

SMOKE MANAGEMENT

PROTECTION DIVISION

2022

MITIGATION & POLICY DEPT.



2022 Welcomes our new Policy and Planning Branch Mitigation Unit Manager Stacy McCarter over the Smoke Management Program which is now under the Mitigation & Policy Department! Stacy has an extensive background in business management and rolls with a Type 1 Incident Management Team on ODF Team 2 for the past 9 years.



Welcome Amanda Rau who joined us in February as the Prescribed Fire Planning Coordinator. Amanda has 23 years of operational, and policy management experience and comes with creative solutions for cross border partnerships in prescribed fire.



Welcome Christie Shaw who joined us in December. Christie is a powerhouse of organization and comes to help us in our Policy & Grant department.



Staff that joined in earlier: Welcome Sherri Pugh who joined us in July and Gary Votaw who joined in 2020. Both are new forecasters to the program that bring a plethora of experience in meteorology.

Oregon Smoke Management Annual Report 2022

Photos: Stacy McCarter top-left, Amanda Rau top-right, Sheri Pugh bottom-right, Christie Shaw bottom-left. Photo of Gary not available.

TABLE OF CONTENTS

2022 Summary
Program Overview
Program Summary.....
Audits
Meteorological Services.....
Program Accomplishment Data
Alternatives to Burning and Emission Reduction Techniques Tracking.....
Prescribed Burning Statistics.....

FIGURES

1 Smoke Management Regulated Areas
2A Length of Intrusion
2B Accumulated Intrusion Hours.....
3 Yearly Intrusion Summary
4A Prescribed Burning Emissions Estimate (PM2.5).....
4B Wildfire Emissions Estimate (Carbon and PM2.5).....
5 Total Forestland Burning Emissions (PM2.5).....
6 Historical Accomplishment -- Total Acres Burned (Statewide).....
7 Historical Accomplishment -- Total Tons Burned (Statewide).....
8 Monthly Prescribed Burn Acres Burned
9 Piled vs Broadcast vs. Underburn Acres Burned

TABLES

1 2012 – 2022 Accomplishment Summary
2 Smoke Intrusion Summary -- 2022
3A Broadcast Burning PM2.5 Emissions by District.....
3B Pile Burning PM2.5 Emissions by District.....
3C Underburning PM2.5 Emissions by District.....
4 Burn Summary by District -- 2022.....
5 Tons Burned by Month by District - 2022
6 Acres Burned by Month by District - 2022
7 2022 Burn Data by Owner Type

EXECUTIVE SUMMARY REPORT

Acres burned – 107,463 Statewide acres were ignited. Due to an unprecedented high pressure creating stagnant air across most of the state for about 4 weeks fall of ‘22, and the 90-day Federal burn ban; this was the lowest number of acres burned during the last 10 years. The 10-year average is 189,292 acres. Both the 10-year average, and the 2022 acres burned, have decreased from the 2021 yearly acres since the start of the pandemic.

Intrusions – There was only 1 smoke intrusion into Smoke Sensitive Receptor Areas (SSRAs) based on the new 2019 definition (see below) of a smoke intrusion. This represents a lower number of intrusions recorded. The 10-year average is 8 intrusions.

Smoke impacts – There were 13 smoke impacts (smoke incidents) recorded with highest impacts in La Pine at 344.6 and 108.6 microns per cubic meter.

Emissions - Emissions were 8,641 tons of PM 2.5. This is considerably less than the 10-year average of 12,146 tons.

OREGON DEPARTMENT OF FORESTRY
FIRE PROTECTION DIVISION
SMOKE MANAGEMENT AND FUELS

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.

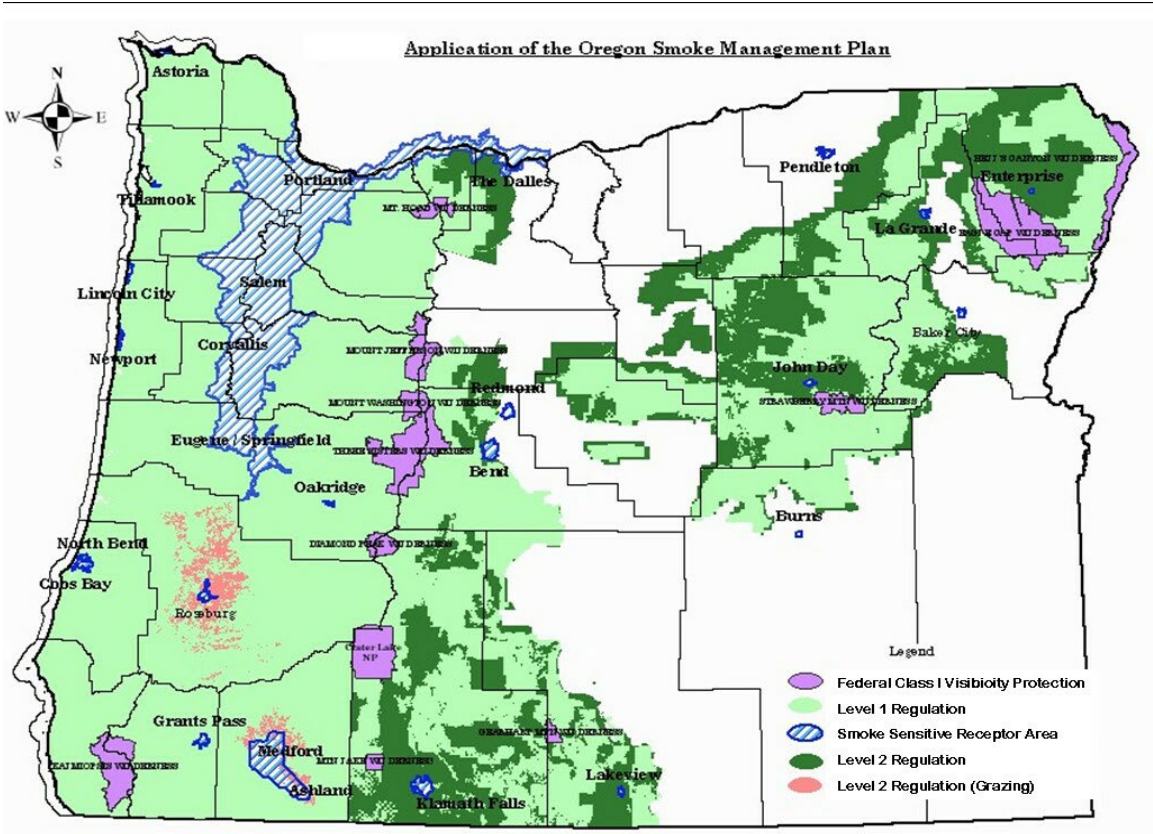
Key elements changed in the plan include: *

- 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.



SMOKE MANAGEMENT ANNUAL REPORT



PROGRAM OVERVIEW CONTINUED

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

PROGRAM SUMMARY

Audits:

The Oregon Smoke Management Plan’s goal is an annual audit of approximately one percent of the prescribed burns conducted in the Regulated Area (see map on left). Approximately half of the audits are conducted on the day of the burn and half are conducted prior to ignition. 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 33 audits were completed, for a total of 32,532 audited tons. The audit breakout was 14 pre-burn audits and 19 burn-day audits. Forest Service, BLM, state, and private units were audited. At least one 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, ... - continued

PROGRAM SUMMARY CONTINUED



Collaborating with USFW to restore ecosystems.

Continued: ... burn boss refresher training courses, the regional Rx-301/341, and 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 advertised and published to the field.

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 written daily

Smoke Management forecasts and burning instructions statewide from October – June, as well as year around phone consultation for prescribed burning operations.

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.

