

Oregon Smoke Management Annual Report

2019



"STEWARDSHIP IN FORESTRY"

**OREGON DEPARTMENT OF FORESTRY
FIRE PROTECTION DIVISION
SMOKE MANAGEMENT AND FUELS**

OREGON SMOKE MANAGEMENT
ANNUAL REPORT
2019

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OREGON DEPARTMENT OF FORESTRY SMOKE MANAGEMENT 2019 ANNUAL REPORT

2019 SUMMARY

- **Acres burned** – Statewide 200,629 acres were ignited. This is a 14 percent increase above the 10-year average. The 10-year average is 175,942 acres.
- **Intrusions** – There were six smoke intrusions into Smoke Sensitive Receptor Areas (SSRAs) based on the new definition (see below) of a smoke intrusion. The 10-year average is nine intrusions.
- **Smoke impacts** – Most intrusions were of short impact (four hours or less). One lasted 48 hours. Another intrusion briefly exceeded the National Ambient Air Quality Standard.
- **Emissions** -- Emissions were 12,327 tons of PM 2.5, which was slightly greater than the 10-year average of 11,678 tons.

PROGRAM OVERVIEW

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 revision to the plan was completed in early 2019. Implementation started March 1 of that year.

Key elements changed in the plan include:*

1. The definition of a smoke intrusion to include a threshold for a short-term (hourly) smoke impact and a threshold for a 24-hour average impact.
2. Development of a communication framework and community response plans. Approved community response plans will allow for an exemption to the one-hour threshold of a smoke intrusion.
3. Increasing the amount of polyethylene sheeting allowed to cover burn piles to keep them dry in order to reduce smoke emissions.

*See OAR 629-048 for the details of these changes.

The plan's overall purposes are:

1. To improve the management of prescribed burning as a forest management and protection practice.

2. To minimize emissions from prescribed burning consistent with the air quality objectives of the federal Clean Air Act.

The plan is a framework through which emission reduction goals are achieved. The State Forester administers the plan, in cooperation with landowners, land management agencies, and air quality agencies. The plan applies to all lands classified as forestland and all federally managed forestland, whether or not classified, within a forest protection district. In general, all federal forestland and Class I forestland in western Oregon is regulated at a higher level but all forestland owners and managers must comply with most or all aspects of the program.

The Oregon Smoke Management Plan contains six principle objectives. These objectives are to:

1. Minimize smoke emissions resulting from prescribed burning;
2. Provide maximum opportunity for essential forestland burning;
3. Protect public health by avoiding intrusions;
4. Coordinate with other state smoke management programs;
5. Comply with state and federal air quality and visibility requirements; and

- Promote the further development of alternatives to burning and emission reduction techniques.

PROGRAM SUMMARY

Audits:

The Oregon Smoke Management Plan goal is an annual audit of approximately one-percent of the prescribed burns conducted in the Regulated Area (see map on page 4). Approximately half of the audits are conducted on the day of the burn and half are conducted prior to the burn. The purpose of these audits is to maintain consistent data reporting and monitor the effectiveness of the Oregon Smoke Management program.

The Smoke Management Field Coordinator devotes significant time to overseeing the audit program and improving the compliance for conducting audits. This year 44 audits were completed, for a total of 38,300 audited tons. The audit breakout was 21 pre-burn audits and 23 burn-day audits. Forest Service, BLM, state, and private units were audited. Two of these audits were mutually agreed upon and performed on a non-regulated neighboring agency in a successful relationship building and information-sharing visit.

Trends show that reported tons are generally within the acceptable range of audited tons. This is an improvement from the under reporting of tons in past years.

The Smoke Management Field Coordinator continues to teach both agency and non-agency personnel the proper way to estimate fuel loading through on-the-job training during site visits, burn boss refresher training courses, the regional Rx-410 Smoke Management Techniques course, and fuel load estimation briefing papers. An entire series of video tutorials on how to do a fuels transect, estimate tonnage, and use tools to help burners have also been updated and improved based on feedback from the field this year.

In addition, the SIMPLE fuel-loading calculator has been accepted by Forest Service and BLM researchers. Research and testing are ongoing as the field continues to use the new fuel-loading tool. Our federal partners have adopted its use and ODF's fuel-loading estimation methodology as their standard operating procedures. A white paper on the technique and where to get more information was developed by the Smoke Management Field Coordinator in consultation with the Forest

Service's Regional Air Quality Program Manager. It's anticipated this outreach and education effort will lead to more precise fuel-load estimates.

Meteorological Services:

Oregon Department of Forestry meteorologists give three daily Smoke Management forecasts and burning instructions for western Oregon, northeast Oregon, and south-central Oregon. Through a cooperative agreement with DEQ they are making the open burning forecast for the Willamette Valley north of Lane County throughout the year. In addition, ODF provides the Department of Agriculture field burning forecasts for the north Willamette Valley, Jefferson County, and Union County during the summer field burning season (July 1- October 15).

Other forecast services include weather support for significant weather events (heavy rain, wind, etc.) and for weather events that may increase the chances for wildfire and its spread. In addition, the meteorologists provide daily quality control of weather stations for the National Fire Danger Rating System.

PROGRAM ACCOMPLISHMENT DATA

Alternatives to Burning and Emission Reduction Techniques Tracking:

As part of a recommendation from the 2013 review of the Smoke Management Plan, the program is tracking acres of treated forestland where alternatives to burning were employed instead of using prescribed fire. In addition, emission reduction techniques of prescribed burn units are also tracked. See results:

Total statewide acres of alternatives to burning: **4,185** (minimal data provided by both federal and private land managers).

Total statewide acres using emission reduction techniques including landing, grapple, hand-piled, and right-of-way piles: **138,275**.

Total statewide acres of covered piles: **4,967**.

Alternative to burning techniques include: biomass removal, scattering material, chipping, crushing, firewood removal, non-treatment, or other

techniques for reducing fire hazard and/or creating planting spots without using prescribed fire.

Emission reduction techniques include: piling clean piles instead of broadcast or underburning, use of rapid ignition techniques, covering piles with polyethylene sheeting to keep the piles dry, and other techniques used to reduce particulate and gaseous emissions while burning.

The goal is to show the program is not exclusively focused on prescribed burning but all treatment methods that most effectively reduce fire hazard, maintain productive and resilient forests, and keep or improve air quality.

