

Oregon Smoke Management Annual Report

2020



"STEWARDSHIP IN FORESTRY"

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

OREGON SMOKE MANAGEMENT
ANNUAL REPORT
2020

Prepared By:
FIRE PROTECTION DIVISION
OREGON DEPARTMENT OF FORESTRY
2600 STATE STREET
SALEM, OREGON 97310

TABLE OF CONTENTS

	Page
2020 Summary.....	1
Program Overview.....	1
Program Summary.....	2
Audits.....	2
Meteorological Services.....	2
Program Accomplishment Data.....	2
Alternatives to Burning and Emission Reduction Techniques Tracking.....	2
Prescribed Burning Statistics.....	3
 FIGURES	
1 Smoke Management Regulated Areas.....	4
2A Length of Intrusion.....	5
2B Accumulated Intrusion Hours.....	5
3 Yearly Intrusion Summary.....	6
4A Prescribed Burning Emissions Estimate (PM2.5).....	7
4B Wildfire Emissions Estimate (Carbon and PM2.5).....	7
5 Total Forestland Burning Emissions (PM2.5).....	8
6 Historical Accomplishment -- Total Acres Burned (Statewide).....	11
7 Historical Accomplishment -- Total Tons Burned (Statewide).....	11
8 Monthly Prescribed Burn Acres Burned.....	12
9 Piled vs Broadcast vs. Underburn Acres Burned.....	12
 TABLES	
1 2011 – 2020 Accomplishment Summary.....	4
2 Smoke Intrusion Summary -- 2020.....	6
3A Broadcast Burning PM2.5 Emissions by District.....	9
3B Pile Burning PM2.5 Emissions by District.....	9
3C Underburning PM2.5 Emissions by District.....	10
4 Burn Summary by District -- 2020.....	13
5 Tons Burned by Month by District -- 2020.....	14
6 Acres Burned by Month by District -- 2020.....	15
7 2020 Burn Data by Owner Type.....	16



OREGON DEPARTMENT OF FORESTRY

SMOKE MANAGEMENT 2020 ANNUAL REPORT

2020 SUMMARY

- **Acres burned** – Statewide 130,997 acres were ignited. Due the COVID-19 pandemic and epic September wildfires, this was lowest number of acres burned during the last 10 years. The 10-year average is 173,319 acres.
- **Intrusions** – There were no smoke intrusions into Smoke Sensitive Receptor Areas (SSRAs) based on the new definition (see below) of a smoke intrusion. This represents the lowest number of intrusions ever recorded. The 10-year average is eight intrusions.
- **Smoke impacts** – There was only one smoke impact – a smoke incident – recorded in Florence.
- **Emissions** -- Emissions were 8,266 tons of PM 2.5. This is considerably less than the 10-year average of 11,472 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 classified or not, 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 principal 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 40 audits were completed, for a total of 30,884 audited tons. The audit breakout was 20 pre-burn audits and 20 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 continue to 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 provide 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: 2,504 (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: 17,276.

Total statewide acres of covered piles: 12,484.

Alternative to burning techniques include biomass removal, scattering material, chipping, crushing, firewood removal, non-treatment, or other techniques for reducing fire hazards and/or creating planting spots without using prescribed fire.

Emission reduction techniques including 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 2020 and compares them with previous years.



Rapid ignition creates less smoke.

