hrs
Jun 30	CFPA	Roseburg	97-740-60612-03	Private	Heavy	4.5 Hrs
Aug 10	West Oregon	Corvallis	99-553-37024-00	Private	Moderate	2 Hrs
Oct 13	West Lane	Roseburg	98-781-51084-00	Private	Unknown (Est – Mod)	4 Hrs
Nov 9	Linn	Willamette Valley - Sodaville	99-791-40209-00	Private	Light	6 Hrs

TABLE 2b

PROTECTED AREA SMOKE INTRUSION SUMMARY – 1999

Non-Restricted Area

Date	Forest	Area Affected	Owner Class	Intensity	Length
Apr 16	Wallowa- Whitman	Baker City	USFS	Light	3 Hrs

Figure 4A

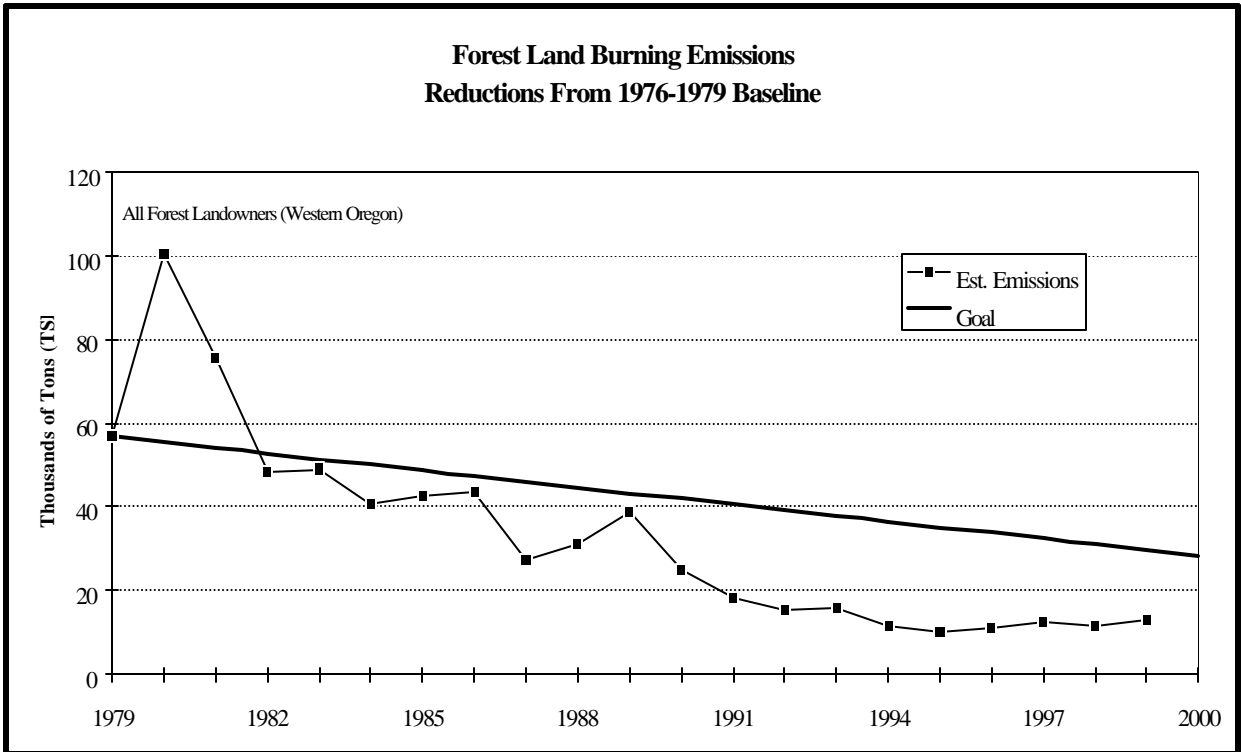


Figure 4B

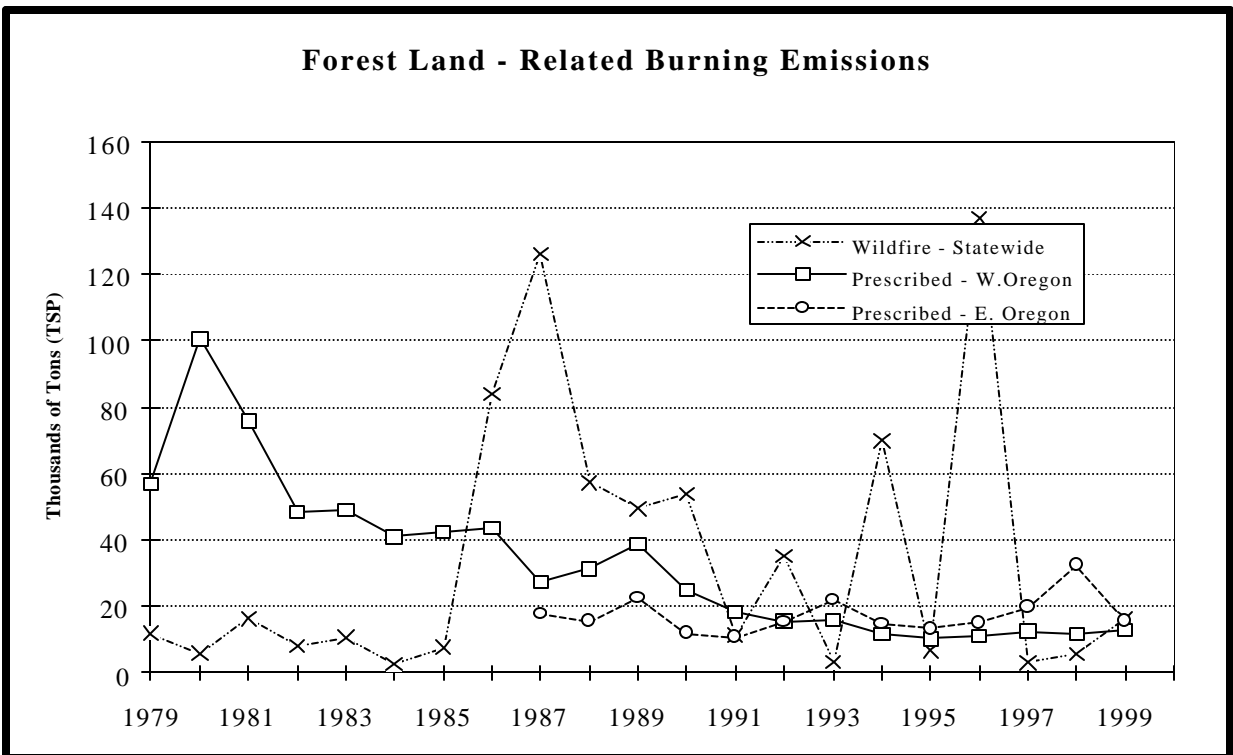


Table 3
Class 1 Area Visibility Protection Period Burning

Year	Cascade Range			Coast Range		
	No. of Units	Acres	Tons	No. of Units	Acres	Tons
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
1999	4	39	1,210	6	38	361

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 16, 1993, due to wet conditions during the spring. During this period 930 acres were burned in the Cascade Range and 1285 acres were burned in the Coast Range.
5. An exemption was granted to allow burning in the Cascade Range through July 23, 1998 due to extremely wet conditions during the spring. All Cascade burning was conducted during this exemption period.
6. An exemption was granted to allow burning in the Cascade Range Monday through Thursday from July 6 through July 22, 1999 due to a deep snowpack and late snow melt in the spring. All Cascade burning conducted during the visibility protection period occurred during this exemption window.