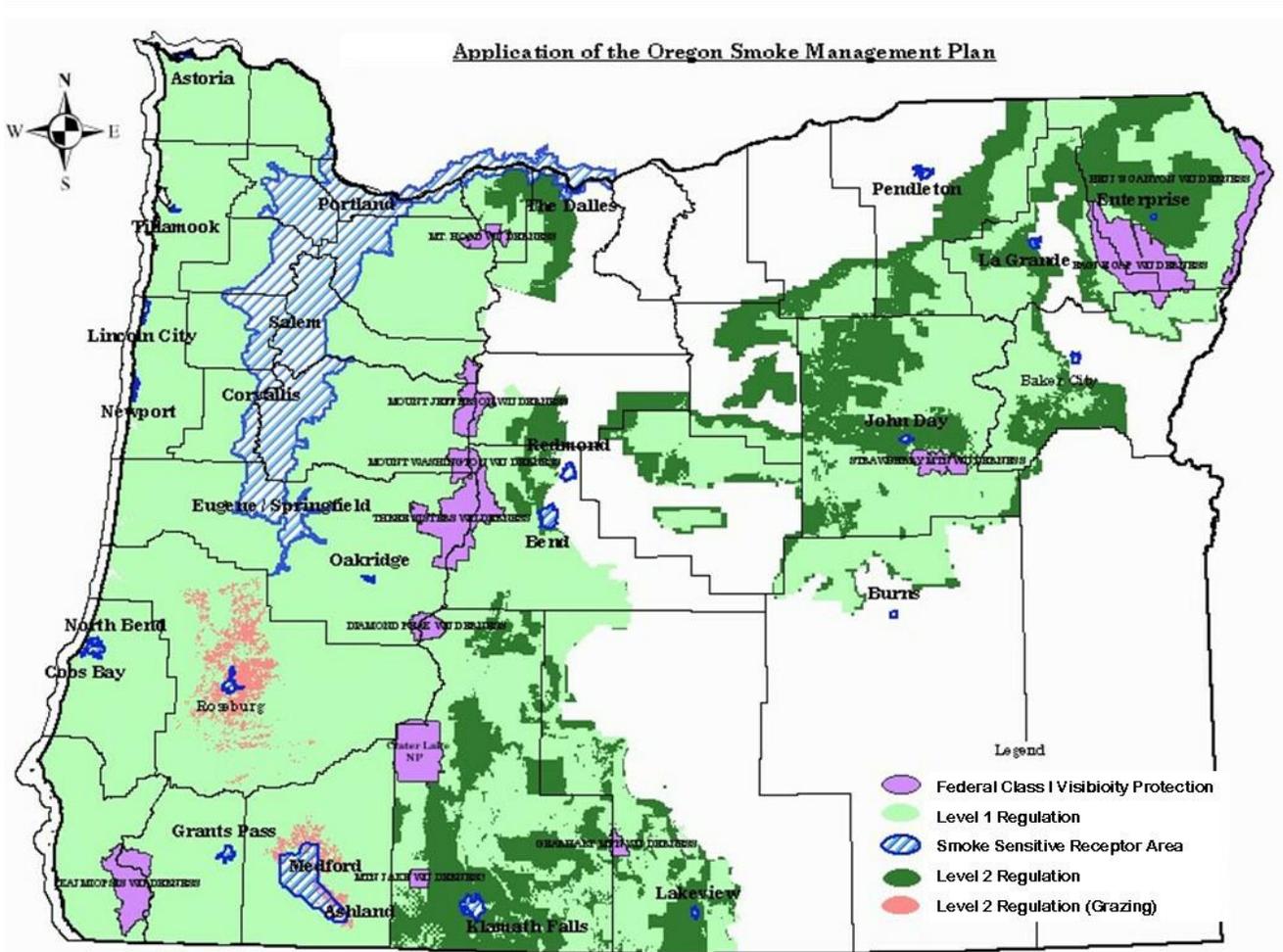
Prescribed Burning Statistics:

The following tables and figures provide detailed information about the Smoke Management program. The data details accomplishments for 2019 and compares them with previous years.



Weather balloon used to track wind direction during a prescribed burn near Oakridge.

Figure 1



**TABLE 1
2010-2019 ACCOMPLISHMENT SUMMARY**

Year	Total No. Units	No. Units Burned	Acres Burned	Tons Burned	Incidents	Intrusions	Unit/Intrusion %
2010	3,471	2,451	157,224	1,171,239		8	.33
2011	3,544	2,880	162,154	1,370,113		6	.21
2012	3,651	3,092	141,892	1,086,214		7	.23
2013	3,890	3,104	182,189	1,308,114		3	.10
2014	4,095	3,443	208,593	1,405,349		13	.38
2015	3,601	3,076	179,613	1,371,114		9	.29
2016	3,484	2,868	181,800	1,228,107		11	.38
2017	3,597	2,849	159,624	1,004,108		10	.35
2018	4,307	3,382	185,702	1,270,725		18	.53
2019	3,726	3,312	200,629	1,245,128	39*	6*	.19*
Average	3,737	3,046	175,942	1,246,021	39	9	.30

*Based on new smoke incident and intrusion definitions implemented in the 2019 rule change.