Figure 1

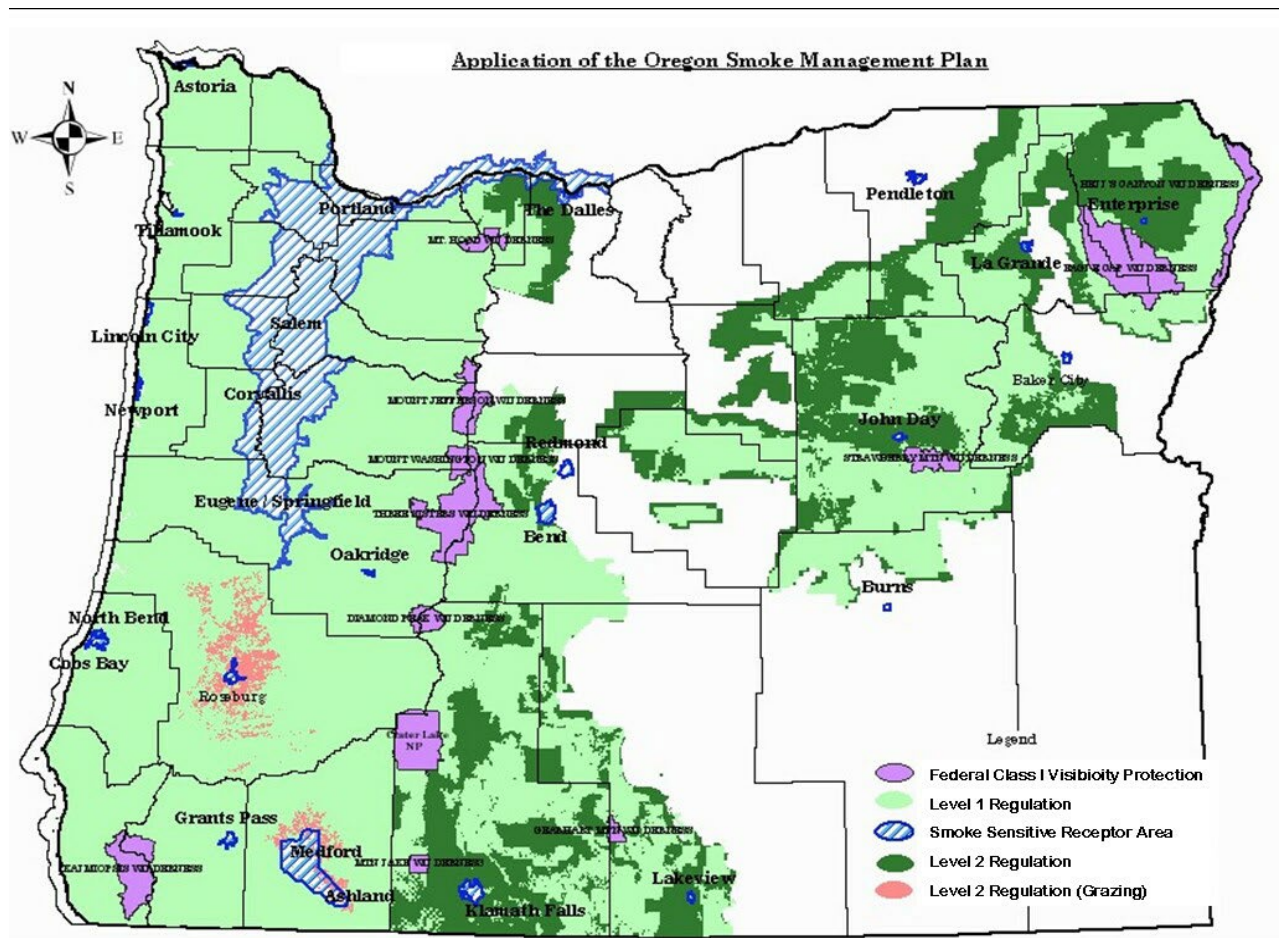


TABLE 1
2011-2020 ACCOMPLISHMENT SUMMARY

Year	Total No. Units	No. Units Burned	Acres Burned	Tons Burned	Incidents	Intrusions	Intrusion/ignition%
2011	3,544	2,880	162,154	1,370,113		6	.17 [^]
2012	3,651	3,092	141,892	1,086,214		7	.19 [^]
2013	3,890	3,104	182,189	1,308,114		3	.08 [^]
2014	4,095	3,492	208,593	1,405,349		13	.31 [^]
2015	3,601	3,101	179,613	1,371,114		9	.24 [^]
2016	3,484	2,928	181,800	1,228,107		11	.30 [^]