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PROGRAM ACCOMPLISHMENT DATA

ALTERNATIVES TO BURNING, EMISSION REDCUTION TECHNIQUES



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 using emission reduction techniques including landing, grapple, hand-piled, and right-of-way piles according to ODF Smoke Management Database: 99,775.

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 2022 and compares them with previous years.

TABLE 1
2013-2022 ACCOMPLISHMENT SUMMARY

Year	Total No. Units (Registered)	No. Units Burned	Acres Burned	Tons Burned	Incidents	Intrusions	Intrusion/ignition%
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	39	18	.42^
2019*	3,726	3,319	200,629	1,245,128		6	.14^
2020	3,146	2,287	130,997	863,875		0	.00^
2021	3,253	2,287	143,653	996,496	43	2	.06^
2022	3014	2148	107,463	874,117	13	1	.01^
Average	3,611	2,911	168,026	1,156,713	24	8	0.19^

*Based on new smoke incident and intrusion definitions implemented in the 2019 rule change.
^Values were all recalculated from 2012 to intrusions per ignition.

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Figure 2A

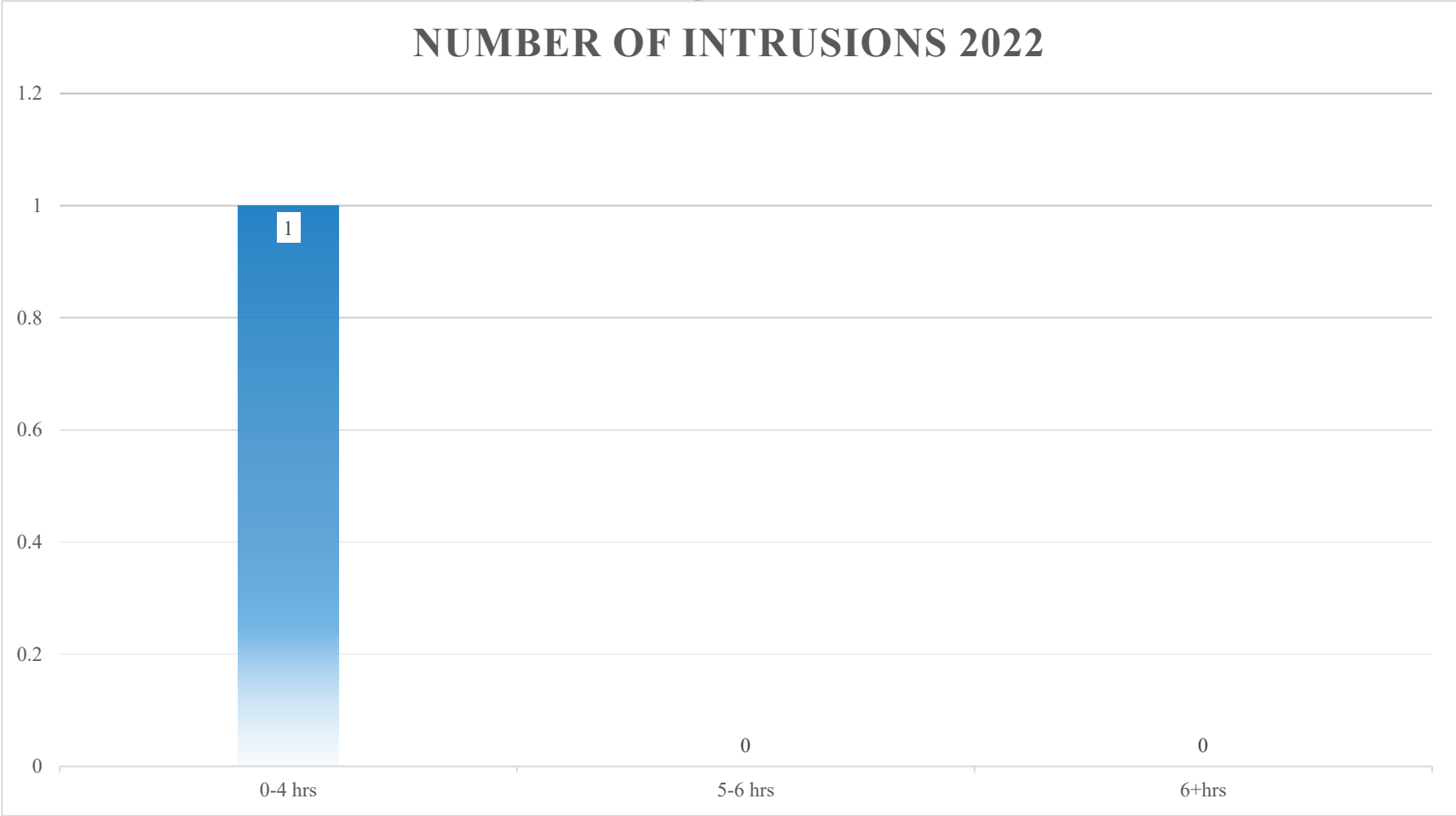
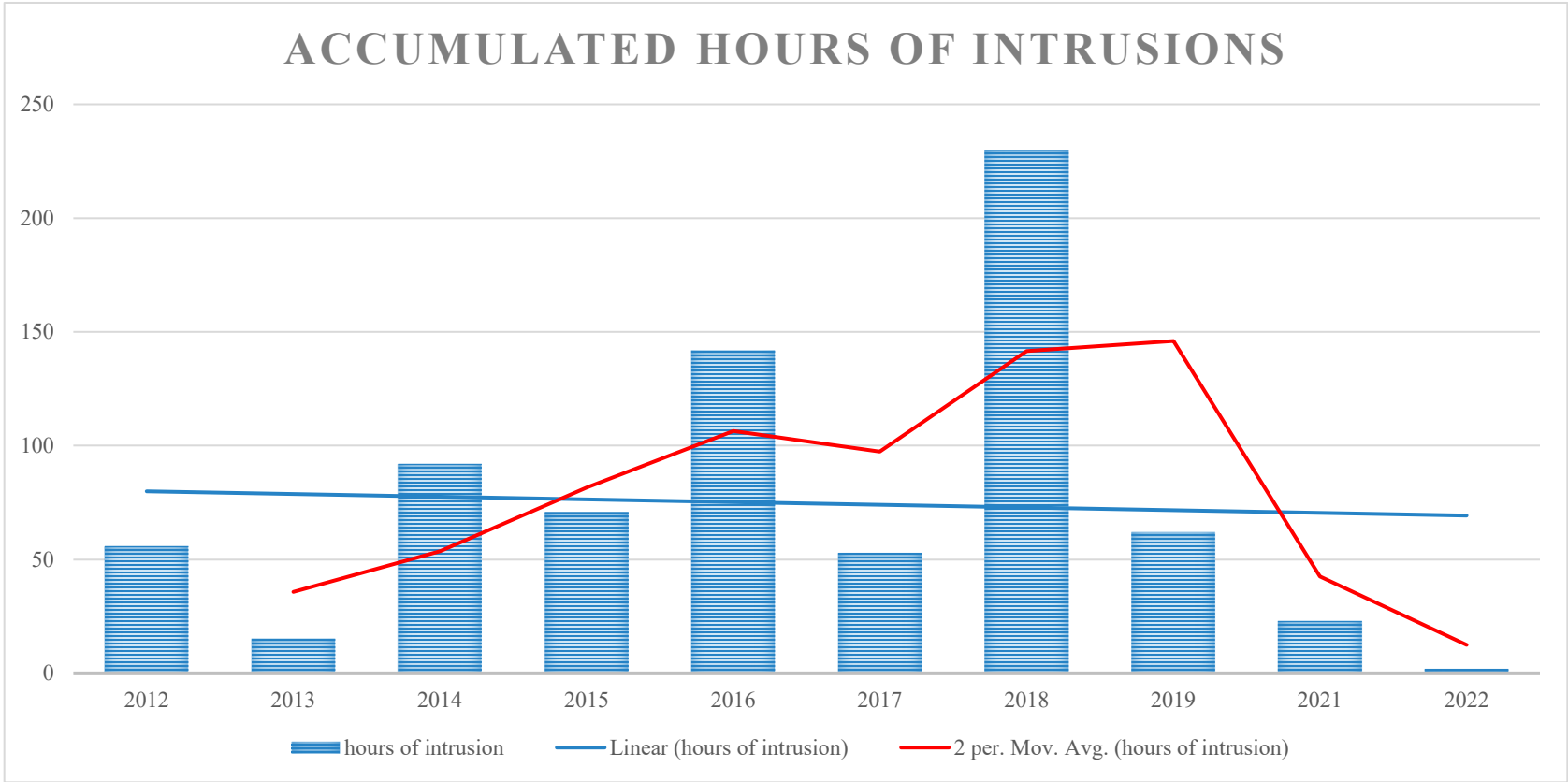