Figure 2A

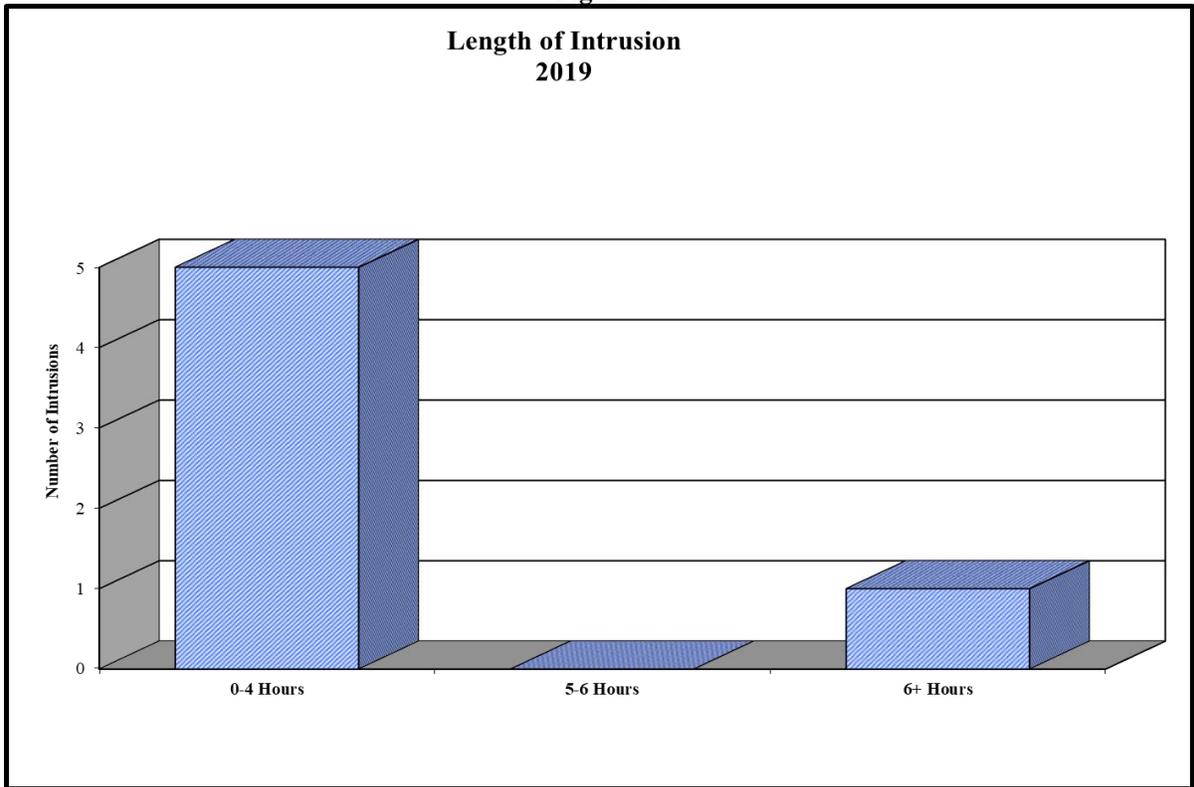


Figure 2B

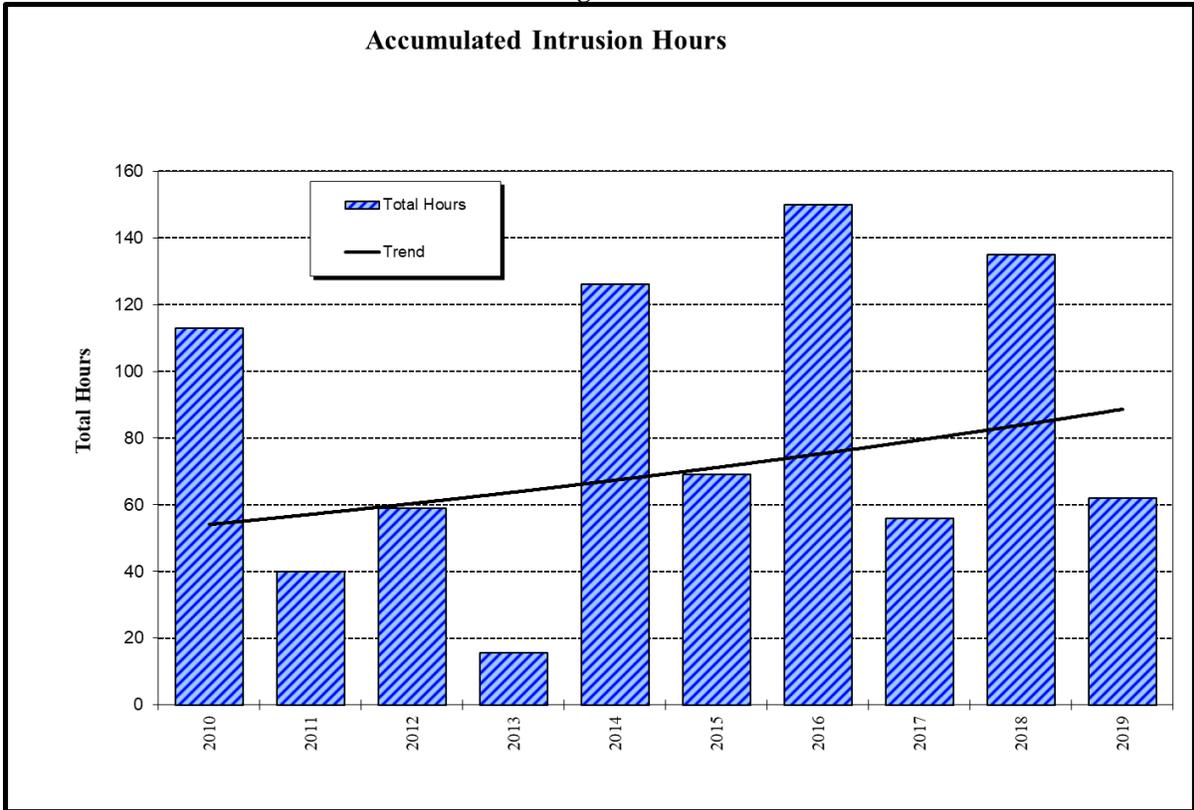
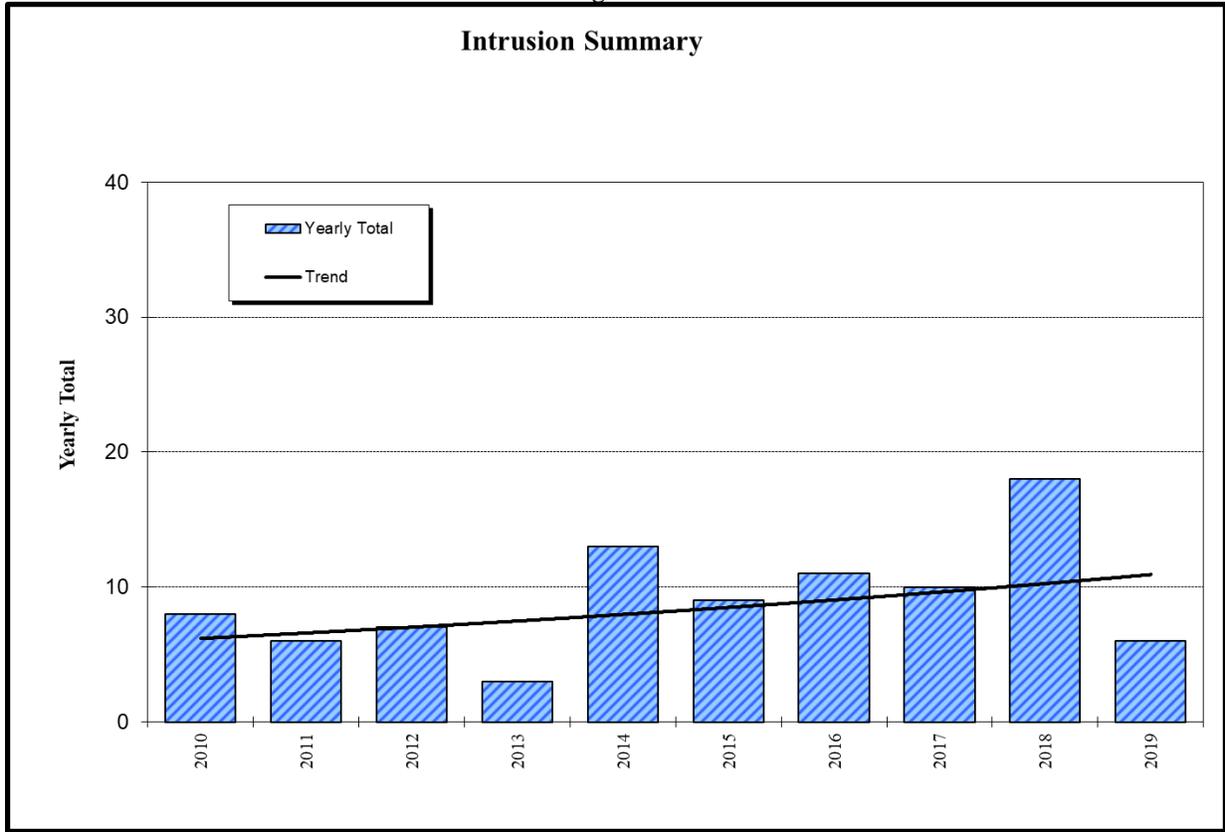


Figure 3



**TABLE 2
SMOKE INTRUSION SUMMARY – 2019**

Date	District/ Forest	Primary Area Affected	Unit No.	Owner Class	Max hrly	Length
					Max 24 hr	
May 9	Deschutes NF	Bend	194060110018	USFS	163.7mg N/A	1 hour
May 10	Wallowa- Whitman NF	Baker City	194061630011	USFS	72.3 mg N/A	1 hour
Oct 24	NE Oregon	Enterprise	189740975900	Private	203.4 mg 36.4 mg	4 hours
Nov 18	CFPA	Coos Bay/ North Bend	187400481873	State	¾ mi vsby N/A	4 hours
Dec 3	Rogue River/ Siskiyou NF	Ashland	194061010004	USFS	98.6 mg N/A	4 hours
Dec 4-5	CFPA	Coos Bay/ North Bend	187401169792 197400225492	Private State	N/A 28.9 mg	48 hours

