

Oregon
Department
of Agriculture

SUMMARY OF THE 2014 FIELD-BURNING SEASON

**As prepared by
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<http://www.oregon.gov/ODA/programs/NaturalResources/Pages/Burning.aspx>



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Prepared By The Oregon Department of Agriculture Natural Resources Program Area Smoke Management Program

1. Introduction

This summary is prepared annually by the Oregon Department of Agriculture (ODA) Smoke Management Program staff to report the statistics for each field-burning season.

2. Weather Discussion - Prepared by the Oregon Department of Forestry Weather Office

Program Overview

Predicting weather patterns that will promote the lifting and evacuation of smoke out of the Willamette Valley and away from populated areas is vital to the efficient operation of the Smoke Management Program. There are usually only a few days each summer with “excellent” ventilation conditions, so days with “marginal-to-good” ventilation conditions must be efficiently utilized to keep overall smokes impacts to a minimum.

Weather Discussion

After a wet start to spring, the April through June period was warmer and drier than average. That enabled fields to begin coming ready for burning by the second week of June. However, a strong upper-level ridge of high pressure, which did not produce any favorable days for burning, dominated the first half of July. There were several periods of exceptionally warm weather, with Salem recording a high temperature of 90° F or greater on 9 of the first 16 days (See Figure 1). That same period was generally dry with the exception of some thundershowers on July 13 (See Figure 2).

The upper-level ridge weakened enough by July 17 to allow for the burning of the first few fields of the season (172 acres) with no registered smoke impacts. The next burning opportunity came just ahead of an unseasonably cool upper-level trough on Monday, July 21; 758 acres were burned with southwest transport winds and good mixing. There were no registered smoke impacts.

From one-tenth to one-quarter of an inch of rain fell over the eastern side of the northern Willamette Valley (Silverton Hills Region) on the morning of July 22, rendering fields too wet for burning. That was just a precursor to an unseasonably cool and wet weather system that dumped from one-quarter to one-half inch of rain across the region on