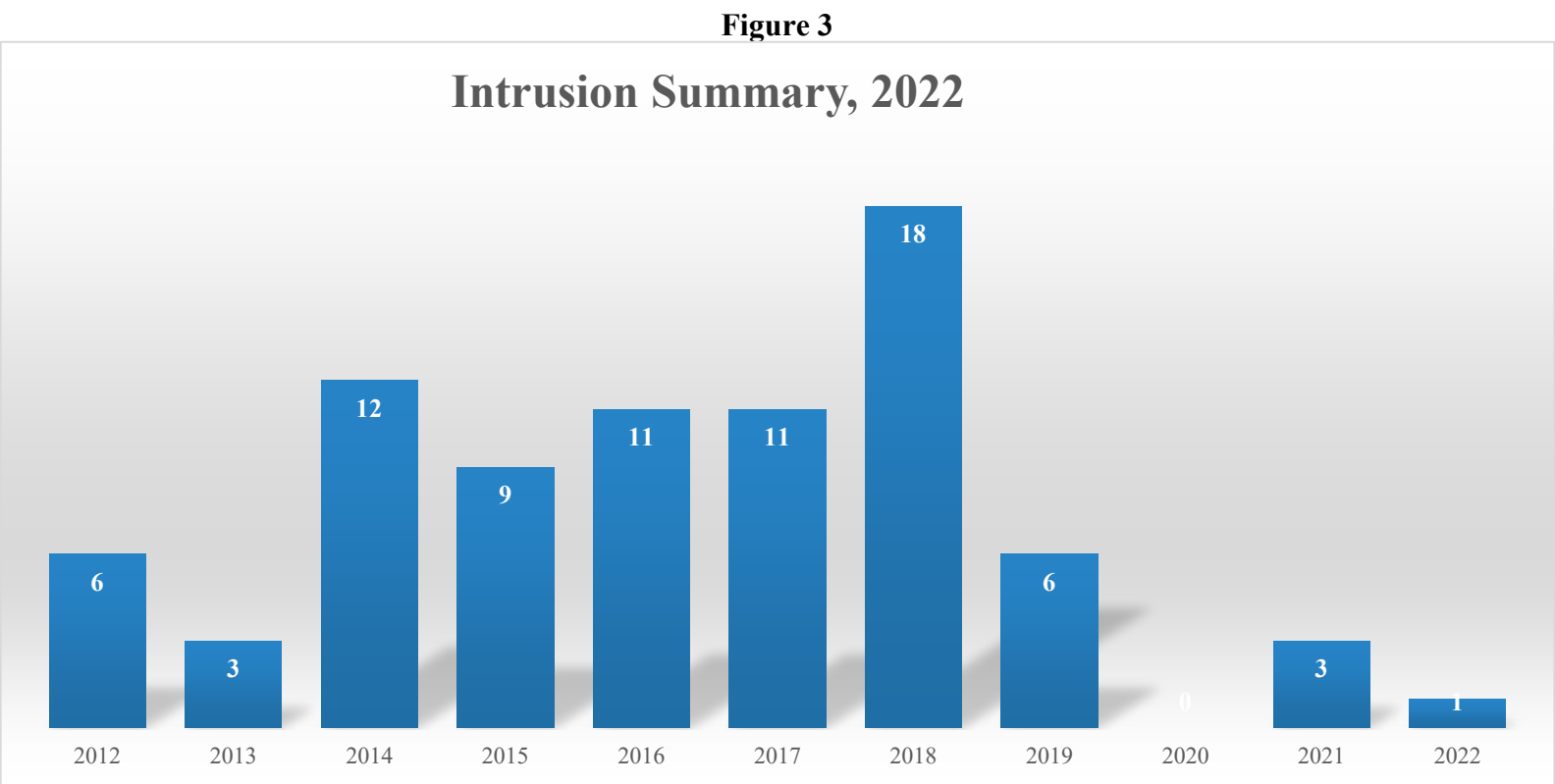
Figure 2B



No trend data available due to zero intrusions in 2020.



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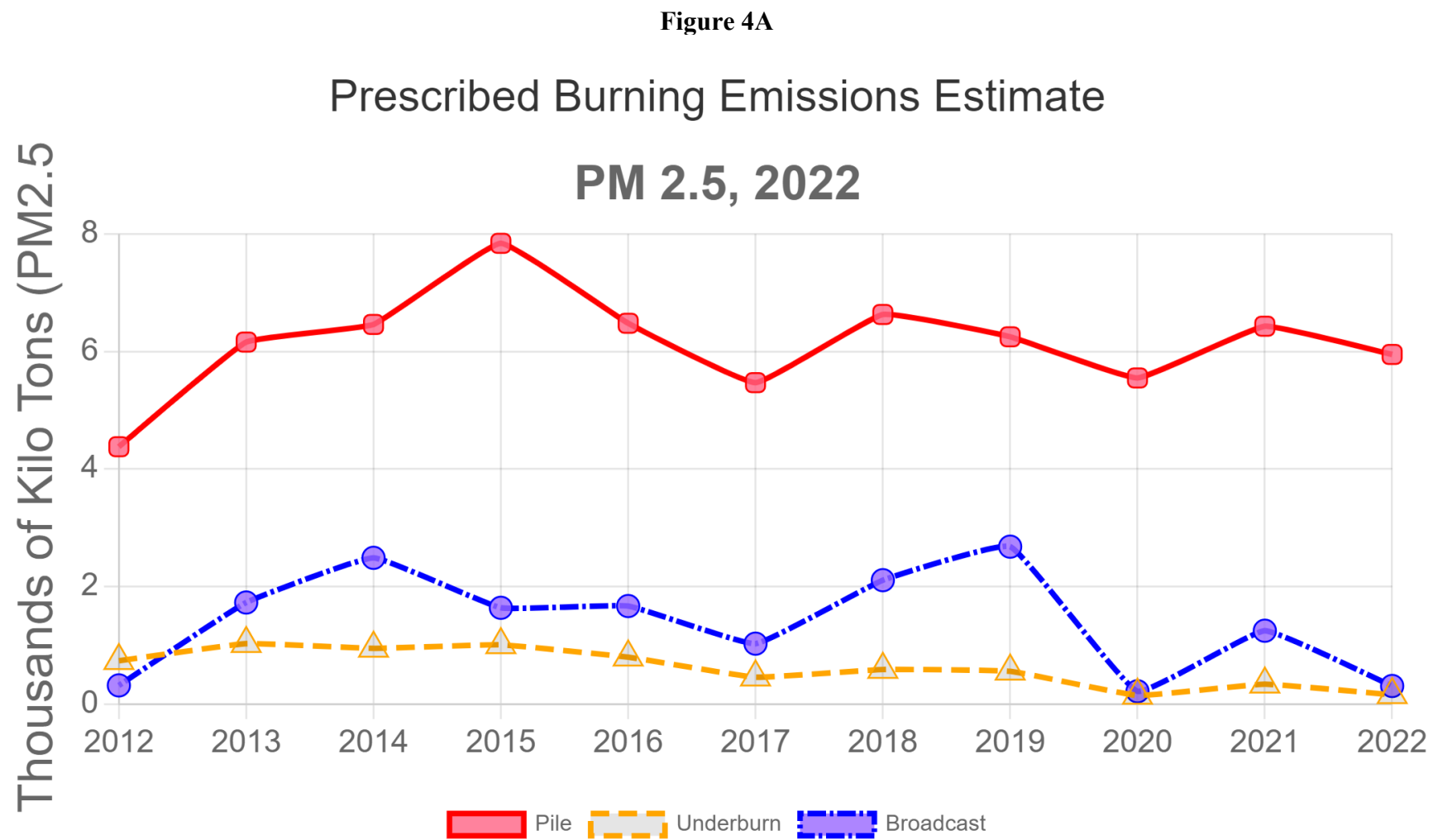