Figure 5

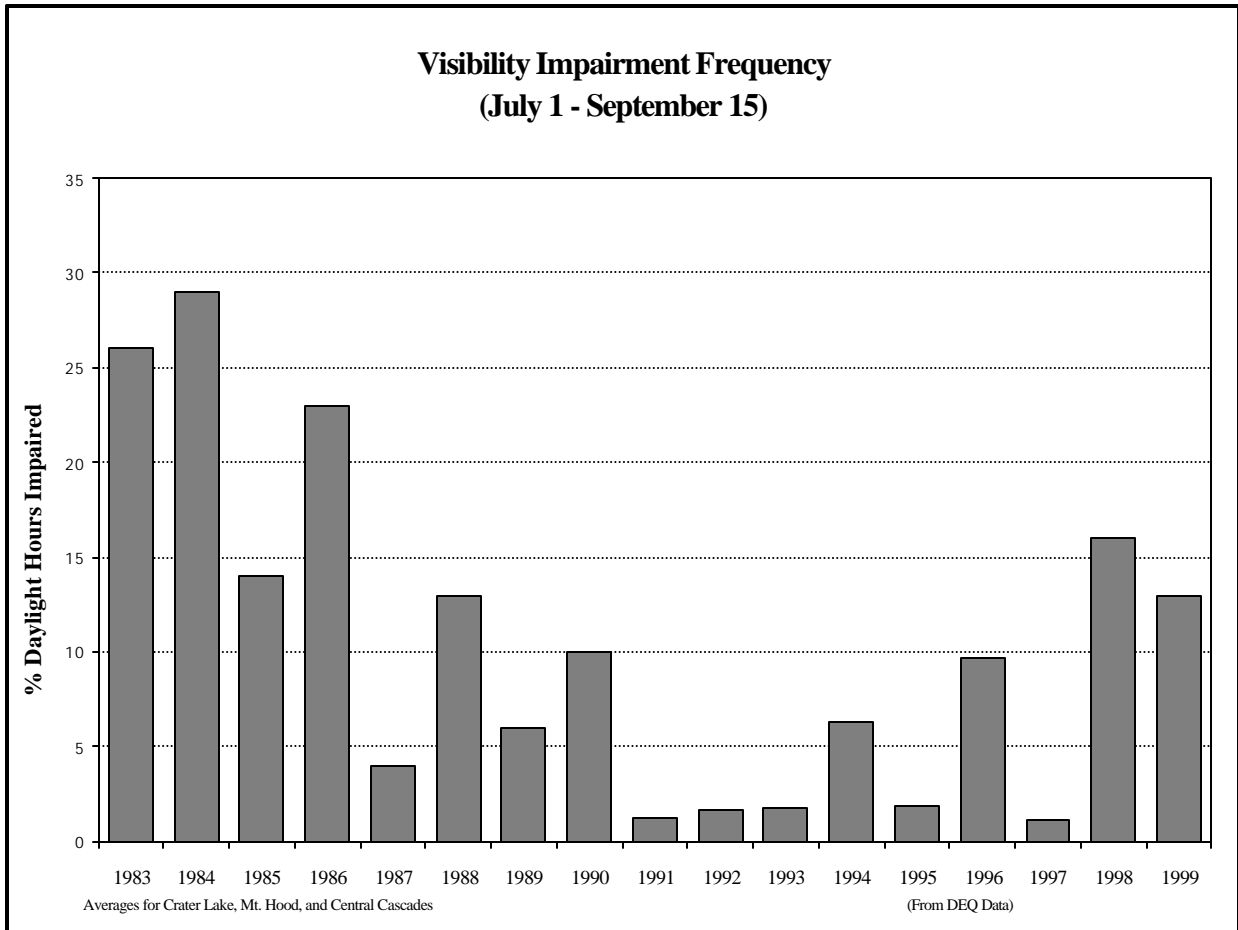


Figure 6

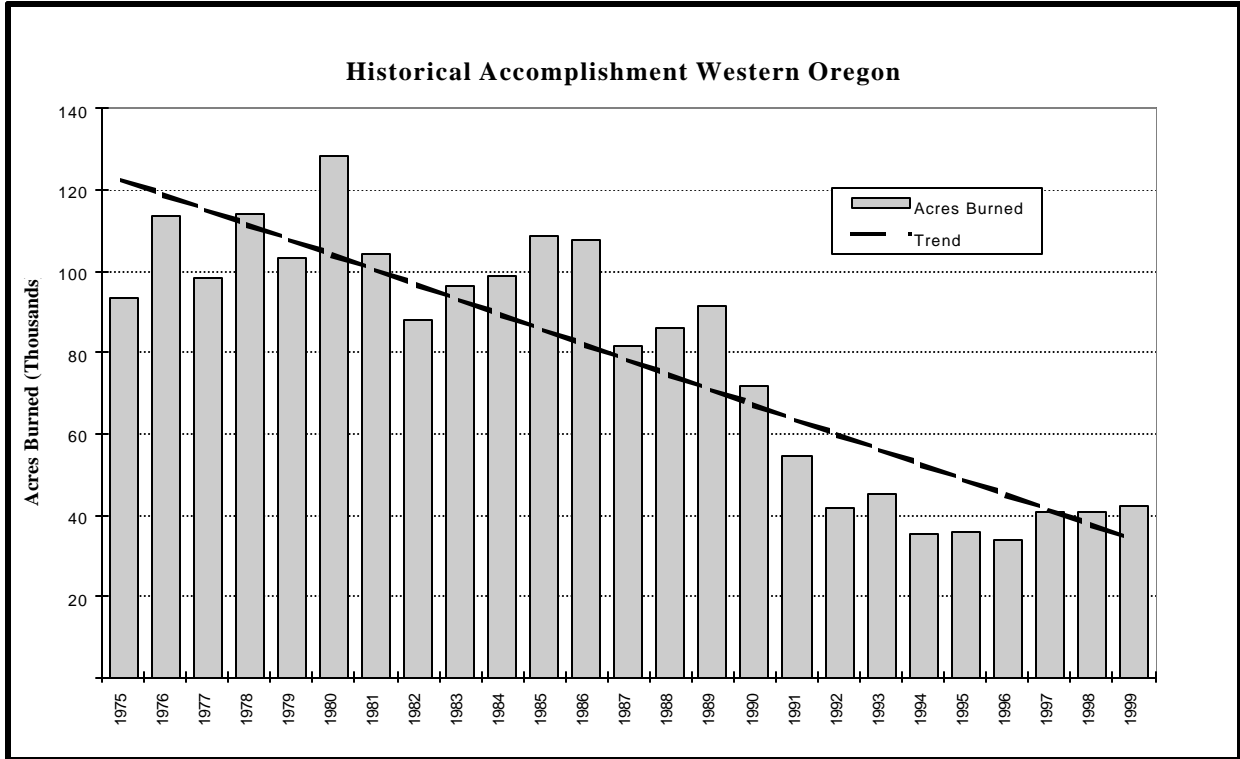


Figure 7

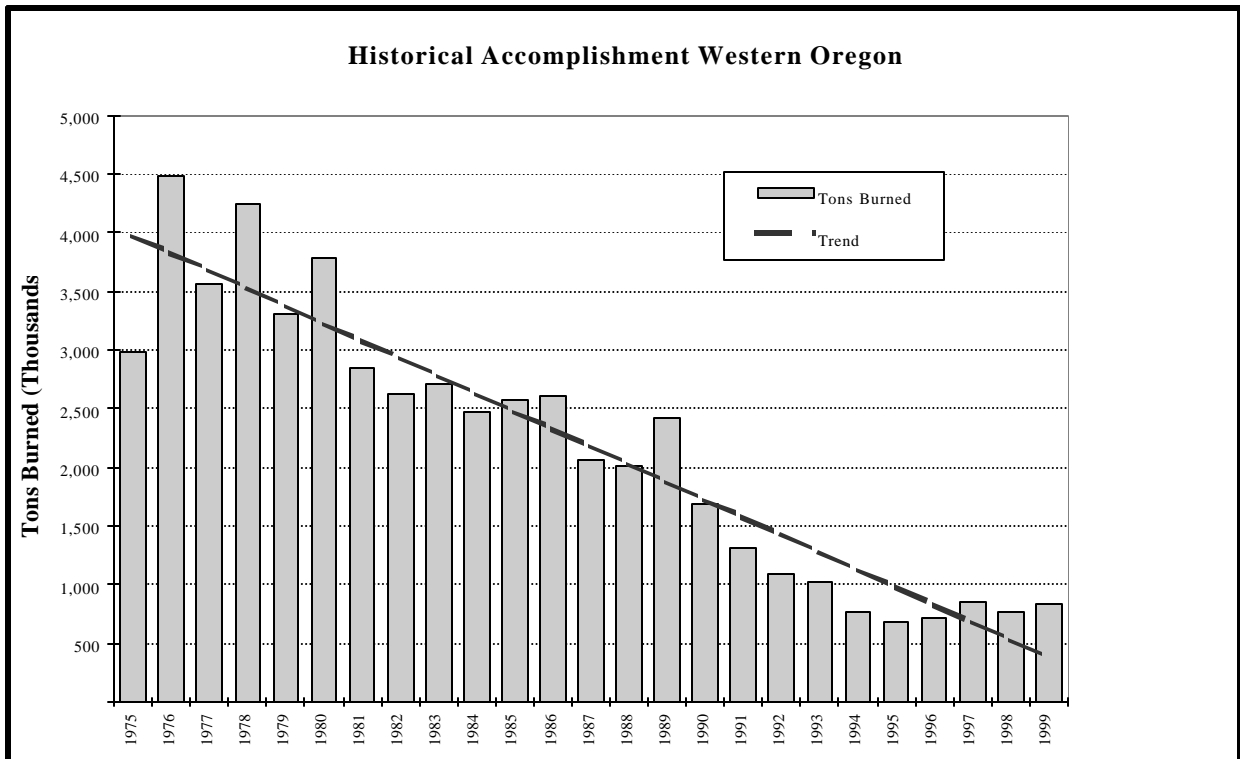


Figure 8A

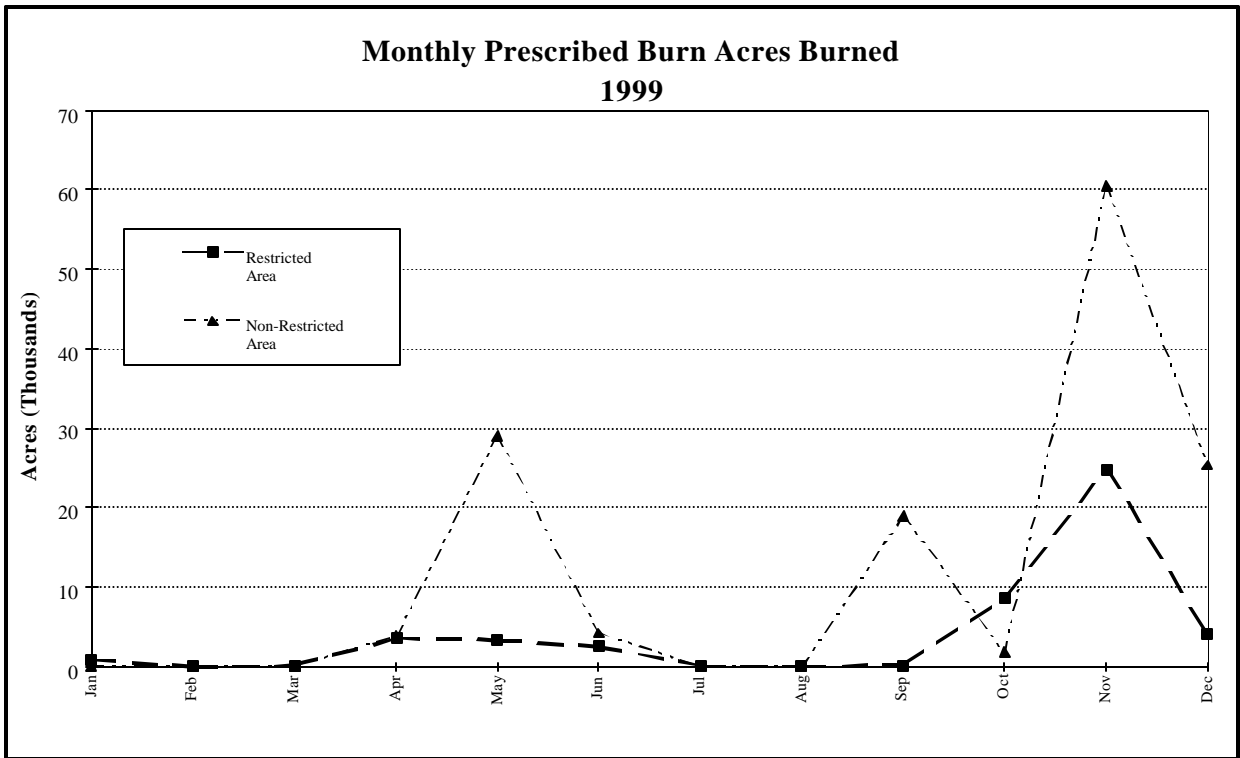


Figure 8B

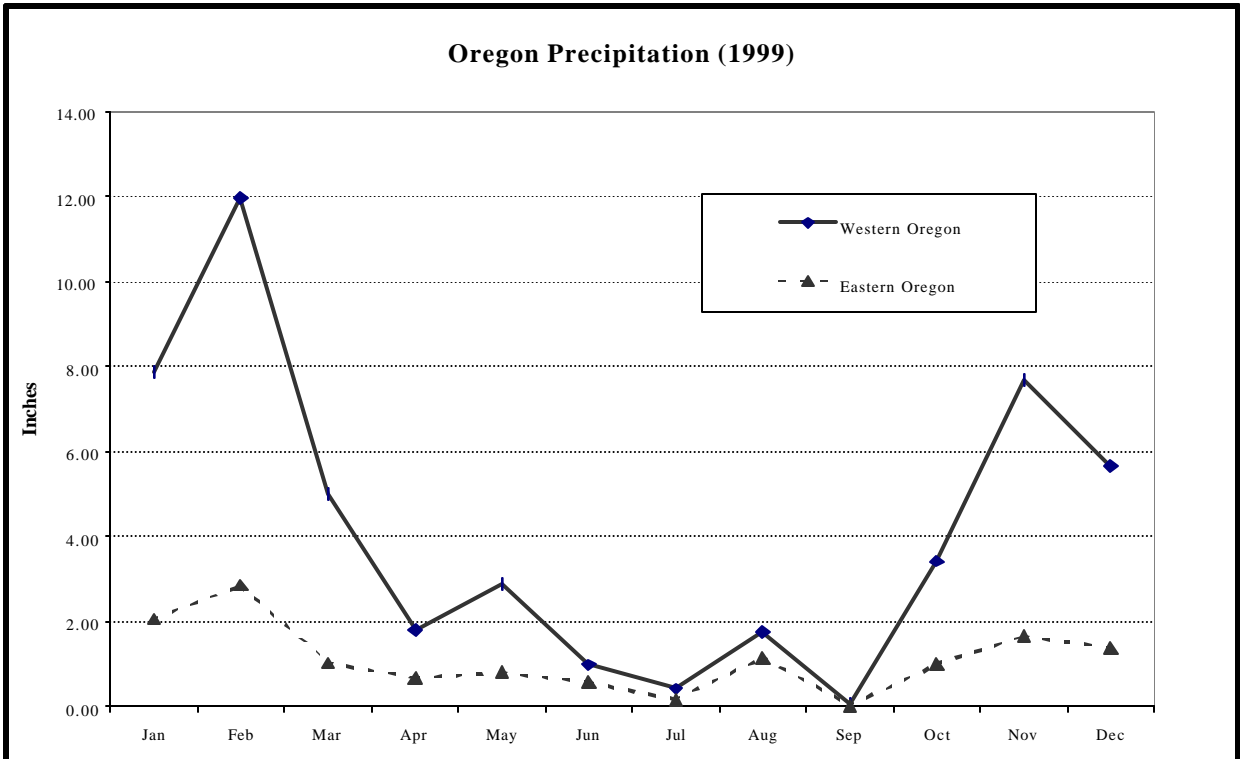


Figure 9

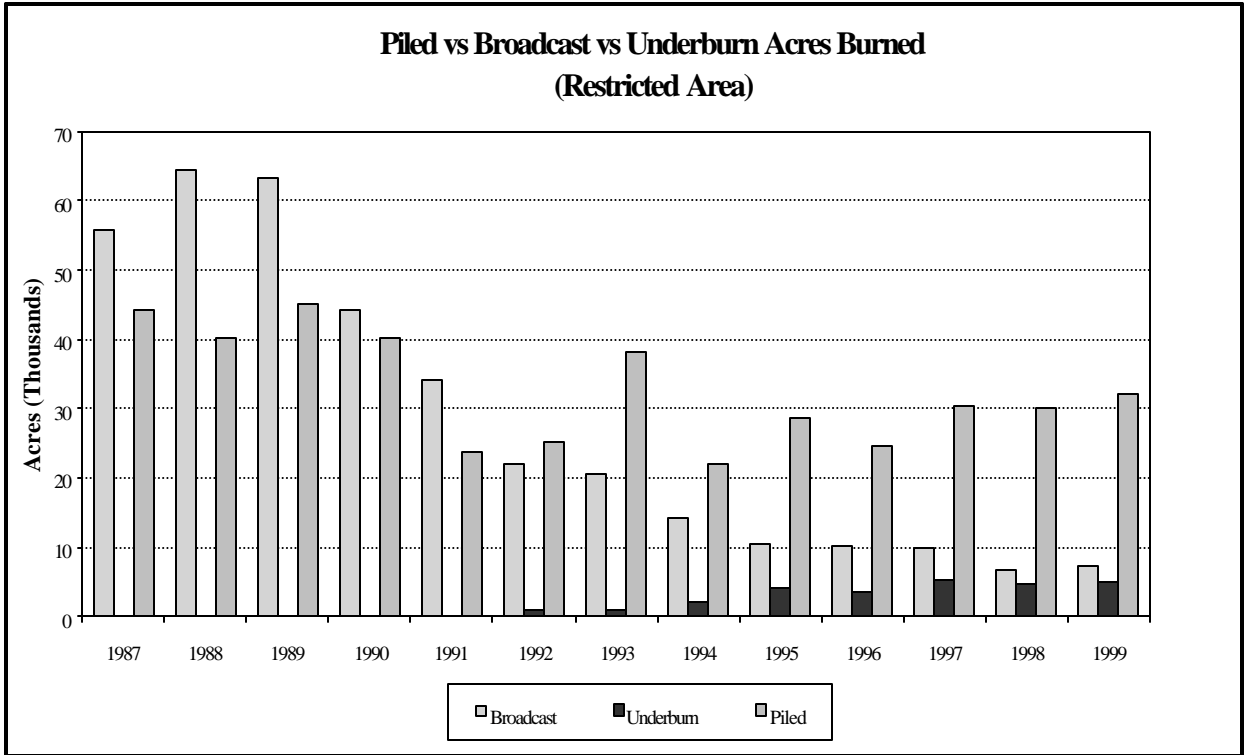


Figure 10

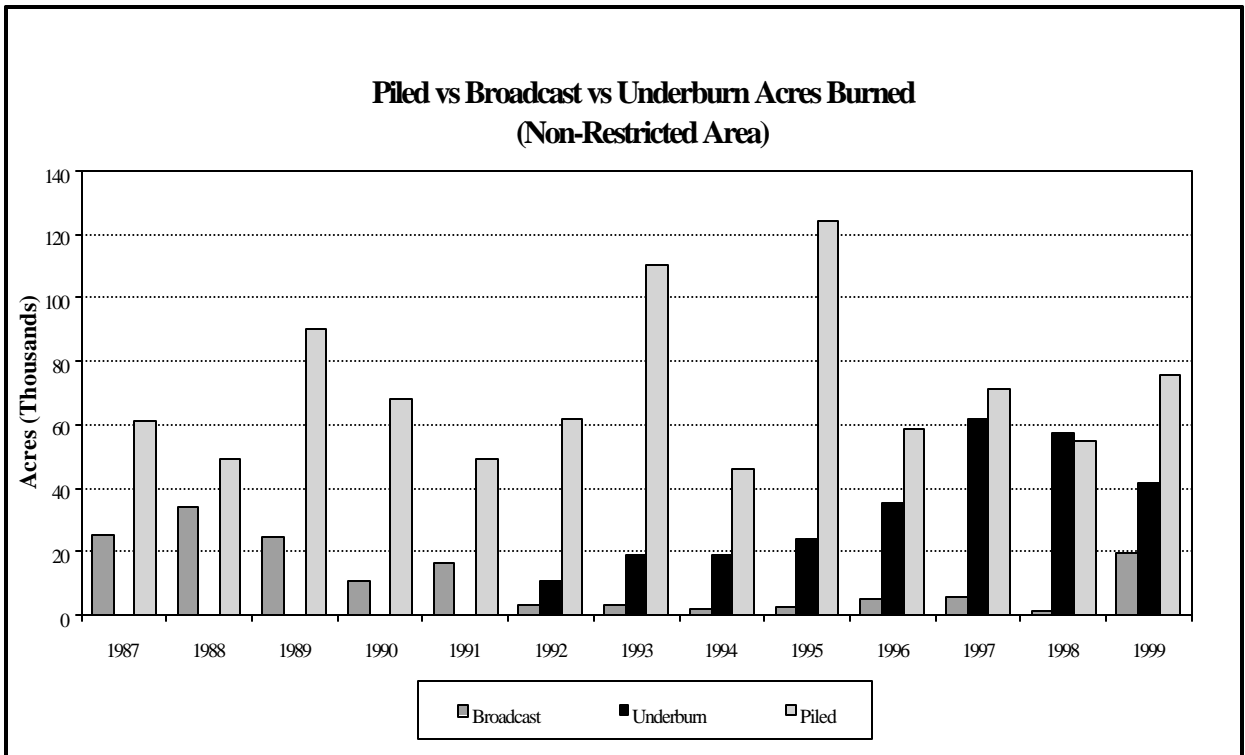


Table 4A
BURN SUMMARY BY DISTRICT -- 1999
(Restricted Area)

District/Forest	Units Burned	Acres Burned	Tons Burned
Astoria	90	1008	44,376
Clackamas-Marion	34	1011	41,695
Coos FPA	406	6773	197,949
Douglas FPA	167	3279	49,356
East Lane	173	4395	85,434
Forest Grove	110	1963	39,749
Linn	104	4024	81,308
Southwest	227	4866	47,896
Tillamook	27	494	11,461
West Lane	177	2771	52,351
West Oregon	229	6903	115,222
Klamath NF	0	0	0
Mt Hood NF	11	1291	15,582
Rogue River NF	58	992	10,280
Siskiyou NF	64	409	8,147
Siuslaw NF	9	64	1,073
Umpqua NF	45	1094	13,233