Figure 4A

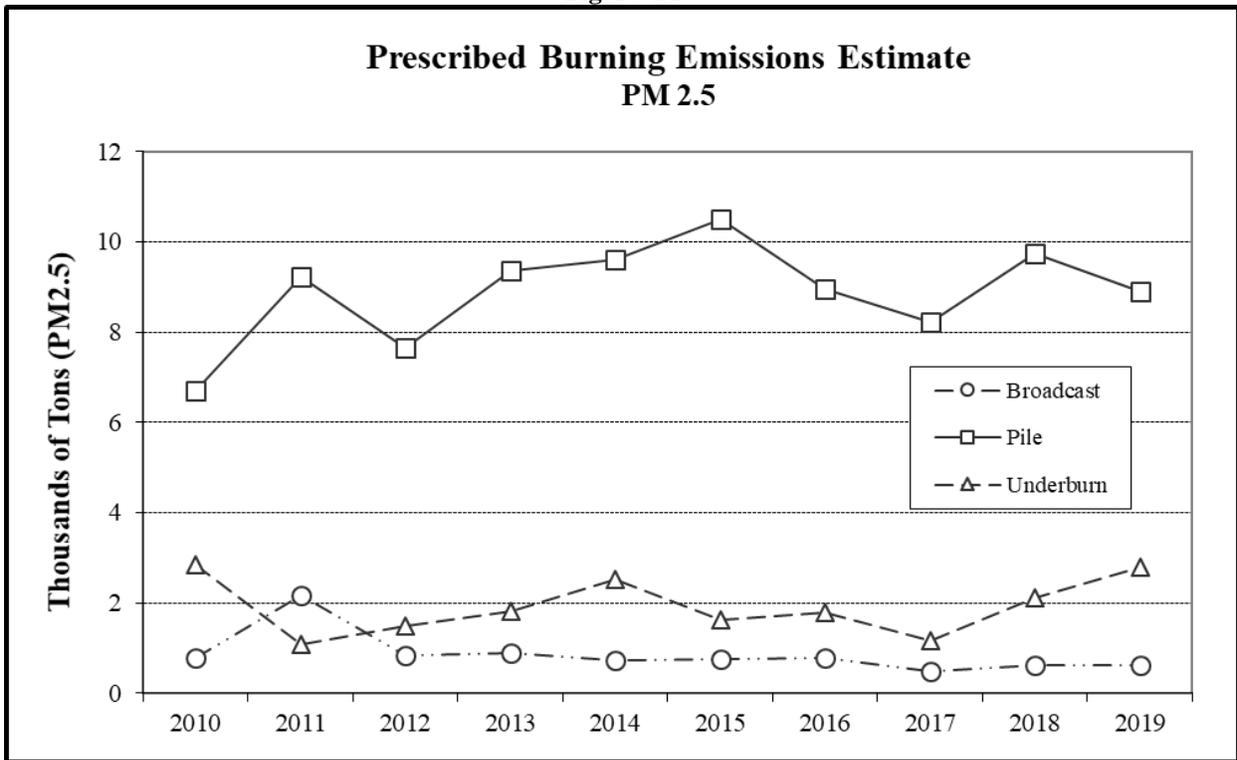


Figure 4B

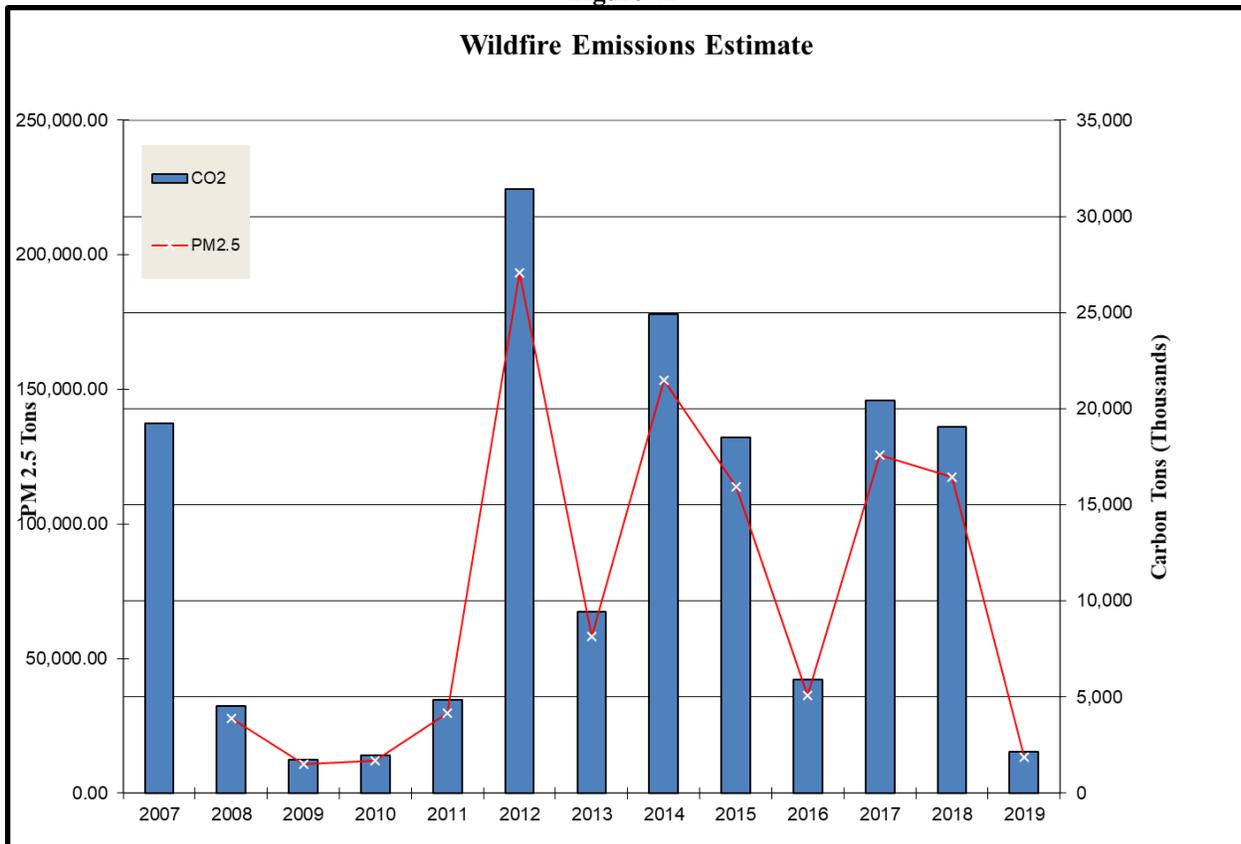
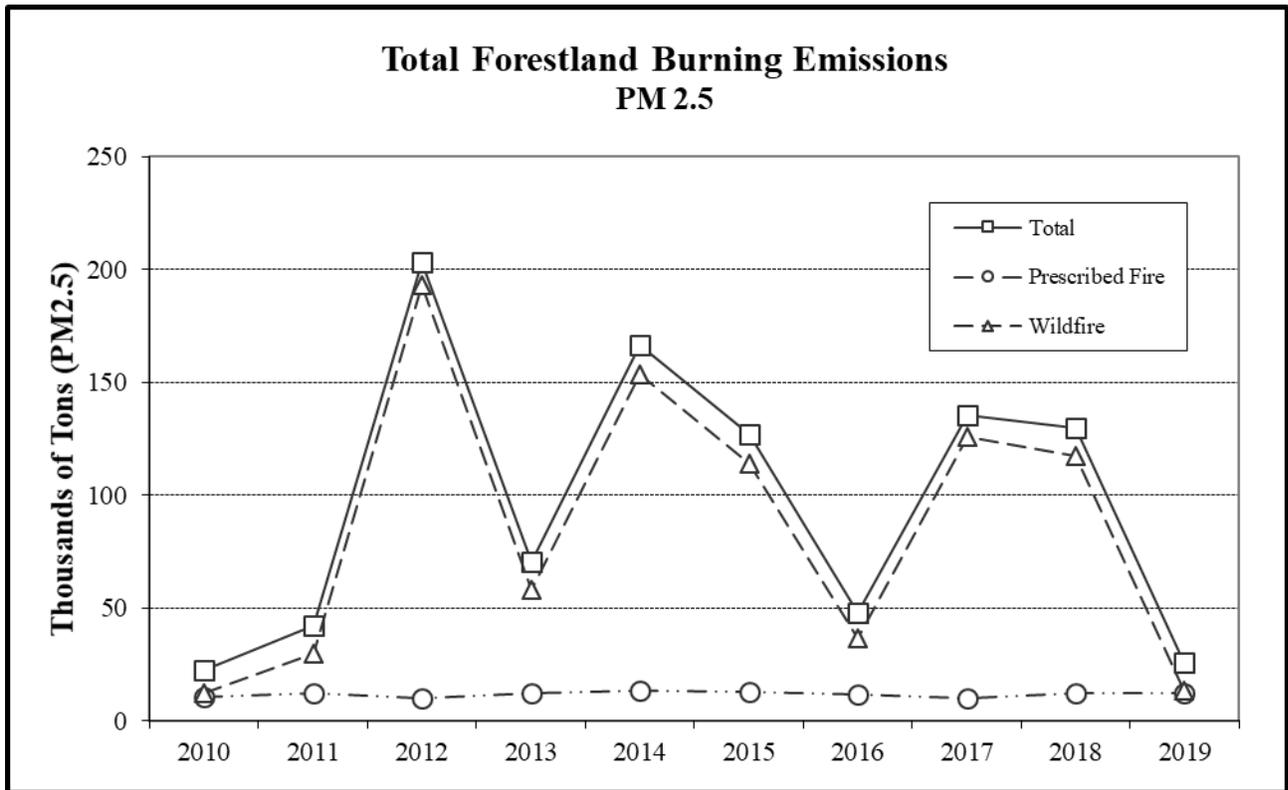