2017	3,597	2,868	159,624	1,004,108		10	.29 [^]
2018	4,307	3,388	185,702	1,270,725		18	.42 [^]
2019	3,726	3,319	200,629	1,245,128	39*	6*	.14 [^]
2020	3,146	2,287	130,997	863,875	1	0	.00 [^]
Average	3,704	3,029	173,319	1,215,285	20	8	.21[^]

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

[^]Values were all recalculated from 2011 to intrusions per ignition.

Figure 2A

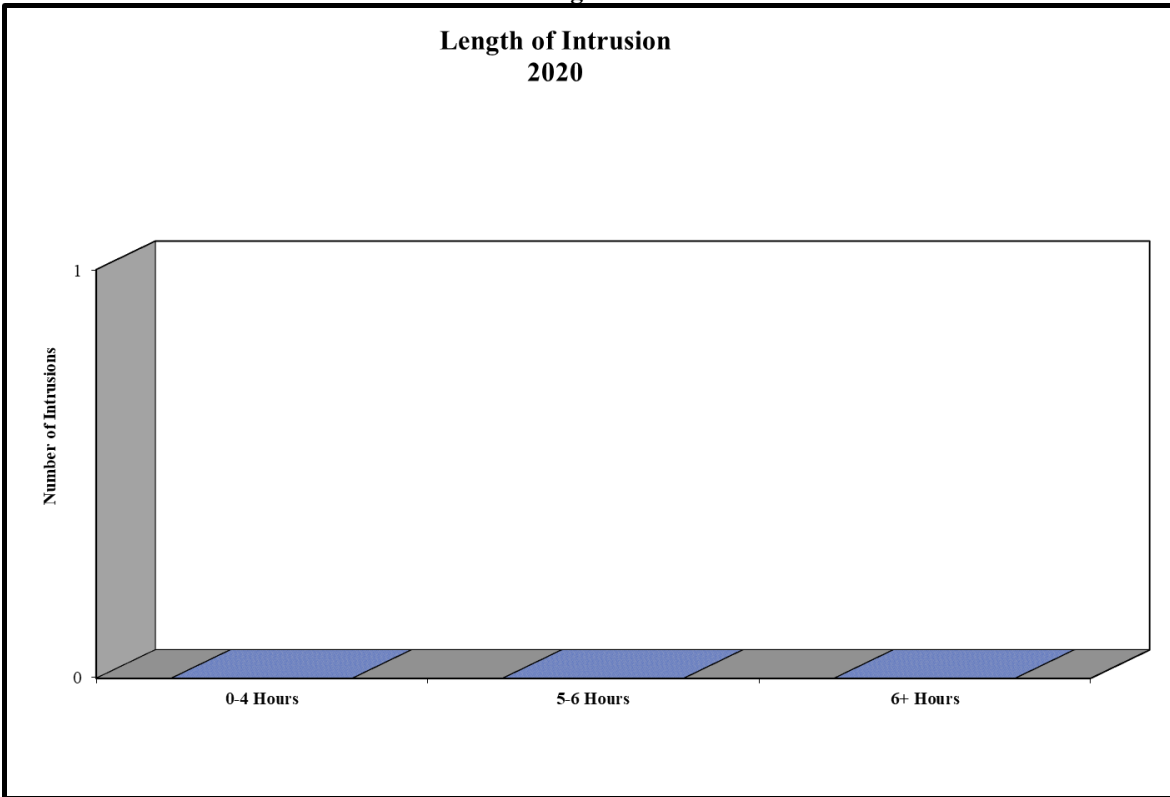
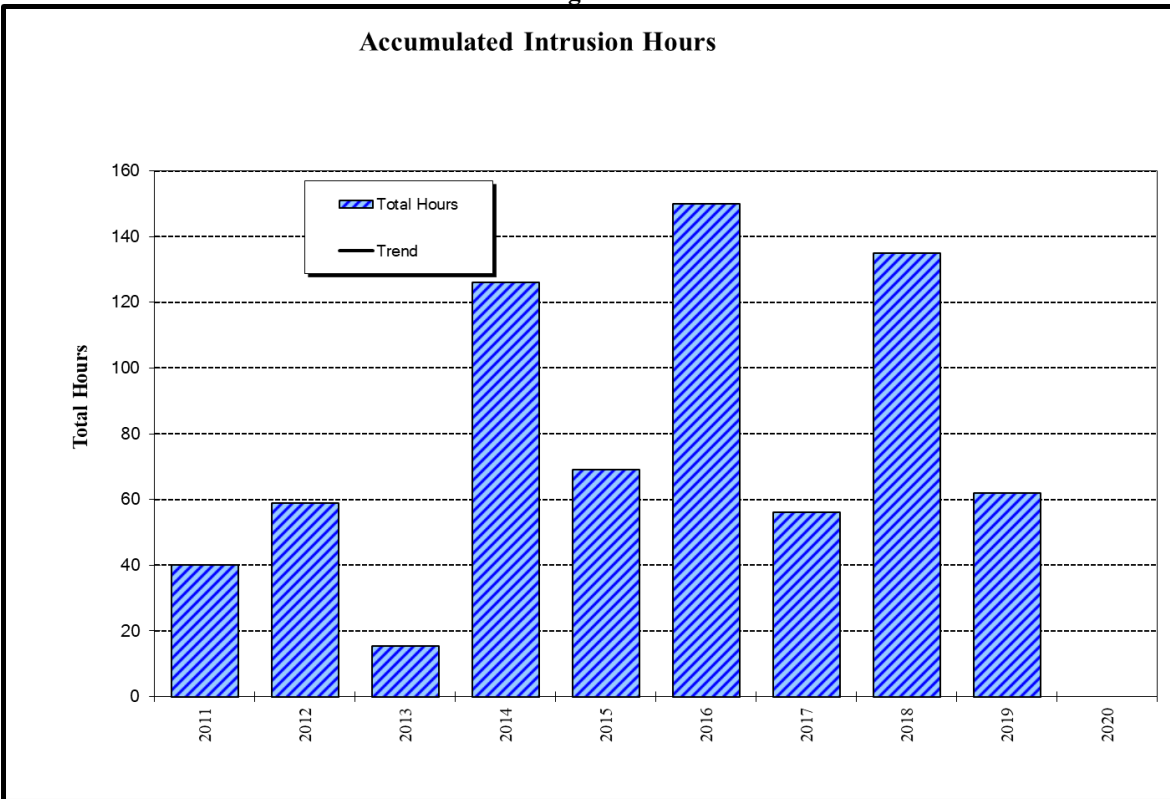
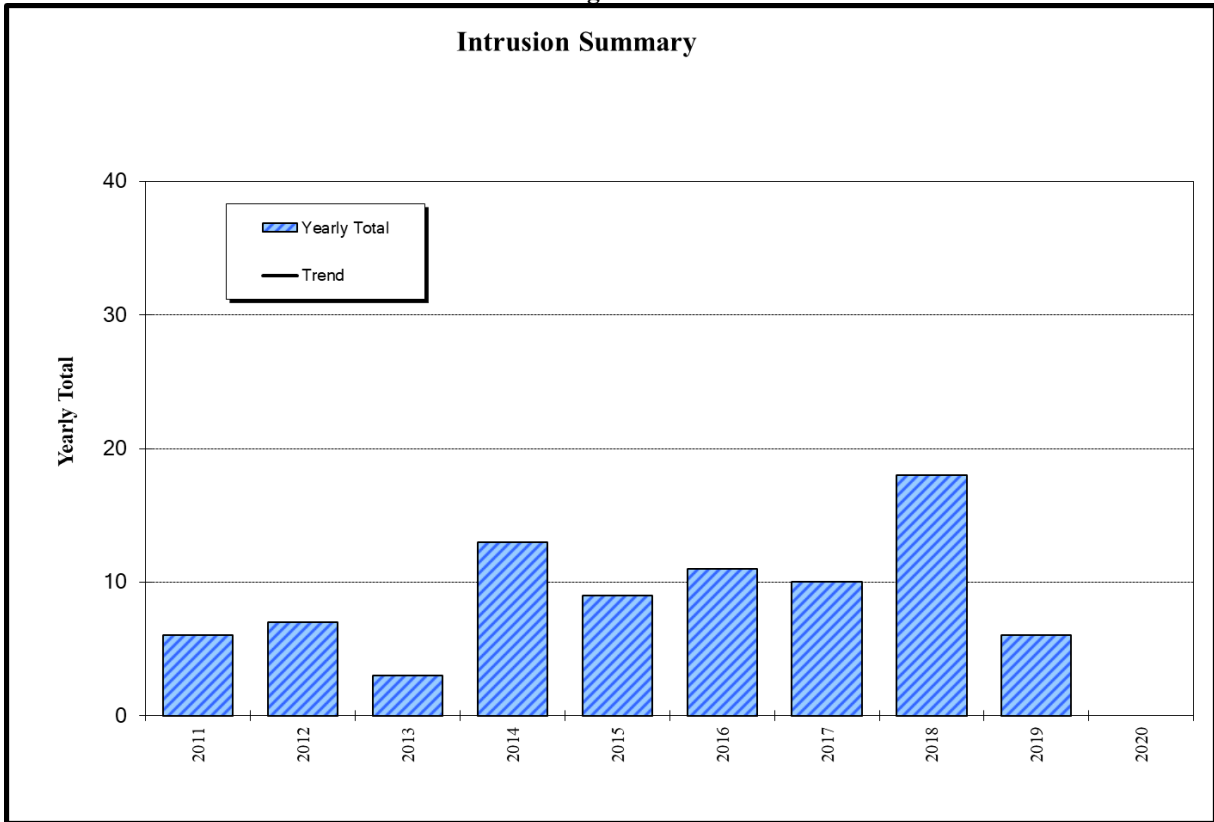