Willamette NF	89	788	26,731
Deschutes NF	282	6167	25,121
TOTAL	2,302	48,292	866,964

TABLE 4B
BURN SUMMARY BY DISTRICT – 1999
(Non-Restricted Area)

District/Forest	Units Burned	Acres Burned	Tons Burned
Central Oregon	66	20327	115,994
Klamath-Lake	139	22046	234,673
Northeast	139	23880	59,694
Walker Range	13	28135	62,922
Fremont NF	10	16465	120,487
Malheur NF	123	11745	86,722
Ochoco NF	93	8971	59,345
Umatilla NF	46	2853	35,637
Wallowa-Whitman NF	207	6944	45,495
Winema NF	31	2510	6,146
TOTAL	867	143,876	827,115

Table 5A
Tons Burned by Month by District
1999
(Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria				100						1,542	28,415	14,319	44,376
Clackamas - Marion				355	533	1,375				17,510	5,232	16,690	41,695
Coos	8,660		170	40,222	13,728	12,619				8,127	90,900	23,523	197,949
Douglas	1,008			2,366	2,931					4,224	33,895	4,932	49,356
East Lane										28,307	55,173	1,954	85,434
Forest Grove				135		1,337				11,055	23,897	3,325	39,749
Linn							720			41,266	39,265	57	81,308
Southwest	972		96	3,400	935					132	30,198	12,163	47,896
Tillamook					560	100				4,856	5,405	540	11,461
West Lane				3,903	1,603	19				11,324	34,360	1,142	52,351
West Oregon				942	8,372		324	780		31,741	72,608	455	115,222
Klamath NF													0
Mt Hood NF					645	7,425				360	5,363	1,789	15,582
Rogue River NF	548			1,197	1,865	927					2,970	2,773	10,280
Siskiyou NF				859	2,713	312				1,061	337	1,801	8,147
Siuslaw NF								29		940	104		1,073
Umpqua NF					1,415	2,493	500			1,157	3,831	3,837	13,233
Willamette NF					1,188	13,234	490			1,491	10,267	61	26,731
Deschutes NF				1,522	4,102	2,983	30			172	1,123	8,604	25,121
District Total	10,640	0	266	51,423	28,662	15,450	1,044	780	0	160,084	419,348	79,100	766,797
Forest Total	548	0	0	3,578	11,928	27,374	1,020	29	1,233	5,408	32,940	16,109	100,167
Grand Total	11,188	0	266	55,001	40,590	42,824	2,064	809	1,233	165,492	452,288	95,209	866,964

Table 5B
Tons Burned by Month by District
1999
(Non-Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Central Oregon					11,145					318	88,520	16,011	115,994
Klamath-Lake				4,935	77,521	47,821			87,500		12,620	4,276	234,673
Northeast				295	501	202				1,309	47,406	9,981	59,694
Walker Range											27,600	35,322	62,922
Crater Lake NP													0
Fremont NF				135	116,152				4,200				120,487
Malheur NF					45,070	19,523				20	17,939	4,170	86,722
Ochoco NF				4,312	4,812	2,200				3,919	42,432	1,670	59,345
Umatilla NF					4,275	13,449	912			10,571	5,625	805	35,637
Wallowa-				7,220	13,170	2,463				2,225	16,023	4,394	45,495
Winema NF				2,951	1,778						1,417		6,146
District Total	0	0	0	5,230	89,167	48,023	0	0	87,500	1,627	176,146	65,590	473,283
Forest Total	0	0	0	14,618	185,257	37,635	912	0	4,200	16,735	83,436	11,039	353,832
Grand Total	0	0	0	19,848	274,424	85,658	912	0	91,700	18,362	259,582	76,629	827,115