*No trend data available due to zero intrusions in 2020.

TABLE 2
SMOKE INTRUSION SUMMARY – 2022

Date	District/ Forest	Primary Area Affected	Unit No.	Owner Class	Max hrly	Length
					Max 24 hr	
12/13/22	Medford, ODF	Talent	22-01	Private, ODF	92.6 (max hr) / 24.1 (24hr. ave.)	2+ hrs.*

*24 hour intrusions



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Figure 4B

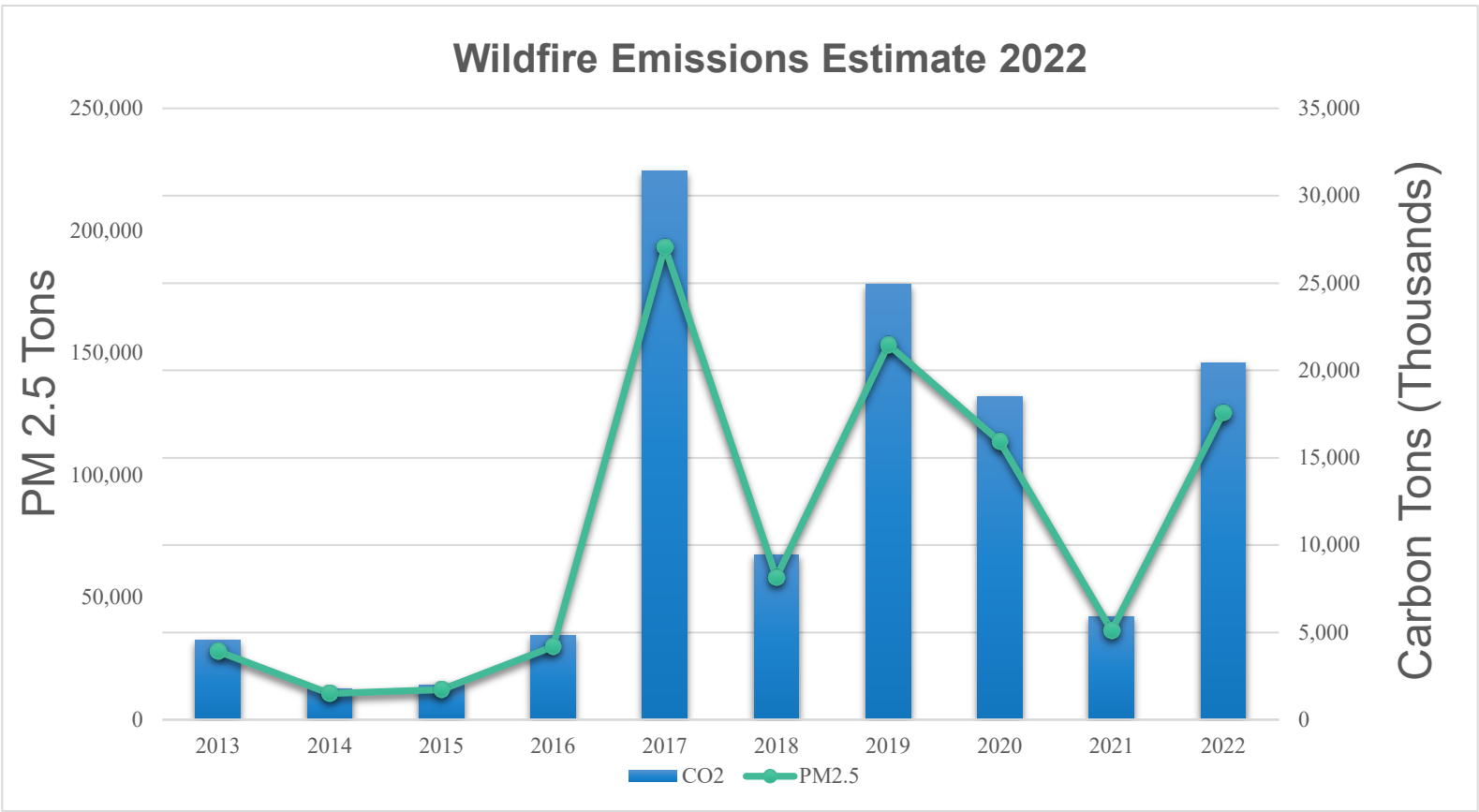
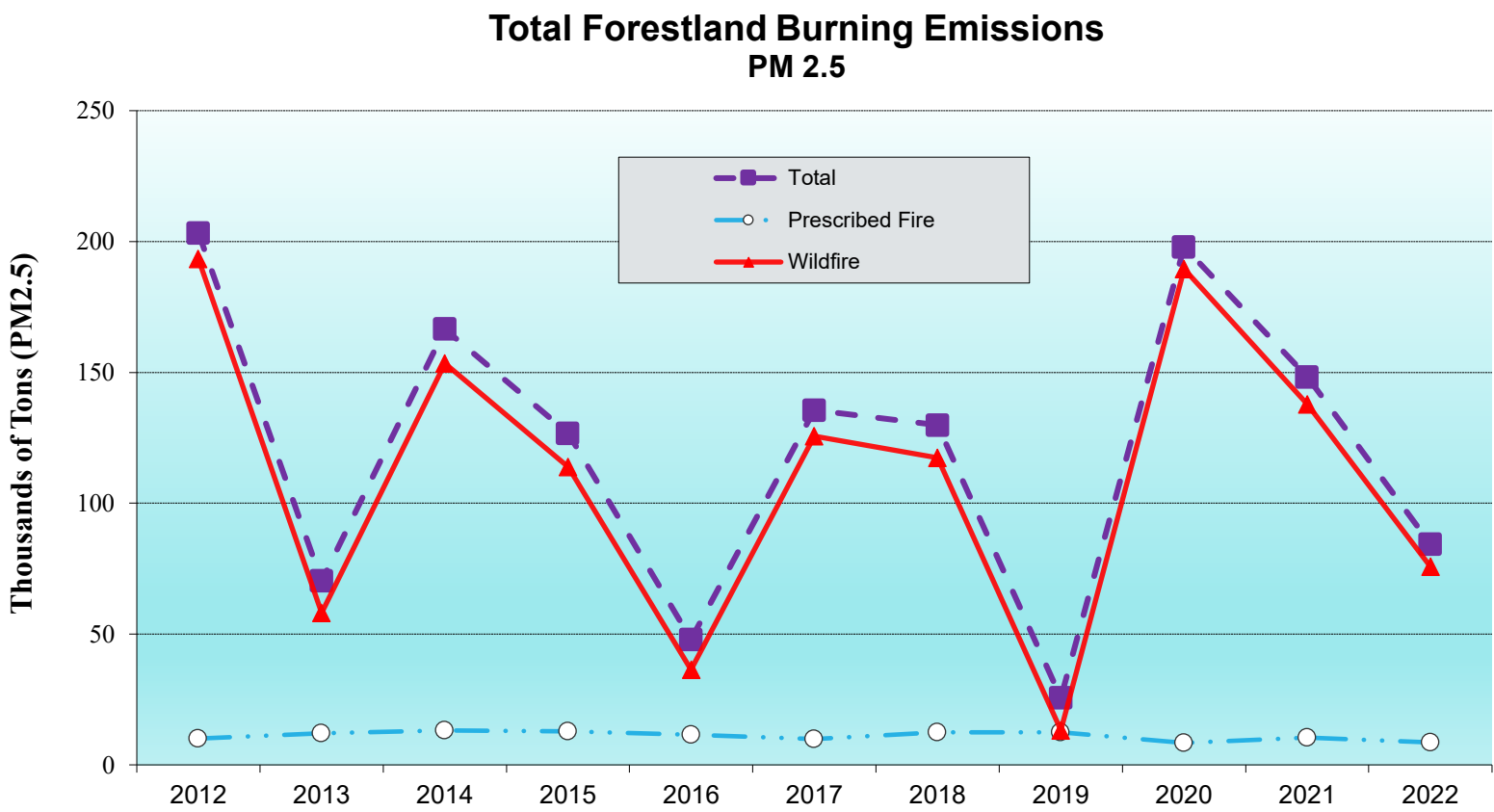