Figure 2B



*No trend data available due to zero intrusions in 2020.

Figure 3



*No trend data available due to zero intrusions in 2020.

**TABLE 2
SMOKE INTRUSION SUMMARY – 2020**

Date	District/ Forest	Primary Area Affected	Unit No.	Owner Class	Max hrly	
					Max 24 hr	Length
No	intrusions	recorded	in	2020		

Figure 4A

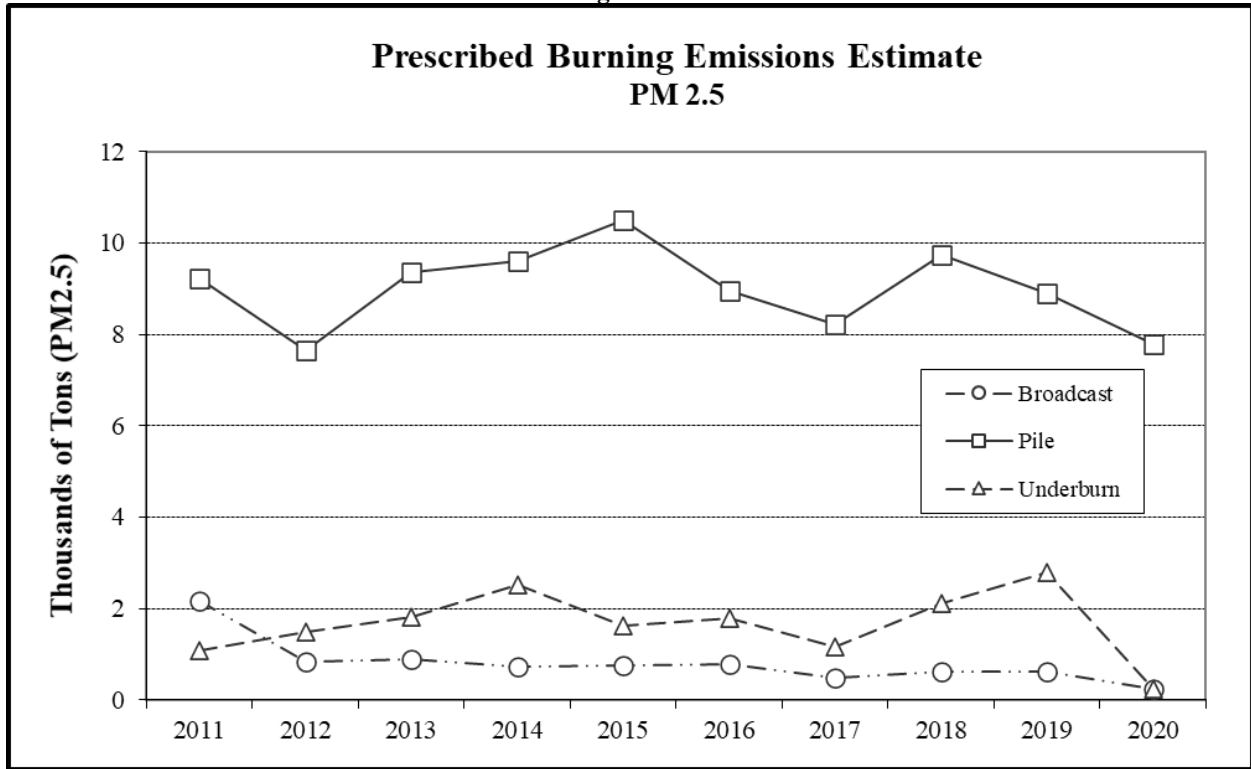


Figure 4B

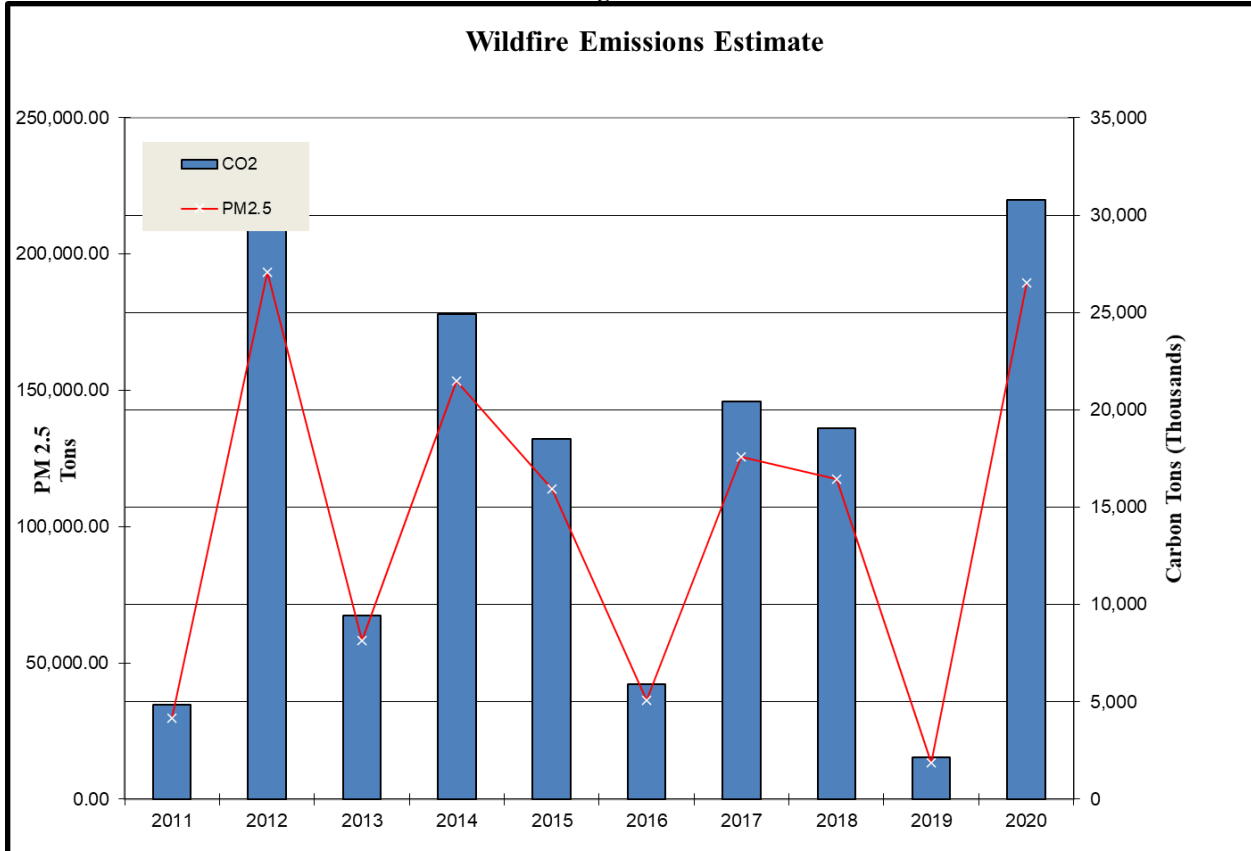
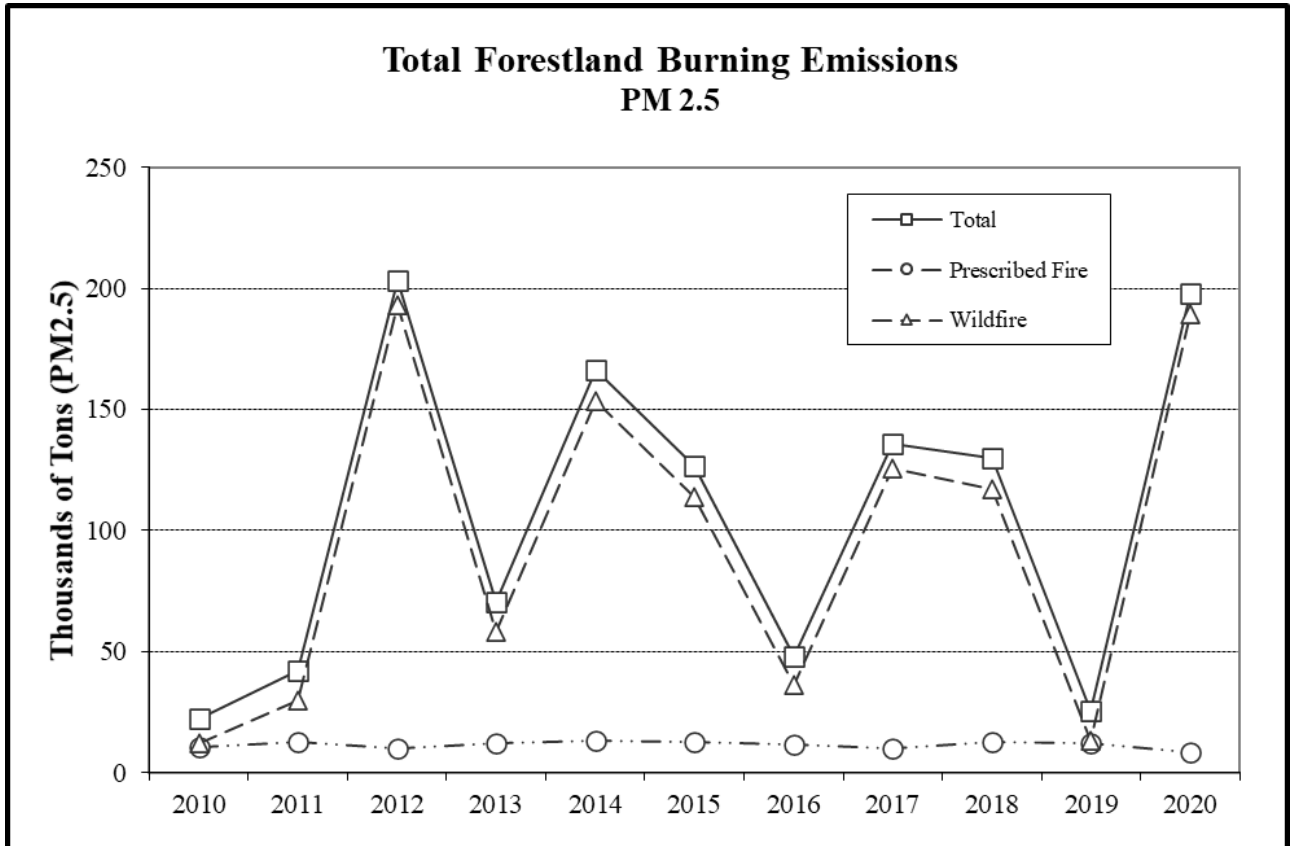
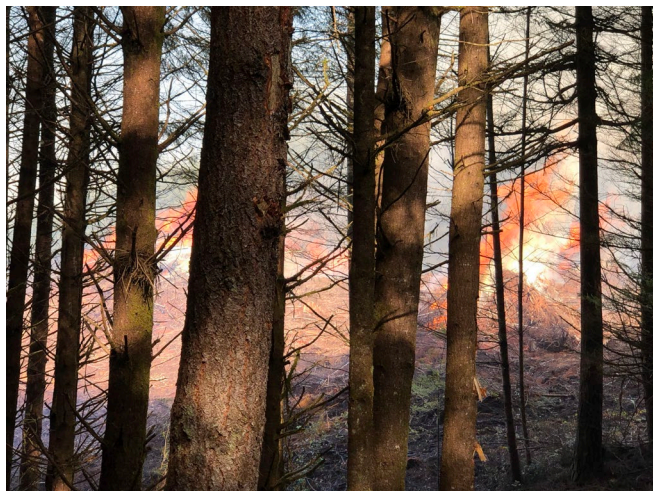