Figure 5



Burning with “fire bikes” can speed up ignitions, creating better lift for smoke ventilation.

Table 3A

PM 2.5 Emissions (Tons) Broadcast										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Astoria	0	0	0	0	0	4	0	0	0	0
Central Oregon	0	916	0	3	13	15	8	0	0	0
Coos FPA	340	773	221	307	170	289	66	131	191	115
Douglas FPA	21	27	56	45	0	105	60	27	20	19
Forest Grove	5	13	0	10	0	0	9	0	0	15
Klamath-Lake	40	1	0	0	0	0	0	0	0	0
North Cascade	0	0	0	0	0	0	0	0	0	0
Northeast Oregon	204	68	106	0	0	0	68	24	0	0
South Cascade	0	1	1	1	0	0	0	0	0	0
Southw est Oregon	18	12	0	2	3	8	3	9	0	0
Tillamook	0	0	0	5	0	0	0	0	22	0
Walker Range	0	0	0	0	0	0	0	0	0	0
West Oregon	81	44	15	38	9	5	0	49	50	17
Western Lane	25	50	1	36	6	69	15	129	156	208
Columbia Gorge SA	0	0	0	0	0	0	0	0	0	0
Crater Lake NP	11	0	0	0	0	0	0	0	0	0
Deschutes NF	3	0	0	68	0	12	13	0	0	59
Fremont NF	0	0	0	0	0	0	133	59	75	179
Klamath NF	0	0	0	0	0	0	0	0	0	0
Malheur NF	0	0	357	0	371	0	1	0	0	0
Mt. Hood NF	0	0	0	0	0	0	0	0	0	0
Ochoco NF	0	0	3	17	8	0	8	0	0	2
Rogue/Siskiyou NF	0	1	4	65	9	22	0	11	0	0
Siuslaw NF	0	0	0	0	0	0	0	0	0	0
Umatilla NF	31	143	19	0	44	53	85	0	0	0
Umpqua NF	4	41	12	0	0	17	0	8	0	0
Wallow a-Whitman NF	9	68	20	243	89	52	308	40	92	18
Willamette NF	2	2	12	20	9	98	0	1	10	0
Winema NF	0	0	15	30	0	0	1	0	0	0
Total	794	2160	842	890	731	749	778	488	616	632

Table 3B

PM 2.5 Emissions (Tons) Pile										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Astoria	142	305	490	525	326	377	446	559	654	508
Central Oregon	128	151	174	148	295	256	294	48	72	97
Coos FPA	0	0	0	0	0	0	4	1	5	0
Douglas FPA	748	837	915	1125	1266	1259	1130	1122	1289	1323
Forest Grove	720	533	515	815	1223	1180	934	1065	1281	728
Klamath-Lake	273	250	311	545	351	299	196	311	318	458
North Cascade	107	139	54	80	292	871	338	59	93	52
Northeast Oregon	164	213	283	465	306	405	216	196	687	487
South Cascade	288	1436	312	1276	829	438	952	823	813	477
Southw est Oregon	994	1130	754	886	778	934	708	596	780	648
Tillamook	411	453	632	463	683	576	519	483	505	750
Walker Range	114	235	138	296	236	236	144	211	174	184
West Oregon	1	0	0	0	1	0	0	0	0	0
Western Lane	873	918	898	1117	1230	1261	917	1012	1184	904
Columbia Gorge SA	195	149	119	118	196	156	90	477	562	391
Crater Lake NP	0	0	0	0	0	0	0	0	0	0
Deschutes NF	0	0	0	1	0	3	2	0	0	1
Fremont NF	312	253	230	185	208	306	170	245	377	348
Klamath NF	7	8	10	24	73	83	117	3	2	182
Malheur NF	2	4	2	6	10	5	14	5	1	0
Mt. Hood NF	127	722	185	251	309	389	603	323	89	127
Ochoco NF	33	51	21	33	74	51	23	47	18	47
Rogue/Siskiyou NF	0	1	105	75	0	21	6	3	0	0
Siuslaw NF	599	601	741	261	346	521	241	87	225	298
Umatilla NF	29	34	23	22	33	22	22	4	2	26
Umpqua NF	26	18	25	15	30	150	75	58	167	107
Wallow a-Whitman NF	153	46	201	115	83	133	75	32	23	50
Willamette NF	200	559	353	327	244	165	388	266	227	390
Winema NF	38	72	128	143	107	280	252	126	113	307
Total	6696	9219	7656	9366	9618	10495	8941	8221	9737	8893

Table 3C

PM 2.5 Emissions (Tons) Underburn										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Astoria	0	0	0	0	0	0	0	0	0	0
Central Oregon	277	0	20	1	10	0	0	0	0	0
Coos FPA	0	0	0	0	0	0	0	1	0	0
Douglas FPA	0	0	0	0	0	0	0	0	0	0
Forest Grove	0	0	0	0	0	0	0	0	0	0
Klamath-Lake	1	9	0	0	0	0	0	0	0	15
North Cascade	0	0	0	0	0	0	0	0	0	0
Northeast Oregon	0	0	0	0	0	0	0	0	0	0
South Cascade	0	0	0	0	0	0	0	0	0	0
Southw est Oregon	22	11	26	31	5	17	17	2	11	21
Tillamook	0	0	0	0	0	0	0	0	0	0
Walker Range	0	0	0	0	0	0	0	0	0	0
West Oregon	0	0	0	0	0	0	0	0	0	0
Western Lane	0	0	0	0	0	0	0	0	0	0
Columbia Gorge SA	0	0	0	0	0	0	0	0	0	0
Crater Lake NP	0	0	0	0	0	0	0	0	0	0
Deschutes NF	174	129	58	143	292	200	129	225	307	496
Fremont NF	677	248	190	142	209	680	294	233	389	193
Klamath NF	0	0	0	0	0	0	0	0	0	0
Malheur NF	541	34	524	514	533	11	481	268	549	182
Mt. Hood NF	61	28	14	43	8	1	20	0	0	0
Ochoco NF	46	91	0	89	79	103	65	99	123	160
Rogue/Siskiyou NF	103	157	4	25	49	59	88	48	23	83
Siuslaw NF	0	0	0	0	0	0	0	0	0	0
Umatilla NF	247	170	232	355	411	267	1	0	108	179
Umpqua NF	106	0	33	58	139	10	60	28	57	2
Wallow a-Whitman NF	320	83	228	330	495	162	475	67	306	193
Willamette NF	37	59	45	40	164	81	92	97	108	20
Winema NF	227	76	116	45	138	34	68	97	125	1259
Total	2839	1095	1490	1816	2532	1625	1790	1165	2106	2803



New rules allow greater burn window opportunities. Successful landscape burn near Chemult.