Table 6A
Acres Burned by Month by District
1999
(Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria				1						120	609	278	1,008
Clack-Marion				25	27	48				651	218	42	1,011
Coos	385		9	1,961	677	411				227	2,364	739	6,773
Douglas	84			186	161					318	2,293	237	3,279
East Lane										1,653	2,649	93	4,395
Forest Grove				13		55				353	1,399	143	1,963
Linn							25			1,956	2,042	1	4,024
Southwest	347		96	418	173					15	2,378	1439	4,866
Tillamook					19	10				292	146	27	494
West Lane				196	114	6				420	1,843	192	2,771
West Oregon				68	634		16	47		2,089	4,039	10	6,903
Klamath NF													0
Mt Hood NF					160	675				74	305	77	1,291
Rogue River	32			225	297	84					190	164	992
Siskiyou NF				55	121	13			9	7	106	98	409
Siuslaw NF								29		14	21		64
Umpqua NF					109	90	15			186	661	33	1,094
Willamette NF					50	358	14			68	288	10	788
Deschutes NF				423	770	771	10		113	210	3,310	560	6,167
District Total	816	0	105	2,868	1,805	530	41	47	0	8,094	19,980	3,201	37,487
Forest Total	32	0	0	703	1,507	1,991	39	29	122	559	4,881	942	10,805
Grand Total	848	0	105	3,571	3,312	2,521	80	76	122	8,653	24,861	4,143	48,292

Table 6B
Acres Burned by Month by District
1999
(Non-Restricted Area)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Central Oregon					855					91	15197	4184	20,327
Klamath-Lake				235	2605	781			17500		710	215	22,046
Northeast				152	507	255				775	17804	4387	23,880
Walker Range											13800	14335	28,135
Crater Lake NP													0
Fremont NF				15	15050				1400				16,465
Malheur NF					6287	1978				12	2719	749	11,745
Ochoco NF				858	1509	550				304	5594	156	8,971
Umatilla NF					1070	585	38			516	555	89	2,853
Wallowa-Whitman NF				2055	780	90				130	2602	1287	6,944
Winema NF				613	375						1522		2,510
District Total	0	0	0	387	3,967	1,036	0	0	17,500	866	47,511	23,121	94,388
Forest Total	0	0	0	3,541	25,071	3,203	38	0	1,400	962	12,992	2,281	49,488
Grand Total	0	0	0	3,928	29,038	4,239	38	0	18,900	1,828	60,503	25,402	143,876

TABLE 7A
TONS BURNED BY MONTH WITHIN COUNTY
1999
(Restricted Area)

COUNTY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Benton	0	0	0	0	0	0	0	0	0	7,505	29,233	100	36,838
Clackamas	0	0	0	0	0	1,375	0	0	0	7,660	1,572	16,690	27,297
Clatsop	0	0	0	100	0	0	0	0	0	1,662	29,860	14,019	45,641
Columbia	0	0	0	0	0	1,337	0	0	0	9,169	9,080	1,618	21,204
Coos	4,306	0	27	24,952	10,664	9,955	0	0	0	3,149	67,476	9,924	130,453
Curry	4,879	0	143	11,312	1,346	2,664	0	0	1,061	5,745	11,268	5,138	43,556
Deschutes	0	0	44	831	1,282	298	0	0	80	862	2,808	4,462	10,667
Douglas	2,042	0	0	8,142	7,303	4,399	500	0	0	5,714	56,951	10,098	95,149
Hood River	0	0	0	0	25	0	0	0	0	0	0	0	25
Jackson	1,380	0	96	3,712	2,217	897	0	0	0	0	23,633	12,317	44,252
Jefferson	0	0	0	0	2,290	1,149	0	0	46	75	172	243	3,975
Josephine	140	20	40	2,096	1,232	312	0	0	0	132	11,413	3,606	18,991
Klamath	0	0	0	693	1,257	1,185	30	0	0	0	4,884	545	8,594
Lake	0	0	0	0	239	0	0	0	0	411	34	1,201	1,885
Lane	3	0	0	3,903	3,494	7,957	490	0	0	44,070	92,290	1,922	154,129
Lincoln	0	0	0	0	4,733	0	324	809	0	9,206	22,230	0	37,302
Linn	0	0	0	0	180	1,612	720	0	0	43,153	39,251	92	85,008
Marion	0	0	0	355	869	1,733	0	0	0	10,210	3,809	0	16,976
Multnomah	0	0	0	0	0	0	0	0	0	78	80	0	158
Polk	0	0	0	630	2,384	0	0	0	0	12,550	18,410	100	34,074
Tillamook	0	0	0	0	560	100	0	0	0	5,486	5,749	618	12,513
Wasco	0	0	0	0	7,220	825	0	0	0	0	5,232	1,789	15,066
Washingto n	0	0	0	30	0	0	0	0	0	1,554	2,777	351	4,712
Yamhill	0	0	0	517	1,155	0	0	0	0	3,104	12,445	1,278	18,499
TOTAL	12,750	20	350	57,273	48,450	35,798	2,064	809	1,187	171,495	450,657	86,111	866,964

TABLE 7B

**TONS BURNED BY MONTH WITHIN COUNTY
1999
(Non-Restricted Area)**

COUNTY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Baker	0	0	0	2,574	4,230	1,410	0	0	0	136	8,956	4,419	21,725
Crook	0	0	0	5,038	8,145	0	0	0	0	4,038	58,543	15,841	91,605
Deschutes	0	0	0	0	0	0	0	0	0	0	30,338	170	30,508
Grant	0	0	0	0	49,830	13,873	0	0	0	2,411	6,079	3,835	76,028
Harney	0	0	0	0	22,636	3,680	0	0	87,500	0	33,304	1,858	148,978
Hood River	0	0	0	0	0	0	0	0	0	318	7,375	0	7,693
Jefferson	0	0	0	800	0	0	0	0	0	0	2,760	0	3,560
Klamath	0	0	0	8,021	167,064	16,483	0	0	0	0	41,637	22,802	256,007
Lake	0	0	0	0	57,425	0	0	0	4,200	0	0	16,796	78,421
Morrow	0	0	0	0	2,800	1,857	0	0	0	195	25	795	5,672
Umatilla	0	0	0	0	15	4,116	0	0	0	5,600	5,605	4,981	20,317
Union	0	0	0	275	6,301	5,449	0	0	0	4,993	8,013	360	25,391
Wallowa	0	0	0	4,666	3,432	88	912	0	0	1,056	46,156	4,620	60,930
Wasco	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0	0	0	0	280	0	0	280
TOTAL	0	0	0	21,374	321,878	46,956	912	0	91,700	19,027	248,791	76,477	827,115

Table 8A
Burn Data by Owner Type
1999
(Restricted Area)