Figure 1
2014 Field-burning Season Observed Temperatures at the Salem Airport

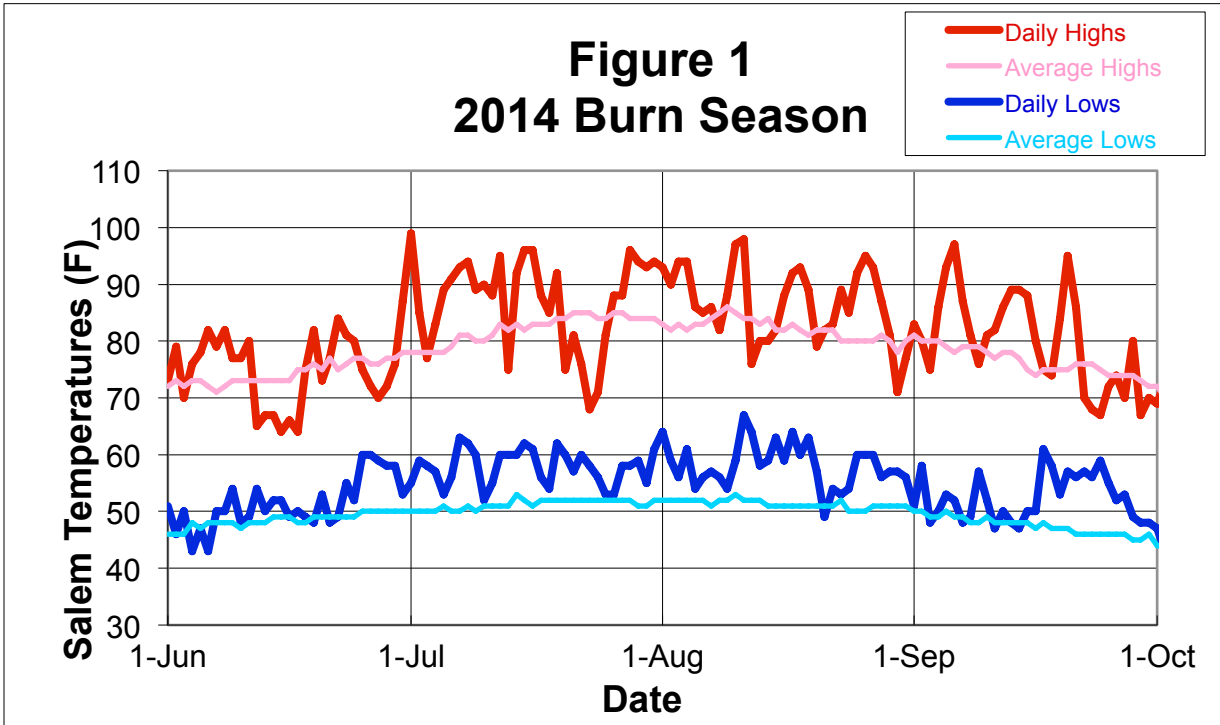
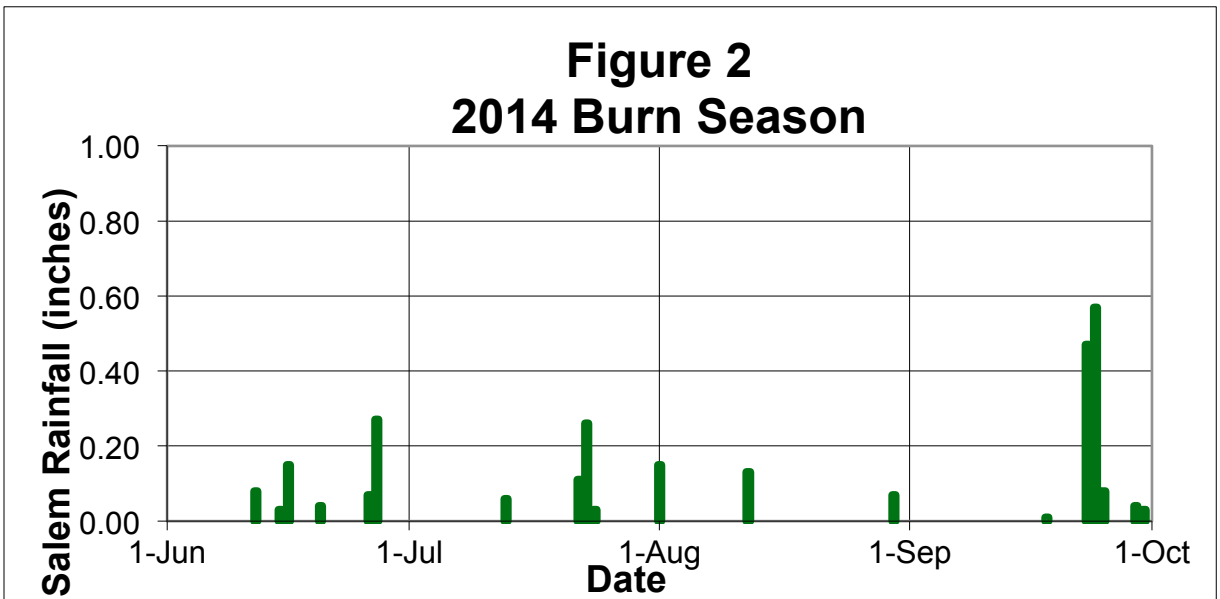


Figure 2
Salem Precipitation Observations for the 2014 Field-burning Season



Wednesday, July 23. Fields needed several days to dry, so no burning was done for the remainder of the week.

During the week of July 28, south-southwesterly flow aloft sent periodic upper-level disturbances across the state. Clusters of thundershowers developed each afternoon and frequently continued into the night, starting numerous wildfires statewide. Most of the storms were located from the Cascades eastward, but a line of high-based thunderstorms traversed the Willamette Valley in the pre-dawn hours of August 1. These storms produced gusty winds and significant lightning but minimal rainfall (mostly less than one-tenth of an inch). Otherwise, the valley had mostly sunny skies, very dry north winds, and 90°+ F temperatures during the week. No burning was done, with State Fire Marshal Burn-Ban Conditions reached most afternoons. The hot and dry weather allowed growers to make progress on harvesting and preparing fields for burning.