Figure 5



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BURNING FOR WILDLIFE

Fire will help to control pests such as fleas and stimulate new growth for others such as praying mantis, while improving new vegetation stimulation for browsing animals such as deer and elk.

Left photo

WINTER PILES

Crews are able to burn covered piles during winter weather increasing their burn window opportunities.

Right photo



Table 3A

PM 2.5 Emissions (Tons) Broadcast

District Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Astoria	478	456	326	380	446	559	654	524	623	436	234
Central Oregon	169	141	329	264	285	48	72	97	196	27	12
Columbia Gorge	0	0	0	0	0	0	0	0	0	0	0
Coos	0	2	1	3	4	1	5	0	0	7	11
Coos FPA	1095	1573	1641	1687	1214	1254	1480	1438	1231	1668	2009
Crater Lake N.P.	0	1	0	3	2	0	0	1	0	4	1
Deschutes NF	168	268	500	522	301	486	690	903	78	659	318
Douglas FPA	498	903	1287	1417	1022	1094	1301	746	728	887	911
Forest Grove	309	533	351	313	205	311	318	473	573	433	468
Fremont NF	14	192	285	764	563	295	466	576	89	478	145
Klamath NF	2	6	10	10	13	5	1	0	0	0	0
Klamath-Lake	42	75	410	871	373	78	143	67	77	22	24
Malheur NF	486	845	1266	419	1085	594	638	334	470	37	117
Mt. Hood NF	35	80	81	52	44	49	18	48	22	28	24
North Cascade	278	421	314	408	331	196	687	486	170	952	569
Northeast	373	1230	829	438	1021	847	815	477	402	532	300
Ochoco NF	108	173	86	124	88	102	123	162	94	313	117
Oregon Caves NM	0	0	0	0	0	0	1	0	0	0	0
Rogue-Siskiyou NF	258	293	423	604	329	146	248	381	98	183	18
Siuslaw NF	23	20	33	22	23	4	2	26	0	0	0
South Cascade	720	802	778	881	678	594	780	648	662	654	528
Southwest	527	420	690	606	546	494	519	777	643	569	490
Tillamook	129	292	240	239	152	211	190	184	168	176	194
Umatilla NF	30	366	490	501	162	58	273	287	97	278	27
Umpqua NF	188	197	224	159	149	68	79	52	77	19	0
Walker Range	0	0	1	0	27	0	0	0	0	0	0
Wallowa-Whitman NF	565	808	827	410	1172	373	625	618	458	749	542
West Oregon	923	1026	1273	1327	934	1063	1234	916	1051	808	1060
Western Lane	164	453	230	306	166	605	717	600	369	319	518
Willamette NF	156	180	281	461	345	225	230	327	6	82	0
Winema NF	53	106	269	177	105	137	255	1262	6	68	0
Total	7791	11862	13475	13368	11785	9897	12564	12410	8388	10388	8637

SMOKE MANAGEMENT ANNUAL REPORT

Table 3B
PM 2.5 Emissions (Tons) PILE

District Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Astoria	478	456	326	380	446	559	654	524	623	436	234
Central Oregon	169	141	329	264	285	48	72	97	196	27	12
Columbia Gorge	0	0	0	0	0	0	0	0	0	0	0
Coos	0	2	1	3	4	1	5	0	0	7	11
Coos FPA	1095	1573	1641	1687	1214	1254	1480	1438	1231	1668	2009
Crater Lake N.P.	0	1	0	3	2	0	0	1	0	4	1
Deschutes NF	168	268	500	522	301	486	690	903	78	659	318
Douglas FPA	498	903	1287	1417	1022	1094	1301	746	728	887	911
Forest Grove	309	533	351	313	205	311	318	473	573	433	468
Fremont NF	14	192	285	764	563	295	466	576	89	478	145
Klamath NF	2	6	10	10	13	5	1	0	0	0	0
Klamath-Lake	42	75	410	871	373	78	143	67	77	22	24
Malheur NF	486	845	1266	419	1085	594	638	334	470	37	117
Mt. Hood NF	35	80	81	52	44	49	18	48	22	28	24
North Cascade	278	421	314	408	331	196	687	486	170	952	569
Northeast	373	1230	829	438	1021	847	815	477	402	532	300
Ochoco NF	108	173	86	124	88	102	123	162	94	313	117
Oregon Caves NM	0	0	0	0	0	0	1	0	0	0	0
Rogue-Siskiyou NF	258	293	423	604	329	146	248	381	98	183	18
Siuslaw NF	23	20	33	22	23	4	2	26	0	0	0
South Cascade	720	802	778	881	678	594	780	648	662	654	528
Southwest	527	420	690	606	546	494	519	777	643	569	490
Tillamook	129	292	240	239	152	211	190	184	168	176	194
Umatilla NF	30	366	490	501	162	58	273	287	97	278	27
Umpqua NF	188	197	224	159	149	68	79	52	77	19	0
Walker Range	0	0	1	0	27	0	0	0	0	0	0
Wallowa-Whitman NF	565	808	827	410	1172	373	625	618	458	749	542
West Oregon	923	1026	1273	1327	934	1063	1234	916	1051	808	1060
Western Lane	164	453	230	306	166	605	717	600	369	319	518
Willamette NF	156	180	281	461	345	225	230	327	6	82	0
Winema NF	53	106	269	177	105	137	255	1262	6	68	0
Total	7791	11862	13475	13368	11785	9897	12564	12410	8388	10388	8637



SMOKE MANAGEMENT ANNUAL REPORT

Table 3C, PM 2.5 Emissions (Tons) UNDERBURN

District Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Central Oregon	2	1	10	0	0	0	0	0	0	0	0
Coos FPA	0	0	0	0	0	1	0	0	0	0	0
Deschutes NF	24	105	292	204	129	225	307	496	23	477	248
Fremont NF	3	147	209	680	312	233	389	193	7	374	70
Klamath-Lake	0	0	0	0	35	19	50	15	0	6	0
Malheur NF	32	607	533	11	481	270	549	182	92	24	0
Mt. Hood NF	14	43	8	1	20	0	0	0	0	7	0
Ochoco NF	0	78	79	103	67	99	123	160	82	81	0
Rogue-Siskiyou NF	5	12	50	61	88	48	23	83	5	58	0
Siuslaw NF	0	0	0	0	0	0	0	0	0	0	0
Southwest	21	29	6	22	21	2	11	23	0	17	3
Umatilla NF	11	351	411	297	1	0	108	179	0	0	0
Umpqua NF	8	58	140	10	72	28	57	2	0	10	0
Wallowa-Whitman NF	207	267	495	162	475	67	306	193	36	166	0
Willamette NF	32	28	164	81	92	97	108	20	0	81	0
Winema NF	1	31	178	62	34	78	179	1259	0	14	0