Figure 6

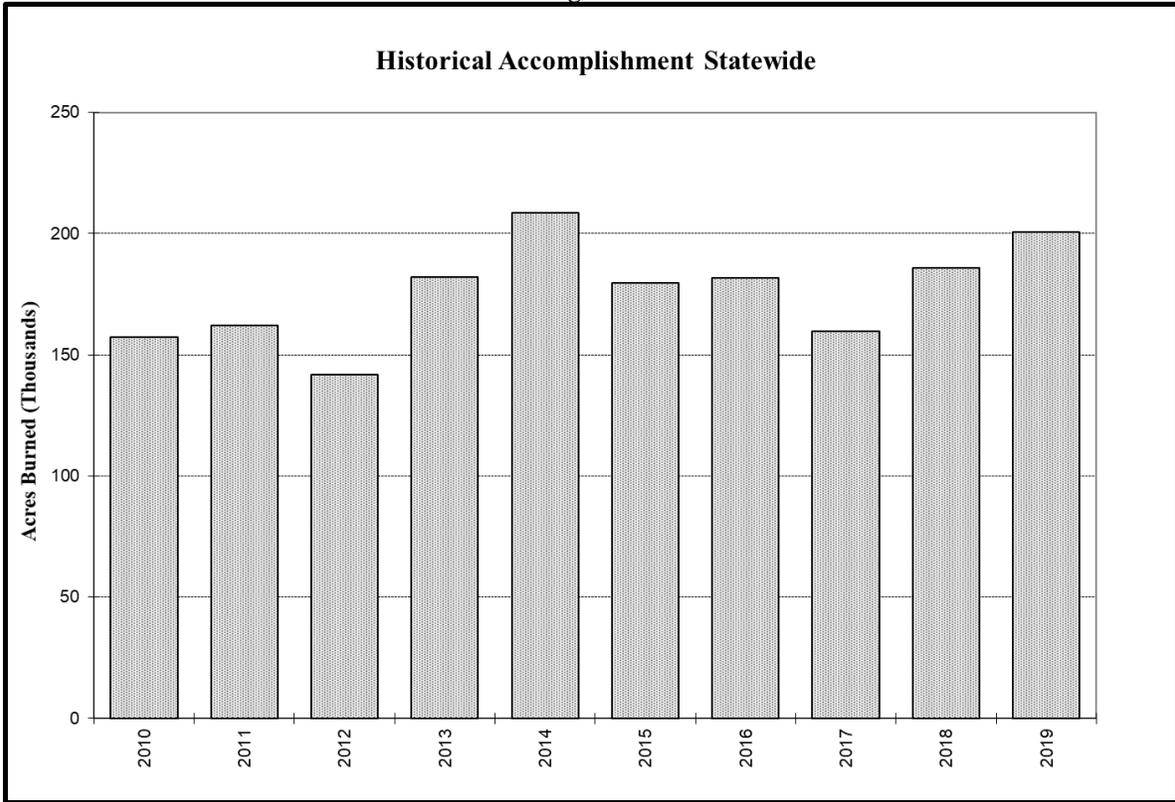


Figure 7

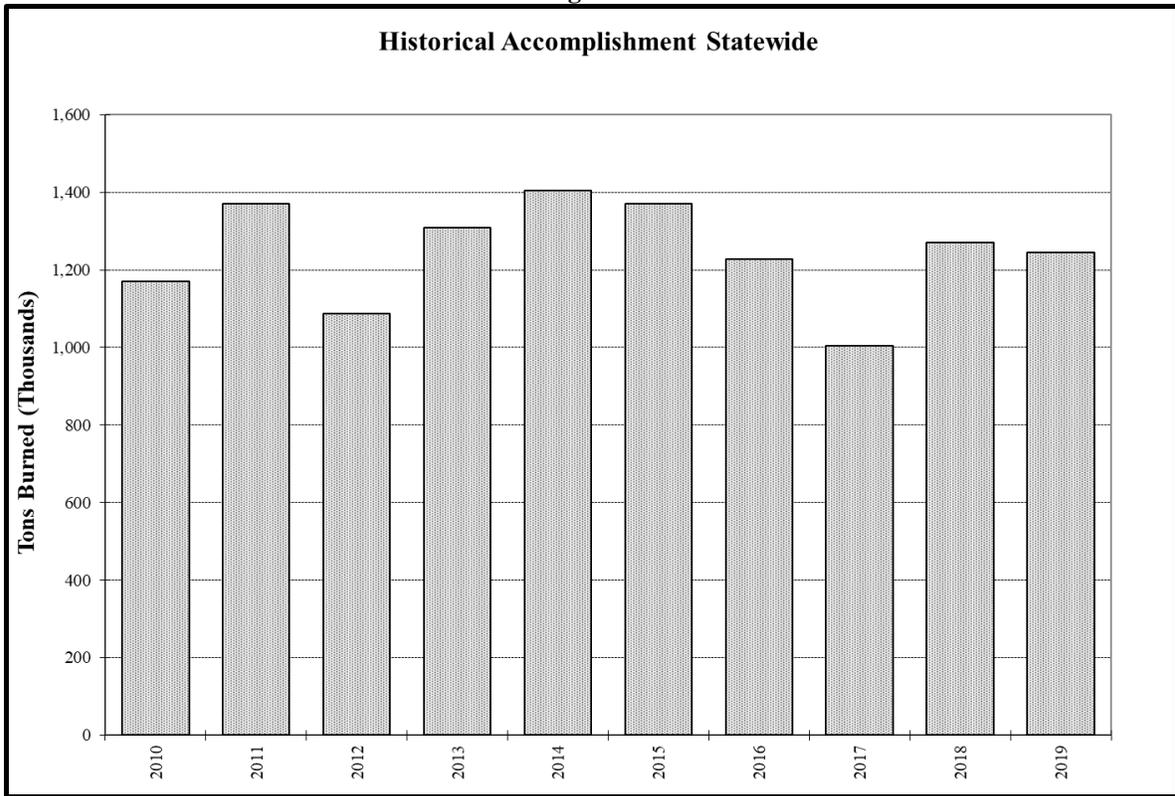


Figure 8

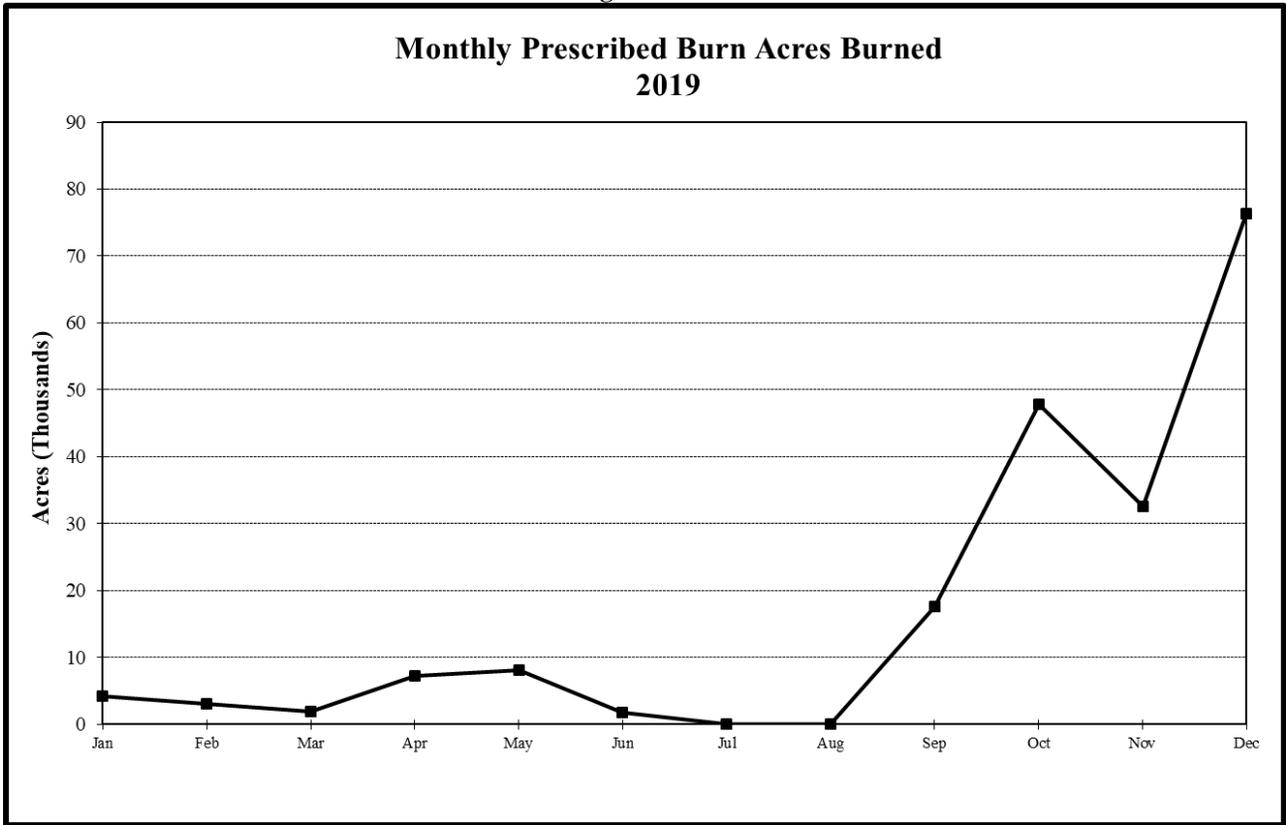
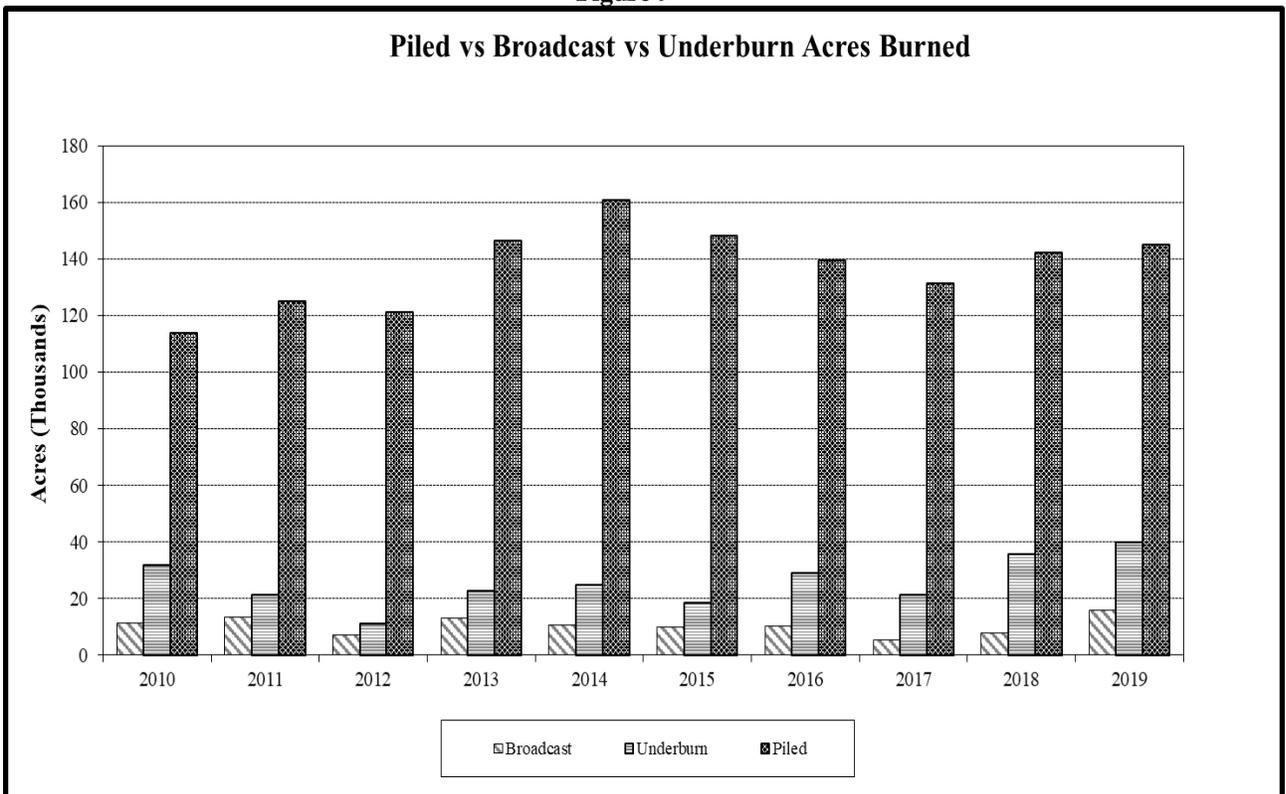


Figure 9



**Table 4
Burn Summary by District -- 2019**

District/Forest	Units burned	Acres burned	Tons burned
Astoria	100	3,290	48,720
Central Oregon	78	10,172	21,282
Coos District	0	0	0
Coos FPA	285	16,327	148,655
Douglas FPA	334	14,937	75,851
Forest Grove	138	4,117	45,304
Klamath-Lake	8	2,400	7,359
North Cascade	118	4,744	43,704
Northeast	81	8,995	56,363
South Cascade	324	12,477	59,944
Soluthwest	172	10,412	90,315
Tillamook	59	4,531	18,279
Walker Range	0	0	0
Western Lane	241	7,086	56,606
West Oregon	288	10,587	89,609
Columbia Gorge SA	1	1	1
Crater Lake NP	2	21	105
Deschutes NF	360	25,093	87,358
Fremont NF	20	8,583	59,652
Klamath NF	0	0	0
Malheur NF	122	9,384	29,364
Mt Hood NF	91	1,840	5,563
Ochoco NF	9	6,790	18,045
Rogue River\Siskiyou NF	119	7,202	42,261
Siuslaw NF	61	2,254	2,234
Umatilla NF	47	2,632	28,823
Umpqua NF	82	1,837	4,779
Wallowa-Whitman NF	88	6,762	61,125
Willamette NF	61	2,121	28,470
Winema NF	23	16,034	115,357
District Total	2,226	110,075	761,991
Forest Total	1,086	90,554	483,137
Grand Total	3,312	200,629	1,245,128