Figure 5



Moon, stars, & flames light the night sky.



Fall like burn conditions in the spring on the coast.

Table 3A

PM 2.5 Emissions (Tons) Broadcast										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Astoria	0	0	0	0	4	0	0	0	0	0
Central Oregon	916	0	3	13	15	8	0	0	0	18
Coos FPA	773	221	307	170	289	66	131	191	115	40
Douglas FPA	27	56	45	0	105	60	27	20	19	60
Forest Grove	13	0	10	0	0	9	0	0	15	6
Klamath-Lake	1	0	0	0	0	0	0	0	0	0
North Cascade	0	0	0	0	0	0	0	0	0	0
Northeast Oregon	68	106	0	0	0	68	24	0	0	0
South Cascade	1	1	1	0	0	0	0	0	0	3
Southwest Oregon	12	0	2	3	8	3	9	0	0	0
Tillamook	0	0	5	0	0	0	0	22	0	0
Walker Range	0	0	0	0	0	0	0	0	0	0
West Oregon	44	15	38	9	5	0	49	50	17	2
Western Lane	50	1	36	6	69	15	129	156	208	50
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	0	0	68	0	12	13	0	0	59	0
Fremont NF	0	0	0	0	0	133	59	75	179	0
Klamath NF	0	0	0	0	0	0	0	0	0	0
Malheur NF	0	357	0	371	0	1	0	0	0	29
Mt. Hood NF	0	0	0	0	0	0	0	0	0	0
Ochoco NF	0	3	17	8	0	8	0	0	2	2
Rogue/Siskiyou NF	1	4	65	9	22	0	11	0	0	0
Siuslaw NF	0	0	0	0	0	0	0	0	0	0
Umatilla NF	143	19	0	44	53	85	0	0	0	0
Umpqua NF	41	12	0	0	17	0	8	0	0	0
Wallowa-Whitman NF	68	20	243	89	52	308	40	92	18	38
Willamette NF	2	12	20	9	98	0	1	10	0	0
Winema NF	0	15	30	0	0	1	0	0	0	0
Total	2160	842	890	731	749	778	488	616	632	248

Table 3B

PM 2.5 Emissions (Tons) Pile										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Astoria	305	490	525	326	377	446	559	654	508	662
Central Oregon	151	174	148	295	256	294	48	72	97	178
Coos District	0	0	0	0	0	4	1	5	0	0
Coos FPA	837	915	1125	1266	1259	1130	1122	1289	1323	1191
Douglas FPA	533	515	815	1223	1180	934	1065	1281	728	668
Forest Grove	250	311	545	351	299	196	311	318	458	516
Klamath-Lake	139	54	80	292	871	338	59	93	52	77
North Cascade	213	283	465	306	405	216	196	687	487	170
Northeast Oregon	1436	312	1276	829	438	952	823	813	477	402
South Cascade	1130	754	886	778	934	708	596	780	648	664
Southwest Oregon	453	632	463	683	576	519	483	505	750	643
Tillamook	235	138	296	236	236	144	211	174	184	164
Walker Range	0	0	0	1	0	0	0	0	0	0
West Oregon	918	898	1117	1230	1261	917	1012	1184	904	1046
Western Lane	149	119	118	196	156	90	477	562	391	217
Columbia Gorge SA	0	0	0	0	0	0	0	0	0	0
Crater Lake NP	0	0	1	0	3	2	0	0	1	0
Deschutes NF	253	230	185	208	306	170	245	377	348	49
Fremont NF	8	10	24	73	83	117	3	2	182	82
Klamath NF	4	2	6	10	5	14	5	1	0	0
Malheur NF	722	185	251	309	389	603	323	89	127	349
Mt. Hood NF	51	21	33	74	51	23	47	18	47	23
Ochoco NF	1	105	75	0	21	6	3	0	0	10
Rogue/Siskiyou NF	601	741	261	346	521	241	87	225	298	92
Siuslaw NF	34	23	22	33	22	22	4	2	26	0
Umatilla NF	18	25	15	30	150	75	58	167	107	97
Umpqua NF	46	201	115	83	133	75	32	23	50	77
Wallowa-Whitman NF	559	353	327	244	165	388	266	227	390	384
Willamette NF	72	128	143	107	280	252	126	113	307	6
Winema NF	101	37	49	89	118	65	59	76	3	6
Total	9219	7656	9366	9618	10495	8941	8221	9737	8893	7773

Table 3C

PM 2.5 Emissions (Tons) Underburn										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Astoria	0	0	0	0	0	0	0	0	0	0
Central Oregon	0	20	1	10	0	0	0	0	0	0
Coos District										0
Coos FPA	0	0	0	0	0	0	1	0	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	9	0	0	0	0	0	0	0	15	0
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
South west Oregon	11	26	31	5	17	17	2	11	21	0
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	129	58	143	292	200	129	225	307	496	23
Fremont NF	248	190	142	209	680	294	233	389	193	7
Klamath NF	0	0	0	0	0	0	0	0	0	0
Malheur NF	34	524	514	533	11	481	268	549	182	92
Mt. Hood NF	28	14	43	8	1	20	0	0	0	0
Ochoco NF	91	0	89	79	103	65	99	123	160	82
Rogue/Siskiyou NF	157	4	25	49	59	88	48	23	83	5
Siuslaw NF	0	0	0	0	0	0	0	0	0	0
Umatilla NF	170	232	355	411	267	1	0	108	179	0
Umpqua NF	0	33	58	139	10	60	28	57	2	0
Wallow a-Whitman NF	83	228	330	495	162	475	67	306	193	36
Willamette NF	59	45	40	164	81	92	97	108	20	0
Winema NF	76	116	45	138	34	68	97	125	1259	0
Total	1095	1490	1816	2532	1625	1790	1165	2106	2803	245



New rules allow greater burn window opportunities.