Total	360	1757	2575	1694	1827	1167	2210	2805	245	1315	321

Figure 6

Historical Accomplishment Statewide

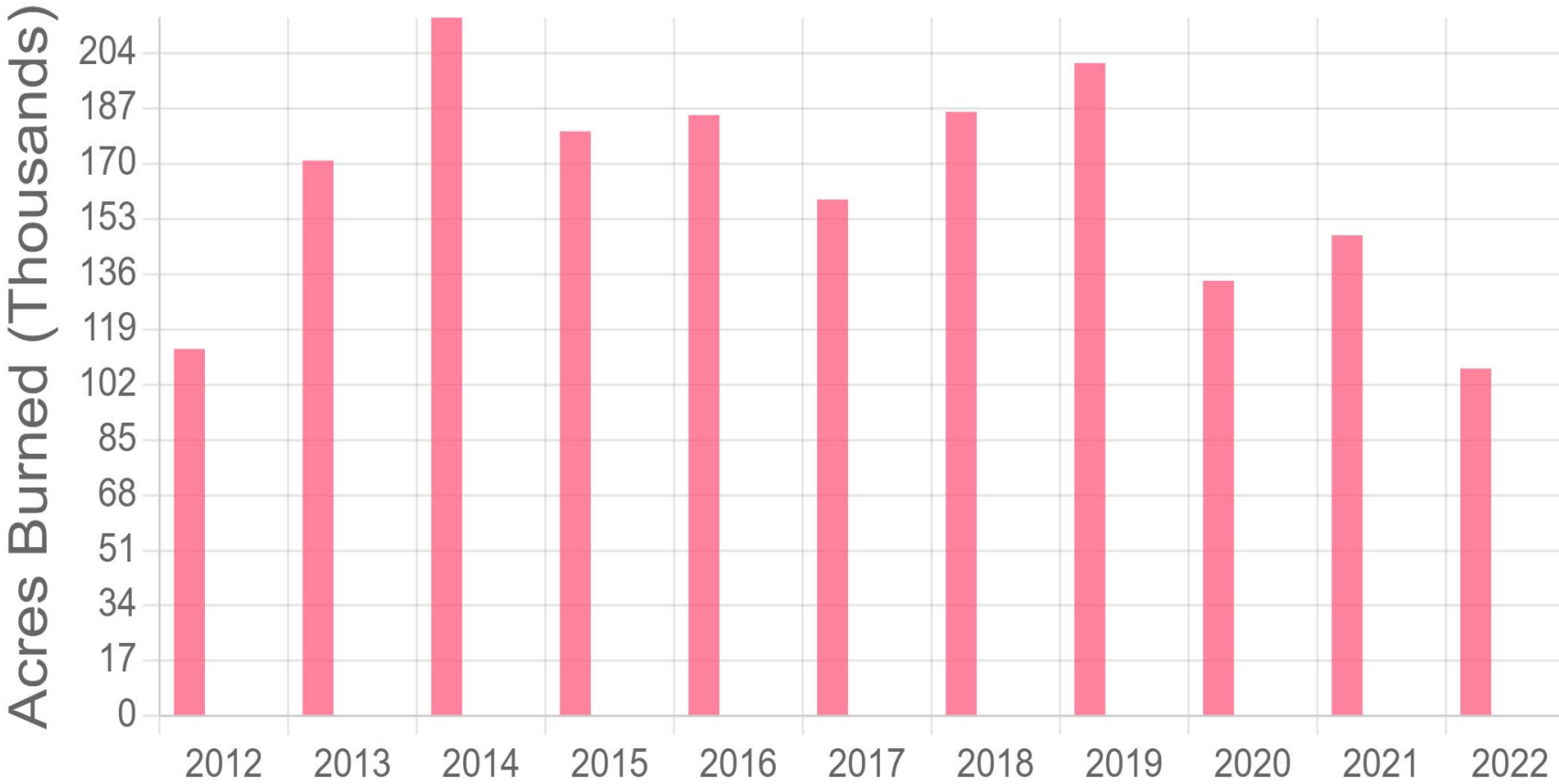