The persistent upper-level ridge weakened for a few days the following week, allowing onshore flow to penetrate just enough inland to cool temperatures from the 90°s into the mid-80°s (near average). A slight westerly component to the afternoon transport winds, combined with excellent mixing heights, allowed for the first significant field-burning of the season (236 acres on Tuesday, August 5; 5 acres on Wednesday, August 6; 904 acres on Thursday, August 7) with no registered smoke impacts. Low-level northerly winds were unfavorable for burning on Friday, August 8.

An upper-level trough, moving into northern California, turned the flow aloft southeasterly that weekend pumping warm and unstable air aloft over Oregon. The Willamette Valley temperatures climbed into the upper 90°s on Sunday, August 10 and Monday, August 11. Thundershowers developed over southern Oregon and then migrated northward across much of the state. Another upper-level trough brought significant cool-down and scattered thundershowers to the Willamette Valley on the afternoon of Tuesday, August 12. On Wednesday, August 13, northwest Oregon was in a dry zone directly under the upper-level trough, with showers to the north and south of the region. Extremely high mixing heights and northwest transport winds allowed for the burning of 1,228 acres. Most of the smoke plumes were highly elevated, but a few early burns created significant ground-smoke, which eventually caused 1 hour of heavy impact (counting as 2 hours of impact) and 2 hours of moderate impact in Lyons. Thundershowers developed over the Cascade foothills that evening and locally brought soaking rains to some of the eastern-most fields; however, most of the fields stayed dry.

The upper-level trough very slowly drifted northeastward over Oregon on Thursday, August 14. With most of the fields remaining dry, high afternoon mixing heights and southwest transport winds allowed for the burning of 732 acres with no registered smoke impacts. The upper-level trough moved over eastern Washington on Friday, August 15. The air aloft was still cool enough to support high mixing heights. However, an “eddy” of low-pressure, centered just off the coast near Lincoln City unexpectedly turned transport winds weakly offshore that afternoon. Only two test-fires totaling 98 acres were conducted with no registered smoke impacts.

A weak circulation center remained off the northern California coast through the subsequent Monday, August 18 with the air aloft slowly warming over Oregon. Valley temperatures returned to the low 90°s; 35 acres of preparatory (prep) burning was conducted. A weather system cutting across southwest Canada forced the California system onshore on Tuesday, August 19, with the flow aloft turning westerly over Oregon. That set up a very favorable pattern for burning, with high mixing heights and northwest transport winds; 2,436 acres were burned with 2 hours of light smoke impact in Lyons. A moderate “Marine Push” that night brought cooler and cloudy conditions into the valley with only spotty areas of very light drizzle. Skies cleared the afternoon of August 20, with northwest transport winds allowing for the burning of 898 acres with 2 hours of moderate smoke impact and 2 hours of light smoke impact in Lyons.

On Thursday, August 21, an upper-level trough dropping southeastward along the British Columbia coastline turned the flow aloft westerly over Oregon and helped afternoon mixing heights climb to near 6,000 feet; 2,326 acres were burned with light westerly transport winds sending the bulk of the smoke over the Cascades. However, some low-level smoke slowly pushed through gaps in the Cascade foothills, resulting in 5 hours of moderate impact and 8 hours of light impact in Lyons that evening and night. The upper-level trough moved over Oregon on Friday, August 22. Northerly transport winds were not favorable for burning.

By early the following week, a strong ridge of high pressure brought a return of sunny skies and 90°+ F temperatures to the Willamette Valley. The next burn opportunity came on Thursday, August 28, when the trailing edge of a dry cold front flattened the upper-level ridge and initiated a cooling trend; 297 acres were burned without impact. Burning was shut down in the mid-afternoon, because the cold front pushed east of the region and smoke plumes began to down-mix. A stronger cold front brought even more cooling and favorable burning conditions Friday afternoon, the August 29; 812 acres were burned with 1 hour of light smoke impact in Lyons. The small size of many of the remaining fields and the upcoming holiday (Labor Day) weekend limited the amount of burning done.

Spotty light showers moved across northwest Oregon on Saturday, August 30, with well below average temperatures. Rainfall totals were mostly less than one-tenth of an inch. The Salem Airport received .07”, the first measurable rain in 18 days; a dry northwesterly flow aloft brought clearing skies Sunday and Monday (Labor Day) with temperatures recovering to around average. An upper-level trough, dropping southward along the British Columbia coastline, turned the flow aloft westerly on Tuesday, September 2. A dry cold front provided favorable burning conditions, and 426 acres were burned without impact.