**Table 5
Tons Burned by Month by District
2019**

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria	800	216		640					5,060	9,137	10	32,857	48,720
Central Oregon	164	1,156	303						150	13,177	1,855	4,477	21,282
Coos District													0
Coos FPA	20,297	395	2,398			300				5,373	21,163	98,729	148,655
Douglas FPA	7,954	115			300				27	9,057	8,829	49,569	75,851
Forest Grove	270	356	637	177	20				862	11,242	2,347	29,393	45,304
Klamath-Lake	1,244	245	2,712	1,632						1,360		166	7,359
North Cascade	1,698	321	35	50						7,814	6,126	27,660	43,704
Northeast	45		10	10					145	17,915	35,098	3,140	56,363
South Cascade	471		56							23,386	15,144	20,887	59,944
Southwest	4,879	2,152	642	1,976	972					240	6,266	73,188	90,315
Tillamook		1,757							1,711	9,980	2,272	2,559	18,279
Western Lane	957	131	3,460	2,702	2,467	1,160				9,687	19,235	16,807	56,606
West Oregon	1,229			420	400					26,834	15,011	45,715	89,609
Columbia Gorge SA		1											1
Crater Lake NP						25				50		30	105
Deschutes NF	672	2,872		3,735	6,085	10,026			18,909	11,974	14,203	18,882	87,358
Fremont NF	750			7,540	10,695	1,200			1,256	21,317	13,914	2,980	59,652
Malheur NF					7,689	15			1,299	15,270	3,942	1,149	29,364
Mt Hood NF						4				1,941	2,855	763	5,563
Ochoco NF				2,040					9,600	5,925	480		18,045
Rogue/Siskiyou NF	1,525	4,216	3,720	2,810	1,300					9,913	2,461	16,316	42,261
Siuslaw NF										451	941	842	2,234
Umatilla NF			54		850		10		624	15,638	11,551	96	28,823
Umpqua NF		101			38	225			123	900	227	3,165	4,779
Wallow-Whitman NF		75			8,677				3,094	30,931	10,278	8,070	61,125
Willamette NF									1,276	19,456	5,454	2,284	28,470
Winema NF				7,820	1,685	1,720			42,128	60,950	754	300	115,357
District Total	40,008	6,844	10,253	7,607	4,159	1,460	0	0	7,955	145,202	133,356	405,147	761,991
Forest Total	2,947	7,265	3,774	23,945	37,019	13,215	10	0	78,309	194,716	67,060	54,877	483,137
Grand Total	42,955	14,109	14,027	31,552	41,178	14,675	10	0	86,264	339,918	200,416	460,024	1,245,128

**Table 6
Acres Burned by Month by District
2019**

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria	47	1		32					372	699	1	2,138	3,290
Central Oregon	86	190	155						150	7,865	467	1,259	10,172
Coos District													0
Coos FPA	1,349	196	121			100				829	1,732	12,000	16,327
Douglas FPA	857	39			30				3	1,043	1,410	11,555	14,937
Forest Grove	14	27	26	14	2				145	1,475	398	2,016	4,117
Klamath-Lake	320	35	678	408						324		635	2,400
North Cascade	183	111	2	18						838	808	2,784	4,744
Northeast	15		6	10					170	2,142	6,292	360	8,995
South Cascade	41		6							3,439	2,270	6,721	12,477
Southwest	620	411	107	487	222					59	399	8,107	10,412
Tillamook		192							631	2,798	593	317	4,531
Walker Range													0
Western Lane	71	41	267	177	111	70				851	2,245	3,253	7,086
West Oregon	116			28	25					2,162	1,578	6,678	10,587
Columbia Gorge SA		1											1
Crater Lake NP						5				10		6	21
Deschutes NF	96	1,121		1,584	1,910	924			2,930	2,416	4,658	9,454	25,093
Fremont NF	171			580	1,340	300			111	1,783	2,305	1,993	8,583
Malheur NF					2,502	5			248	4,590	1,373	666	9,384
Mt Hood NF						1				744	792	303	1,840
Ochoco NF				2,015					3,000	1,675	100		6,790
Rogue/Siskiyou NF	235	590	448	309	168					1,213	480	3,759	7,202
Siuslaw NF										723	1,018	513	2,254
Umatilla NF			54		170		10		172	1,320	888	18	2,632
Umpqua NF		60			2	25			50	549	124	1,027	1,837
Wallowa-Whitman NF		5			1,452				499	2,967	1,167	672	6,762
Willamette NF									242	1,650	205	24	2,121
Winema NF				1,564	147	344			8,924	3,690	1,254	111	16,034
District Total	3,719	1,243	1,368	1,174	390	170	0	0	1,471	24,524	18,193	57,823	110,075
Forest Total	502	1,777	502	6,052	7,691	1,604	10	0	16,176	23,330	14,364	18,546	90,554
Grand Total	4,221	3,020	1,870	7,226	8,081	1,774	10	0	17,647	47,854	32,557	76,369	200,629

**Table 7
Burn Data by Owner Type
2019**

District/Forest	Private			State, County, Muni			Federal (Except USFS)			USFS		
	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons
Astoria	80	2,284	36,235	20	1,006	12,485	0	0	0			
Central Oregon	41	1,432	4,545	11	301	1,699	26	8,439	15,038			
Coos District	0	0	0	0	0	0	0	0	0			
Coos FPA	255	14,224	139,734	6	448	4,337	24	1,655	4,584			
Douglas FPA	292	12,738	68,641	1	119	475	41	2,080	6,735			
Forest Grove	122	3,578	41,858	14	484	3,402	2	55	44			
Klamath-Lake	1	60	130	0	0	0	7	2,340	7,229			
North Cascade	103	3,421	36,004	11	1,066	7,375	4	257	325			
Northeast	81	8,995	56,363	0	0	0	0	0	0			
South Cascade	312	10,664	59,247	0	0	0	12	1,813	697			
Southwest	120	8,024	80,462	19	611	1,259	33	1,777	8,594			
Tillamook	27	1,397	9,986	32	3,134	8,293	0	0	0			
Walker Range	0	0	0	0	0	0	0	0	0			
Western Lane	222	5,867	53,216	5	392	1,939	14	827	1,451			
West Oregon	261	9,208	82,489	22	439	5,363	5	940	1,757			
Columbia Gorge SA							1	1	1			
Crater Lake NP							2	21	105			
Deschutes NF										360	25,093	87,358
Fremont NF										20	8,583	59,652
Klamath NF										0	0	0
Malheur NF										122	9,384	29,364
Mt Hood NF										91	1,840	5,563
Ochoco NF										9	6,790	18,045
Rogue/Siskiyou NF										119	7,202	42,261
Siuslaw NF										61	2,254	2,234
Umatilla NF										47	2,632	28,823
Umpqua NF										82	1,837	4,779
Wallowa-Whitman NF										88	6,762	61,125
Willamette NF										61	2,121	28,470
Winema NF										23	16,034	115,357
Totals	1,917	81,892	668,910	141	8,000	46,627	171	20,205	46,560	1,083	90,532	483,031