Figure 7

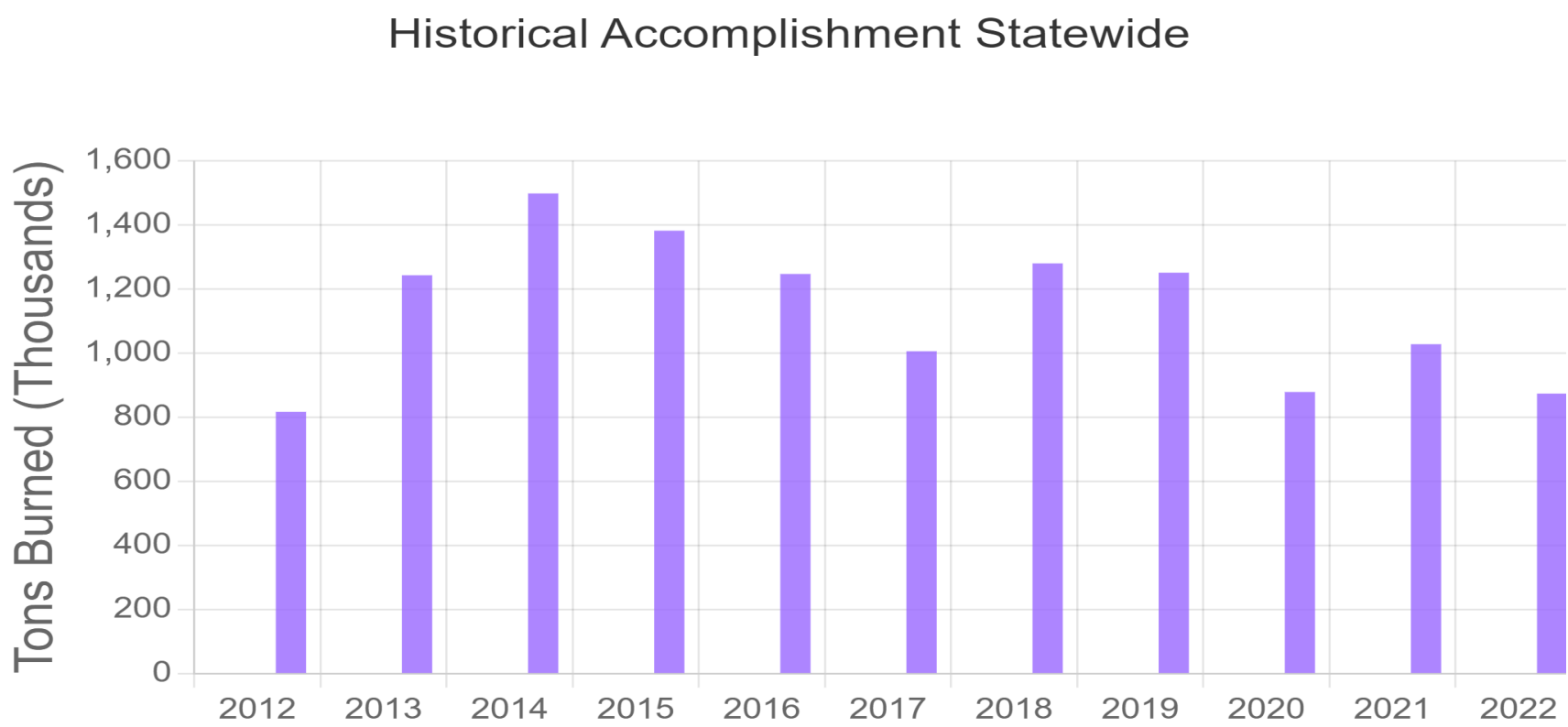


Figure 8

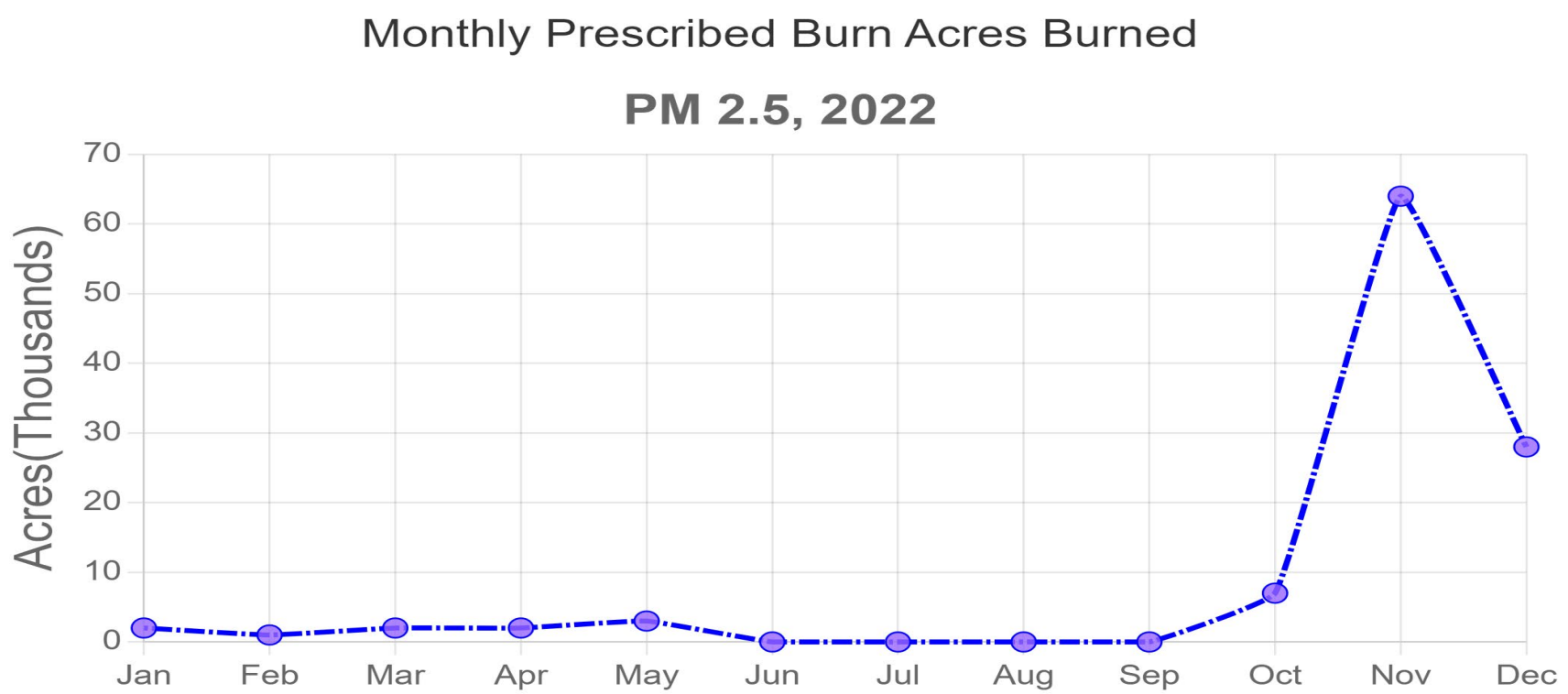
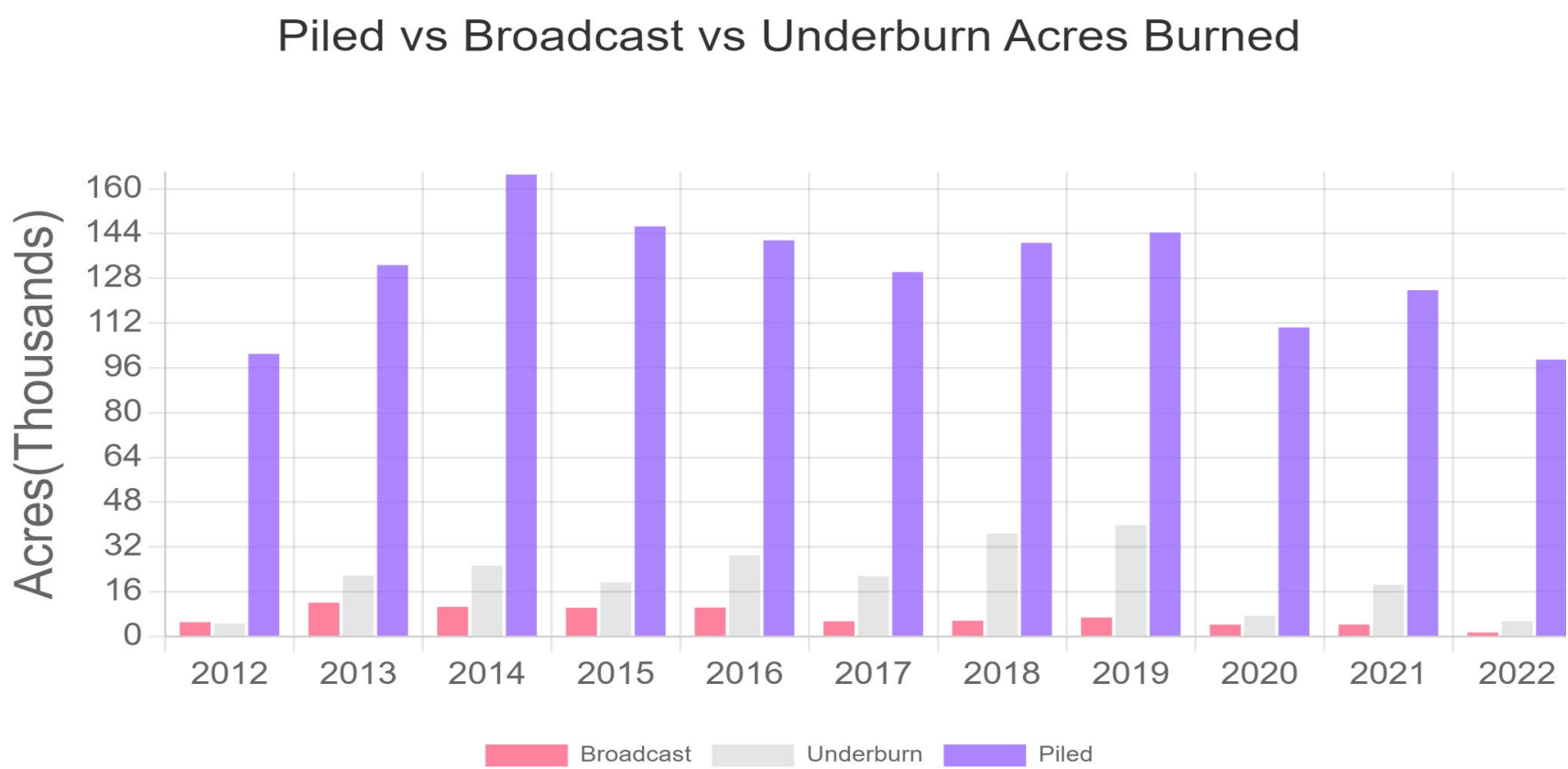