District/ Forest	Private			State			Federal Except USFS			USFS		
	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons
Astoria	67	686	23,693	23	322	20,683						
Marion Clackamas-	27	889	24,076	5	101	2,091	2	21	15,528			
Coos FPA	365	6,379	182,797	18	219	7,642	23	175	7,510			
Douglas FPA	127	2,662	38,639	5	51	540	35	566	10,177			
East Lane	163	3,922	77,659				10	473	7,775			
Forest Grove	106	1,934	39,491	4	29	258						
Linn	98	3,970	80,093	3	29	495	3	25	720			
Southwest	97	1,348	20,079	1	5	24	129	3,513	27,793			
Tillamook	20	383	10,619	6	110	796	1	1	50			
West Lane	169	2,578	50,522	1	1	90	7	192	1,739			
West Oregon	218	6,625	107,517	8	233	6,560	3	45	1,145			
Klamath NF												
Mt Hood NF										11	1,291	15,582
Rogue River NF										58	992	10,280
Siskiyou NF										64	409	8,147
Siuslaw NF										9	64	1,073
Umpqua NF										45	1,094	13,233
Willamette NF										89	788	26,731
Deschutes NF										282	6,167	25,121
Totals	1,457	31,376	655,181	74	1,100	39,179	213	5,011	72,437	558	10,805	100,167

Table 8B
Burn Data by Owner Type
1999
(Non-Restricted Area)

District/ Forest	Private			State			Federal Except USFS			USFS		
	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons
Central Oregon	50	19,111	101,734	14	361	3,115	2	855	11,145			
Klamath-Lake	116	570	13,876	2	95	1,659	21	21,381	219,138			
Northeast	139	23,880	59,694									
Walker Range	13	28,135	62,922									
Crater Lake NP												
Fremont NF										10	16,465	120,487
Malheur NF										123	11,745	86,722
Ochoco NF										93	8,971	59,345
Umatilla NF										46	2,853	35,637
Wallowa-Whitman NF										207	6,944	45,495
Winema NF										31	2,510	6,146
TOTALS	318	71,696	238,226	16	456	4,774	23	22,236	230,283	510	49,488	353,832