The upper-level trough advanced east of the region on Wednesday, September 3. High mixing heights and residual onshore flow allowed for the prep burning of 38 acres with no smoke impacts. Afternoon transport winds and pressure gradients were not favorable for open burning.

Beginning Thursday, September 4, an upper-level ridge of high pressure amplified just off the coast producing a very dry northeasterly flow aloft over Oregon. No burning was done for the remainder of the week, as dry offshore winds warmed temperatures into the 90s, putting much of the Willamette Valley into State Fire Marshal Burn-Ban conditions. The warm spell peaked on Saturday, September 6, with valley temperatures near 100°F.

The strong upper-level ridge over the region gave way to a dry and weak trough by Monday, September 8. A return to onshore flow cooled temperatures back to near average. Two test fires (totaling 77 acres) were burned without impact, but transport winds remained too northerly to allow for additional burning. A reinforcing surge of marine air penetrated into northwest Oregon that night. Stronger onshore flow allowed for 81 acres of midday preparatory burning on Tuesday, September 9 with no smoke impacts. Developing north-northeast transport winds prohibited any additional burning that afternoon.

A rare September weather pattern prohibited any burning for the remainder of the week. An amplifying upper-level ridge in the Gulf of Alaska, forced an unseasonably cold weather system into the northern Rockies. The combination of cold and dry air over northeast Oregon and a building surface thermal trough along the coast produced strong offshore flow across northwest Oregon. Dry and brisk northeast winds warmed valley temperatures back into the 80°s producing State Fire Marshal Burn-Ban conditions in the afternoons.

A wildfire ignited about 10 miles southeast of Estacada on Saturday, September 13. The “36 Pit” fire rapidly grew to over 2,000 acres by Monday, September 15, with weak offshore flow forcing smoke into the Willamette Valley and causing heavy smoke impacts from Salem to Corvallis. Increasing southwesterly flow aloft forced the surface thermal trough east of the Cascades that night, with onshore winds clearing smoke from the valley and reducing wildfire danger.

Even though the “36 Pit” fire expanded to nearly 3,600 acres on Tuesday, September 16, southwesterly winds maintained good air quality in the Willamette Valley. Small amounts of prep burning (33 acres) and two test fires (totaling 189 acres) were done with no smoke impacts. Transport wind direction was unfavorable for additional burning. The flow aloft turned more southerly on Wednesday, September 17 with the surface thermal trough moving back over western Oregon. Weak offshore flow forced smoke from the “36 Pit” wildfire back into the Willamette Valley with moderate smoke impacts registered in Silverton, Lyons, and Sweet Home. No field burning was done.

A weak upper-level trough turned low-level winds back onshore Thursday, September 18 and produced a few light showers across the Willamette Valley. The Salem Airport recorded measurable rain (.01”) for the first time since August 30. Improved mixing and SW transport winds allowed for the burning of dry fields (402 acres) with no smoke impacts. Dry and warmer weather returned on Friday, September 19 with transport winds turning northerly. One field was burned (40 acres) with 1 hour of light smoke impact in Lyons.

A strong upper-level ridge built back over the Pacific Northwest on Saturday, September 20, with offshore flow warming valley temperatures into the mid-90°s. Some smoke from the “36 Pit” wildfire was directed back over the northern Willamette Valley but without the significant smoke impacts. By Sunday afternoon, low-level winds had reversed to onshore, initiating a cooling trend and improving air quality.

On Monday, September 22, southwesterly flow aloft brought mostly cloudy and cooler conditions. All remaining fields (114 acres) were burned for a 2014 season total of 12,304 acres. Autumn began that evening at 7:29 p.m. Silverton recorded 2 hours of moderate smoke impact and 3 hours of light smoke impact that night, but those impacts were likely caused by U.S. Fish and Wildlife restoration and agricultural burns, conducted late in the day just southwest of Silverton.

3. Registered and Burned Acres

Open field burning acreage registration begins in March and continues through April 1. Figure 3 shows the breakdown of acres registered, the statutory limitation of each type, and the final allocation of each type as imposed by the statutory limitation. The registration amounts only show “on-time” registered acres. Registration totals can fluctuate slightly after “late-registration” is conducted.