Figure 6

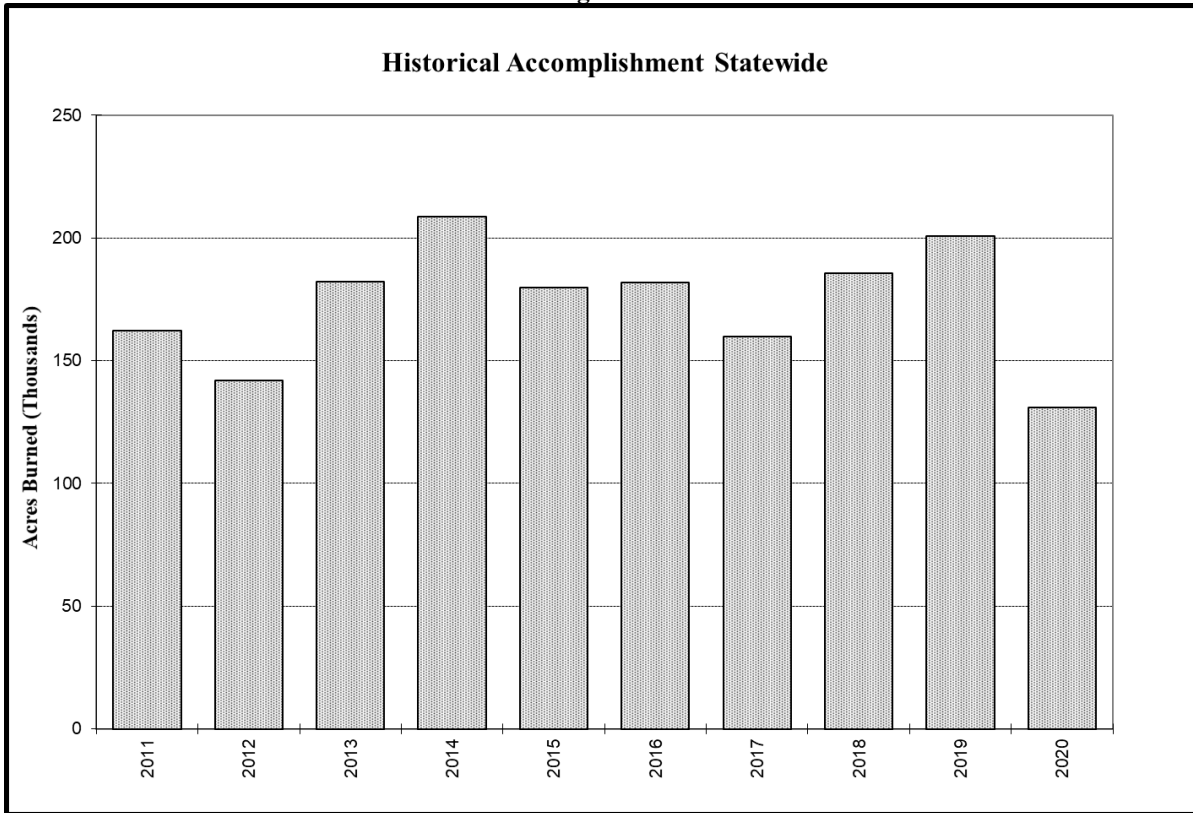


Figure 7

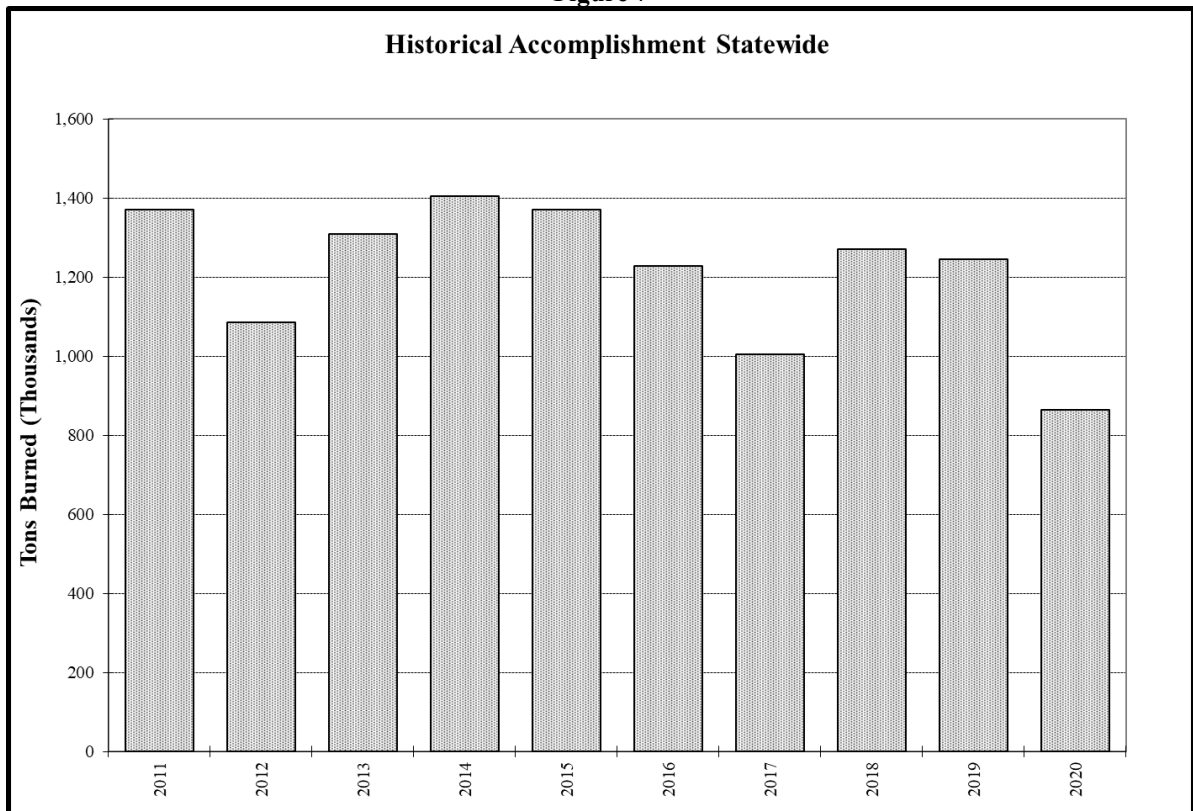


Figure 8

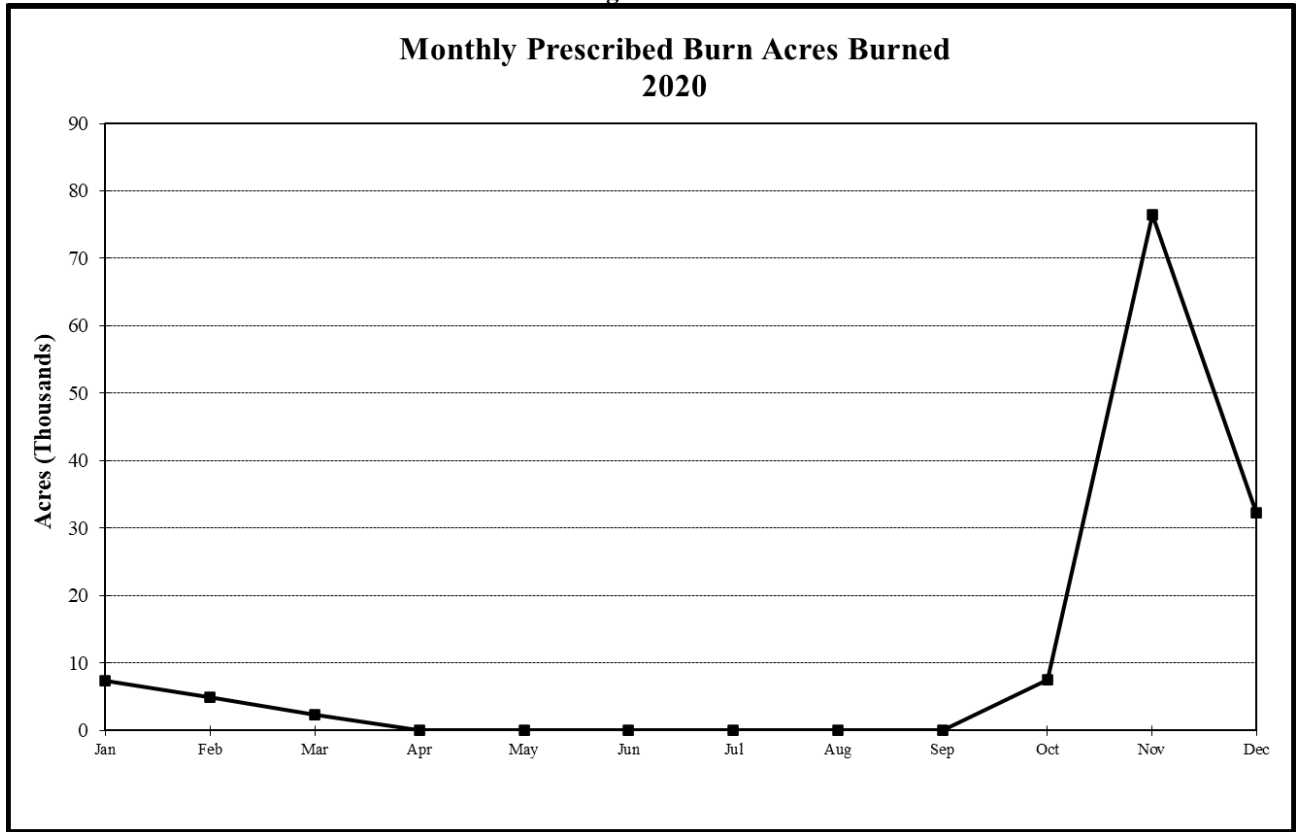


Figure 9

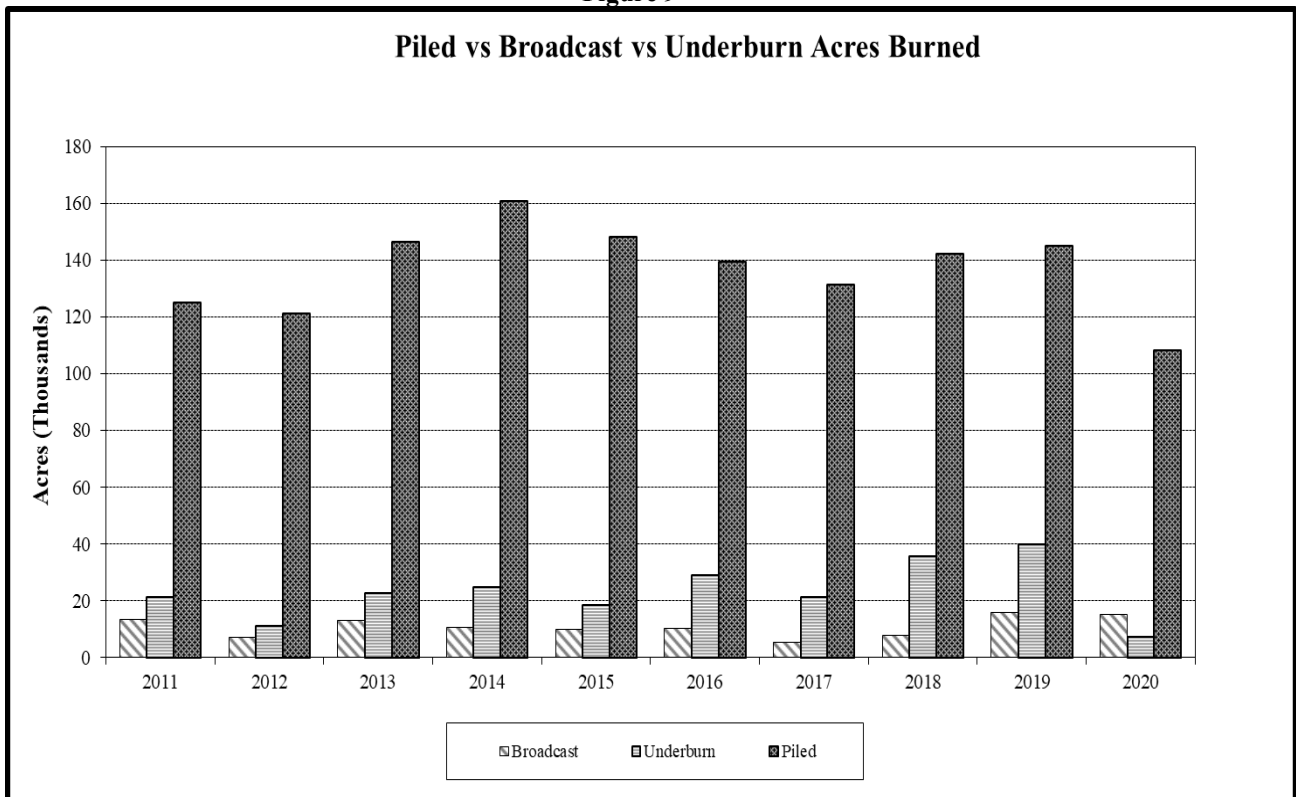


Table 4
Burn Summary by District - 2020

District/Forest	Units burned	Acres burned	Tons burned
Astoria	113	6,257	57,851
Central Oregon	57	14,965	37,588
Coos District	0	0	0
Coos FPA	205	10,688	128,113
Douglas FPA	284	13,517	75,674
Forest Grove	119	4,322	53,394
Klamath-Lake	3	3,020	14,096
North Cascade	57	1,012	14,757
Northeast	65	4,775	48,065
South Cascade	213	7,978	60,013
Southwest	178	10,520	76,485
Tillamook	57	3,541	16,926
Walker Range	0	0	0
Western Lane	171	7,103	26,390
West Oregon	268	9,707	99,570
Columbia Gorge SA	0	0	0
Crater Lake NP	2	9	40
Deschutes NF	65	3,512	7,224
Fremont NF	17	4,719	10,277
Klamath NF	0	0	0
Malheur NF	101	11,684	49,420
Mt Hood NF	29	826	2,515
Ochoco NF	11	3,679	9,323
Rogue River\Siskiyou NF	61	2,783	10,768
Siuslaw NF	7	204	37
Umatilla NF	36	789	11,472
Umpqua NF	69	1,339	8,750
Wallowa-Whitman NF	90	3,382	43,934
Willamette NF	4	224	534
Winema NF	5	442	659
District Total	1,790	97,405	708,922
Forest Total	497	33,592	154,953
Grand Total	2,287	130,997	863,875