Figure 9



SMOKE MANAGEMENT ANNUAL REPORT

Table 4
Accomplished by District Summary 2022

District Name	Total Burned	Acres Burned	Units Burned
Astoria	21639	2637	60
Central Oregon	1365	691	4
Coos	1225	168	5
Coos FPA	210447	13105	254
Crater Lake N.P.	171	21	3
Deschutes NF	23619	10440	70
Douglas FPA	93571	15402	302
Forest Grove	43980	4991	121
Fremont NF	15073	1006	8
Klamath-Lake	2582	463	5
Malheur NF	13656	2520	5
Mt. Hood NF	2439	744	41
North Cascade	51521	5665	110
Northeast	46627	5262	59
Ochoco NF	13664	3442	3
Rogue-Siskiyou NF	2126	487	12
South Cascade	47577	8690	244
Southwest	55433	7678	164
Tillamook	19032	3020	61
Umatilla NF	4569	227	21
Wallowa-Whitman NF	53550	3643	92
West Oregon	98839	10307	308
Western Lane	51411	6852	195
Winema NF	1	2	1

All Districts Total	874117	107463	2148



SMOKE MANAGEMENT ANNUAL REPORT

Table 5
Tons Burned by Month by District
2022

District Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Astoria	0	0	120	0	0	0	0	0	0	2790	11649	7080
Central Oregon	0	0	0	0	0	0	0	0	0	0	577	788
Coos	518	0	307	0	0	0	400	0	0	0	0	0
Coos FPA	1791	4803	622	0	368	0	0	0	0	4704	115664	82495
Crater Lake N.P.	0	0	0	119	37	8	0	0	0	0	7	0
Deschutes NF	158	327	3331	3590	9976	0	0	0	0	0	4875	1362
Douglas FPA	203	630	226	0	0	0	0	0	0	0	56061	36451
Forest Grove	0	0	0	0	0	0	0	0	0	3621	18519	21840
Fremont NF	7414	0	5000	1400	0	0	0	0	0	0	0	1259
Klamath-Lake	150	427	0	0	0	0	0	0	0	0	905	1100
Malheur NF	0	0	0	0	0	0	0	0	0	0	13656	0
Mt. Hood NF	155	153	9	0	0	0	0	0	0	25	1395	702
North Cascade	282	37	1551	82	0	0	0	0	0	0	45455	4114
Northeast	0	0	0	0	0	0	0	0	0	7788	34836	4003
Ochoco NF	0	0	0	0	0	0	0	0	0	5136	7964	564
Rogue-Siskiyou NF	708	1040	0	0	0	0	0	0	0	0	378	0
South Cascade	29	749	0	0	21	0	0	0	0	2433	28667	15678
Southwest	0	0	3	0	412	0	0	0	0	0	26009	29009
Tillamook	0	0	0	0	0	0	0	0	0	4061	14971	0
Umatilla NF	0	0	0	0	0	0	0	0	0	270	2731	1568
Wallowa-Whitman NF	0	0	15	120	20	0	0	0	0	285	53110	0
West Oregon	137	499	260	0	0	0	800	0	0	8141	73620	15382
Western Lane	3647	1501	429	300	0	0	0	0	0	0	35161	10373
Winema NF	0	1	0	0	0	0	0	0	0	0	0	0



SMOKE MANAGEMENT ANNUAL REPORT

Table 6
Acres Burned by Month by District
2022

District Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Astoria	0	0	14	0	0	0	0	0	0	622	1496	505
Central Oregon	0	0	0	0	0	0	0	0	0	0	417	274
Coos	37	0	31	0	0	0	100	0	0	0	0	0
Coos FPA	118	268	40	0	23	0	0	0	0	198	7275	5183
Crater Lake N.P.	0	0	0	14	4	2	0	0	0	0	1	0
Deschutes NF	361	189	1144	1738	2501	0	0	0	0	0	3339	1168
Douglas FPA	45	30	31	0	0	0	0	0	0	0	9504	5792
Forest Grove	0	0	0	0	0	0	0	0	0	688	2111	2192
Fremont NF	556	0	25	200	0	0	0	0	0	0	0	225
Klamath-Lake	25	77	0	0	0	0	0	0	0	0	165	196
Malheur NF	0	0	0	0	0	0	0	0	0	0	2520	0
Mt. Hood NF	34	58	6	0	0	0	0	0	0	9	504	133
North Cascade	121	13	209	37	0	0	0	0	0	0	4510	775
Northeast	0	0	0	0	0	0	0	0	0	1271	3826	165
Ochoco NF	0	0	0	0	0	0	0	0	0	1284	2017	141
Rogue-Siskiyou NF	244	201	0	0	0	0	0	0	0	0	42	0
South Cascade	20	46	0	0	6	0	0	0	0	415	5464	2739
Southwest	0	0	1	0	74	0	0	0	0	0	3552	4051
Tillamook	0	0	0	0	0	0	0	0	0	1269	1751	0
Umatilla NF	0	0	0	0	0	0	0	0	0	45	166	16
Wallowa-Whitman NF	0	0	1	8	2	0	0	0	0	19	3613	0
West Oregon	11	103	63	0	0	0	32	0	0	847	7153	2098
Western Lane	449	262	80	36	0	0	0	0	0	0	4146	1879
Winema NF	0	2	0	0	0	0	0	0	0	0	0	0



Coastal
Burning



SMOKE MANAGEMENT ANNUAL REPORT

Table 7
Burn Data by Owner Type
2022

District Name	Private			State, County, Municipal			Federal(Except USFS)			USFS		
	Total Tons Burned	Acres Burned	Units Burned	Total Tons Burned	Acres Burned	Units Burned	Total Tons Burned	Acres Burned	Units Burned	Total Tons Burned	Acres Burned	Units Burned
Astoria	19814	1553	44	1825	1084	16	0	0	0	0	0	0
Central Oregon	0	0	0	10	40	1	1355	651	3	0	0	0
Coos	0	0	0	0	0	0	918	137	3	0	0	0
Coos FPA	207664	12970	252	232	35	1	0	0	0	0	0	0
Deschutes NF	0	0	0	0	0	0	0	0	0	23619	10440	70
Douglas FPA	85322	13731	262	742	88	1	7507	1583	39	0	0	0
Forest Grove	41871	4577	103	1789	374	17	320	40	1	0	0	0
Fremont NF	0	0	0	0	0	0	0	0	0	15073	1006	8
Klamath-Lake	0	0	0	0	0	0	2582	463	5	0	0	0
Malheur NF	0	0	0	0	0	0	0	0	0	13656	2520	5
Mt. Hood NF	0	0	0	0	0	0	0	0	0	2439	744	41
North Cascade	32217	4883	101	18806	745	7	0	0	0	0	0	0
Northeast	0	0	0	42624	5097	58	0	0	0	0	0	0
Ochoco NF	0	0	0	0	0	0	0	0	0	13664	3442	3
Rogue-Siskiyou NF	0	0	0	0	0	0	0	0	0	2126	487	12
South Cascade	47254	8615	243	323	75	1	0	0	0	0	0	0
Southwest	54314	6844	149	1088	237	8	31	597	7	0	0	0
Tillamook	15644	1768	45	3388	1252	16	0	0	0	0	0	0
Umatilla NF	0	0	0	0	0	0	0	0	0	4569	227	21
Wallowa-Whitman NF	0	0	0	0	0	0	0	0	0	53550	3643	92
West Oregon	96441	9842	295	820	330	6	0	0	0	0	0	0
Western Lane	49876	6611	188	861	34	2	512	181	3	0	0	0
Winema NF	0	0	0	0	0	0	0	0	0	1	2	1

THANK YOU!