Figure 11

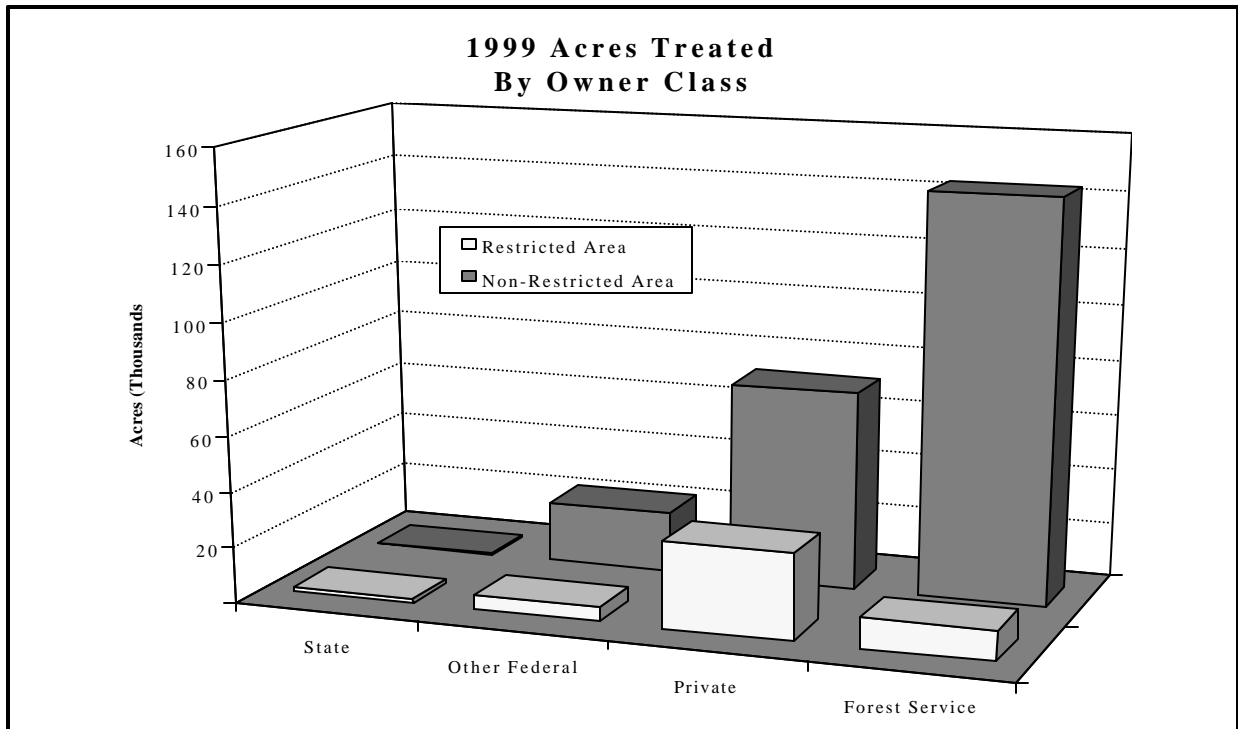


Figure 12A

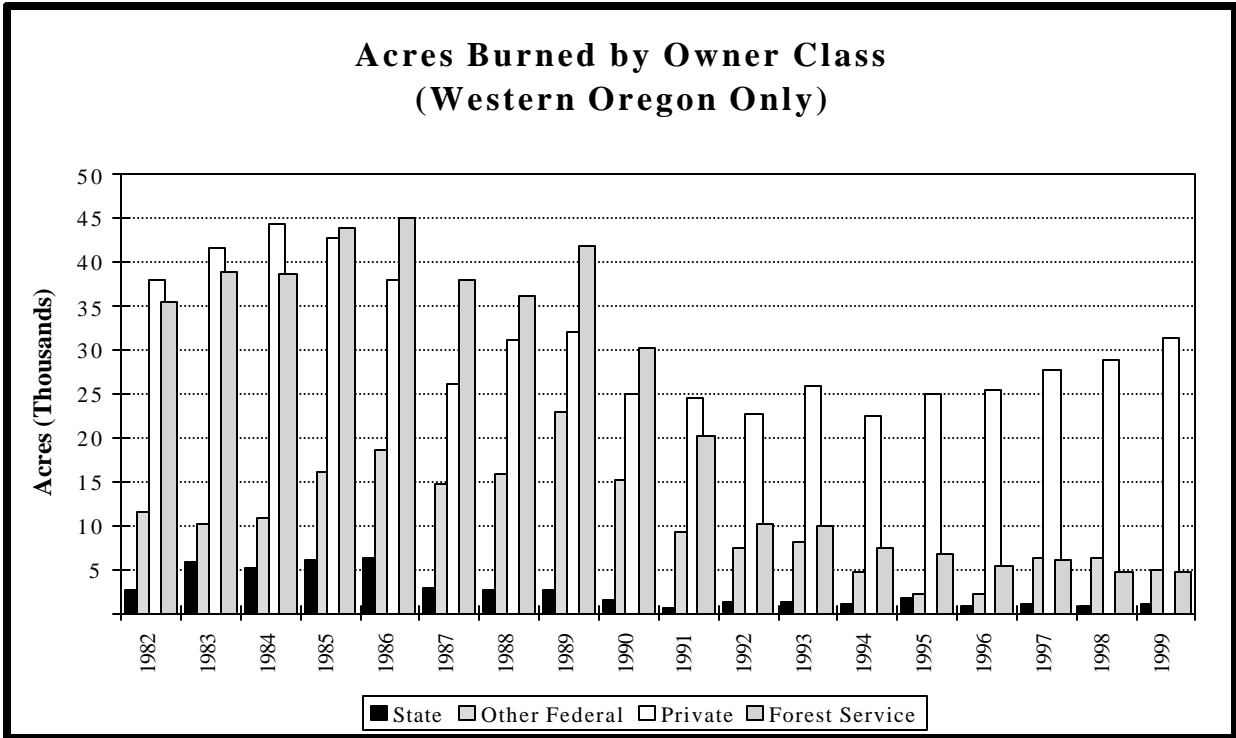


Figure 12B

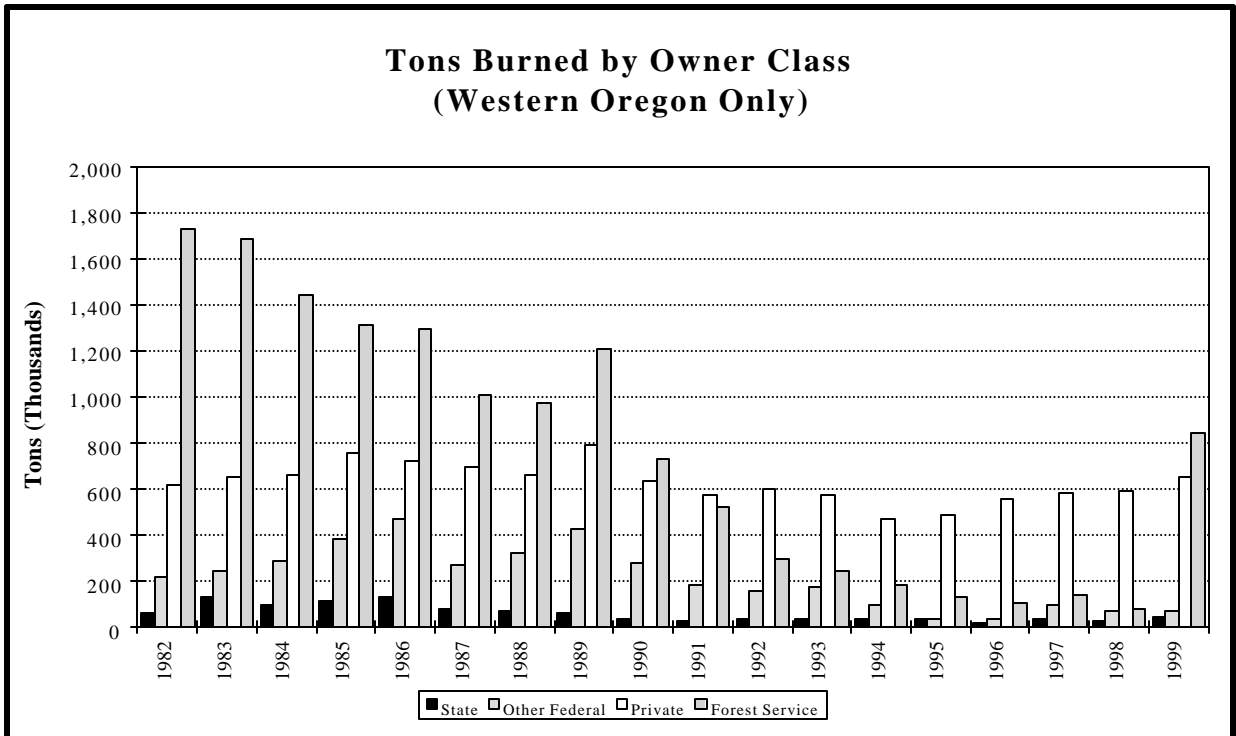


Figure 13a

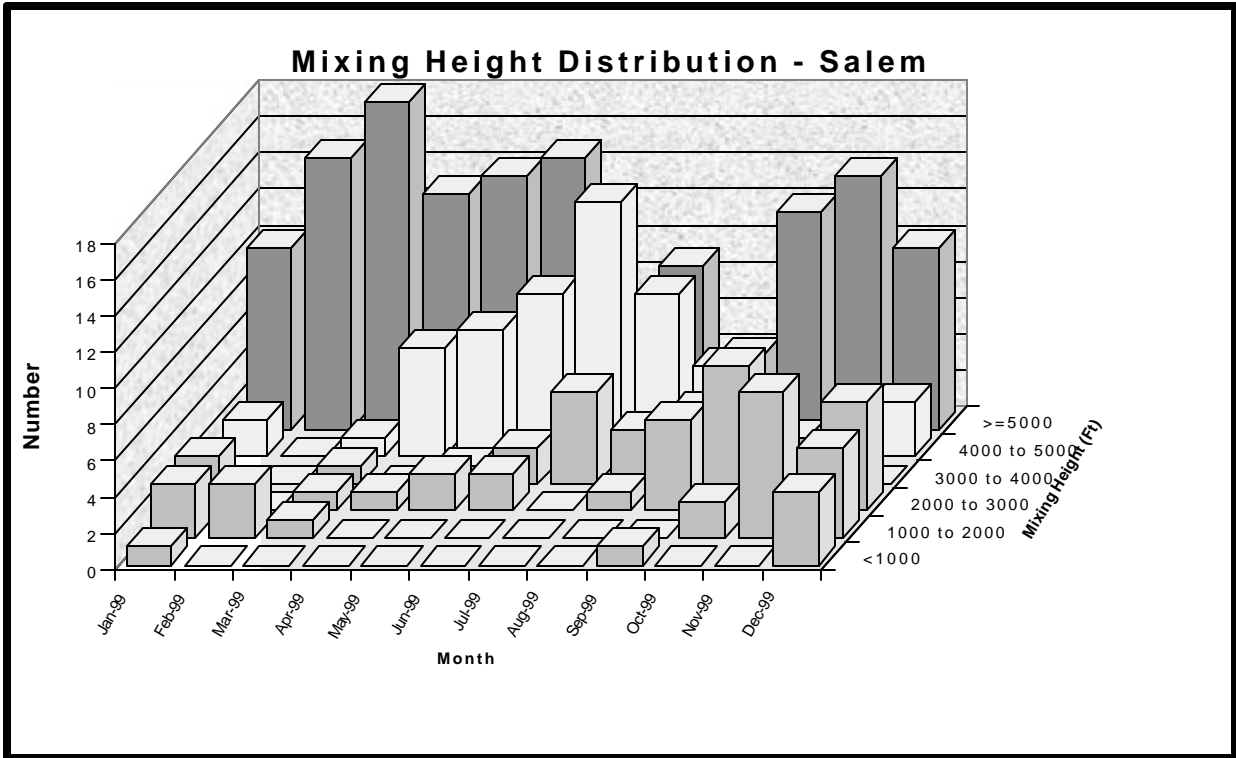


Figure 13b