Figure 3
2014 Acres Registered On-time and Total Burned

Type	Limitation (Maximum burnable acres)	Acres Registered (As of April 2, 2014)	Allocation	2014 Acres Burned
Identified Species & Steep Terrain	15,000	14,670	100%	12,304

Definitions

Type: Open Field Burning

- **Identified Species:** Research has identified some species of grass seed that cannot be profitably produced without thermal sanitation. These identified species are Chewings Fescue, Creeping Red Fescue, and Highland Bentgrass.
- **Steep Terrain:** Fields located in the Willamette Valley where grass seed or cereal grain is grown; however, because of the steepness of the terrain, it is extremely difficult to apply alternatives to open field burning.

4. Enforcement

The 2014 Field-burning Season marked the seventeenth year that ODA has performed the enforcement function of the Smoke Management Program. This is stipulated under a Memorandum of Understanding with the Oregon Department of Environmental Quality, pursuant to Oregon Revised Statutes 468A.585.

There were four enforcement contacts during the 2014 Field-burning Season. Three resulted in a Letter of Warning and one resulted in a Notice of Non-compliance.

5. Smoke Impacts

It is the goal of the ODA Smoke Management Program, with the cooperation of the Willamette Valley grass seed and cereal grain growers, to reduce and/or eliminate smoke impacts in all populated areas. The combination of accurate weather prediction for open field burning, ODA field personnel observations, and grower experience all contribute to alleviate smoke impacts; however, smoke impacts still occur. Unexpected wind shifts; changes in mixing heights, transport wind speed, and wind direction, along with inefficient lighting techniques can all contribute to the occurrence of impacts.

The number of hours recorded for smoke impacts in cities monitored for smoke impacts in 2014 are outlined in Figure 4. There were a total of 17 hours of light impacts and 11 hours of moderate impacts and 2 hours of heavy impacts recorded during the 2014 Field-burning Season.

Figure 4
2014 Open Field Burning Impacts*

Date	Acres Burned	Impact Hours			Location
		Heavy	Moderate	Light	
August 13, 2014	1,228	2	2		Lyons
August 19, 2014	2,436			2	Lyons
August 20, 2014	898		2	2	Lyons
August 21, 2014	2,310		5	8	Lyons
August 29, 2014	817			1	Lyons
September 19, 2014	40			1	Lyons
September 22, 2014**	114		2	3	Silverton

6. Complaints

Open field burning complaints received from Willamette Valley residents by the Smoke Management Program totaled 76 for the 2014 Field-burning Season. Figure 5 identifies

the number of field burning complaints originating from individual cities for the 2014 Field-burning Season.

Figure 5
2014 Open Field Burning Complaints by City

Albany	0	South Willamette Valley	0
Detroit	0	Salem/Keizer	2
Eugene/Springfield	0	Scio	1
Idanha	2	Silverton	6
Lebanon	0	Stayton	19
Lyons/Mehama	35	Sublimity	5
Mill City/Gates	6	Unknown	0
Other	0	Total	76
Portland Metro	0		

*As defined in Oregon Administrative Rule (OAR) 603-077-0105, cumulative hours of smoke impact result in hourly nephelometer measurements that exceed 1.8×10^{-4} b-scat above the average prior 3-hour background levels. For the purposes of this report, “heavy” hours of smoke impact are 5.0×10^{-4} b-scat or more above background (equivalent to visual range of 5 miles or less); “moderate” hours of smoke impact are 1.8×10^{-4} to 5.0×10^{-4} b-scat above background (equivalent to visual range of 12 miles or less); and “light” hours of smoke impact are 1.0×10^{-4} to 1.8×10^{-4} b-scat above the background. “Light” hours of smoke impact were not recorded before the 1999 season. The terms “light,” “moderate,” and “heavy” as used in relation to smoke impacts, are not defined in OAR, but are used by ODA to quantify the level of smoke impact on residents of the Willamette Valley. Nephelometers are located in Carus, Eugene, Lyons, Portland, Salem, Silverton, Springfield, and Sweet Home.

**It is suspected that these impacts were caused by US Fish and Wildlife restoration and agricultural burning SW of Silverton, conducted after field burning was completed. The locations of the field burning conducted and the SW winds during the field burning would not create impacts in Silverton.