Table 5
Tons Burned by Month by District
2020

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria	1,326										37,494	19,031	57,851
Central Oregon	5,237	7,046	2,614							540	7,449	14,702	37,588
Coos District													0
Coos FPA	2,326	3,507	400								78,296	43,584	128,113
Douglas FPA	1,953	1,210	1,606							121	48,612	22,172	75,674
Forest Grove	60	1,520	216	74	50					2	32,912	18,560	53,394
Klamath-Lake	490	1,024	4	200						6,304	2,100	3,974	14,096
North Cascade	1,893	512	114								9,553	2,685	14,757
Northeast	1,000									289	43,576	3,200	48,065
South Cascade	415										52,988	6,610	60,013
Southwest	5,160	1,574	1,678								38,354	29,719	76,485
Tillamook										900	11,965	4,061	16,926
Western Lane	1,828	1,141	805	26							19,299	3,291	26,390
West Oregon	175	930	260							1,689	88,342	8,174	99,570
Columbia Gorge SA													0
Crater Lake NP					36						4		40
Deschutes NF	343	101								2,254	3,522	1,004	7,224
Fremont NF	1,112	152	2,316								5,289	1,408	10,277
Malheur NF	86									6,452	37,044	5,838	49,420
Mt Hood NF		163									1,781	571	2,515
Ochoco NF	521	150								5,544	3,108		9,323
Rogue/Siskiyou NF	2,427	2,900	400								2,342	2,699	10,768
Siuslaw NF											37		37
Umatilla NF										1,683	2,864	6,925	11,472
Umpqua NF	93	140									8,517		8,750
Wallow-Whitman NF	195								300	7,365	26,494	9,580	43,934
Willamette NF			35								499		534
Winema NF	650										9		659
District Total	21,863	18,464	7,697	300	50	0	0	0	0	9,845	470,940	179,763	708,922
Forest Total	5,427	3,606	2,751	0	36	0	0	0	300	23,298	91,510	28,025	154,953
Grand Total	27,290	22,070	10,448	300	86	0	0	0	300	33,143	562,450	207,788	863,875

**Table 6
Acres Burned by Month by District
2020**

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total by District
Astoria	68										4,815	1,374	6,257
Central Oregon	2,430	2,274	1,052							108	1,736	7,365	14,965
Coos District													0
Coos FPA	318	331	20								7,963	2,056	10,688
Douglas FPA	296	197	93							23	8,388	4,520	13,517
Forest Grove	7	26	7	7	2					1	2,975	1,297	4,322
Klamath-Lake	70	181	50	16						1,576	345	782	3,020
North Cascade	148	24	27								378	435	1,012
Northeast	98									133	4,314	230	4,775
South Cascade	138										6,895	945	7,978
Southwest	1,140	450	478								5,321	3,131	10,520
Tillamook										123	3,005	413	3,541
Walker Range													0
Western Lane	579	109	61	2							5,639	713	7,103
West Oregon	69	132	25							129	8,600	752	9,707
Columbia Gorge SA													0
Crater Lake NP					8						1		9
Deschutes NF	509	519								1,077	970	437	3,512
Fremont NF	139	38	415								733	3,394	4,719
Malheur NF	43									2,142	7,444	2,055	11,684
Mt Hood NF		57									585	184	826
Ochoco NF	394	50								1,749	1,486		3,679
Rogue/Siskiyou NF	441	485	80								750	1,027	2,783
Siuslaw NF											204		204
Umatilla NF										142	273	374	789
Umpqua NF	104	95									1,140		1,339
Wallowa-Whitman NF	13								20	370	2,199	780	3,382
Willamette NF			5								219		224
Winema NF	410										32		442
District Total	5,361	3,724	1,813	25	2	0	0	0	0	2,093	60,374	24,013	97,405
Forest Total	2,053	1,244	500	0	8	0	0	0	20	5,480	16,036	8,251	33,592
Grand Total	7,414	4,968	2,313	25	10	0	0	0	20	7,573	76,410	32,264	130,997

**Table 7
Burn Data by Owner Type
2020**

	Private			State, County, Muni			Federal (Except USFS)			USFS		
District/Forest	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons	Units	Acres	Tons
Astoria	79	4,347	49,268	34	1,910	8,583	0	0	0			
Central Oregon	24	1,318	10,464	10	174	904	23	13,473	26,220			
Coos District	0	0	0	0	0	0	0	0	0			
Coos FPA	195	10,098	123,690	4	197	1,517	6	393	2,906			
Douglas FPA	269	13,084	74,010	5	132	1,356	10	301	308			
Forest Grove	100	3,404	46,485	14	439	6,261	5	479	648			
Klamath-Lake	0	0	0	0	0	0	3	3,020	14,096			
North Cascade	47	722	12,562	3	143	1,720	7	147	475			
Northeast	64	4,677	47,065	0	0	0	1	98	1,000			
South Cascade	212	7,968	59,998	0	0	0	1	10	15			
Southwest	145	8,701	71,065	23	1,383	3,023	10	436	2,397			
Tillamook	26	1,305	9,950	31	2,236	6,976	0	0	0			
Walker Range	0	0	0	0	0	0	0	0	0			
Western Lane	153	4,707	23,747	9	369	1,569	9	2,027	1,074			
West Oregon	246	9,015	96,118	20	587	3,326	2	105	126			
Columbia Gorge SA							0	0	0			
Crater Lake NP							2	9	40			
Deschutes NF										65	3,512	7,224
Fremont NF										17	4,719	10,277
Klamath NF										0	0	0
Malheur NF										101	11,684	49,420
Mt Hood NF										29	826	2,515
Ochoco NF										11	3,679	9,323
Rogue/Siskiyou NF										61	2,783	10,768
Siuslaw NF										7	204	37
Umatilla NF										36	789	11,472
Umpqua NF										69	1,339	8,750
Wallowa-Whitman NF										90	3,382	43,934
Willamette NF										4	224	534
Winema NF										5	442	659
Totals	1,560	69,346	624,422	153	7,570	35,235	79	20,498	49,305	495	33,583	154,913