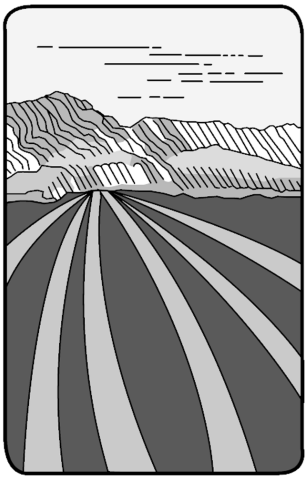

Oregon
Department
of Agriculture

SUMMARY OF THE 2013 FIELD-BURNING SEASON

As prepared by
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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

Predicting weather patterns that will promote the lifting and evacuation of field burning produced 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 and are typically brief late-afternoon windows within those days that have ideal conditions. The periods with marginal or better ventilation conditions must be efficiently forecasted and utilized to keep overall smoke impacts to a minimum.

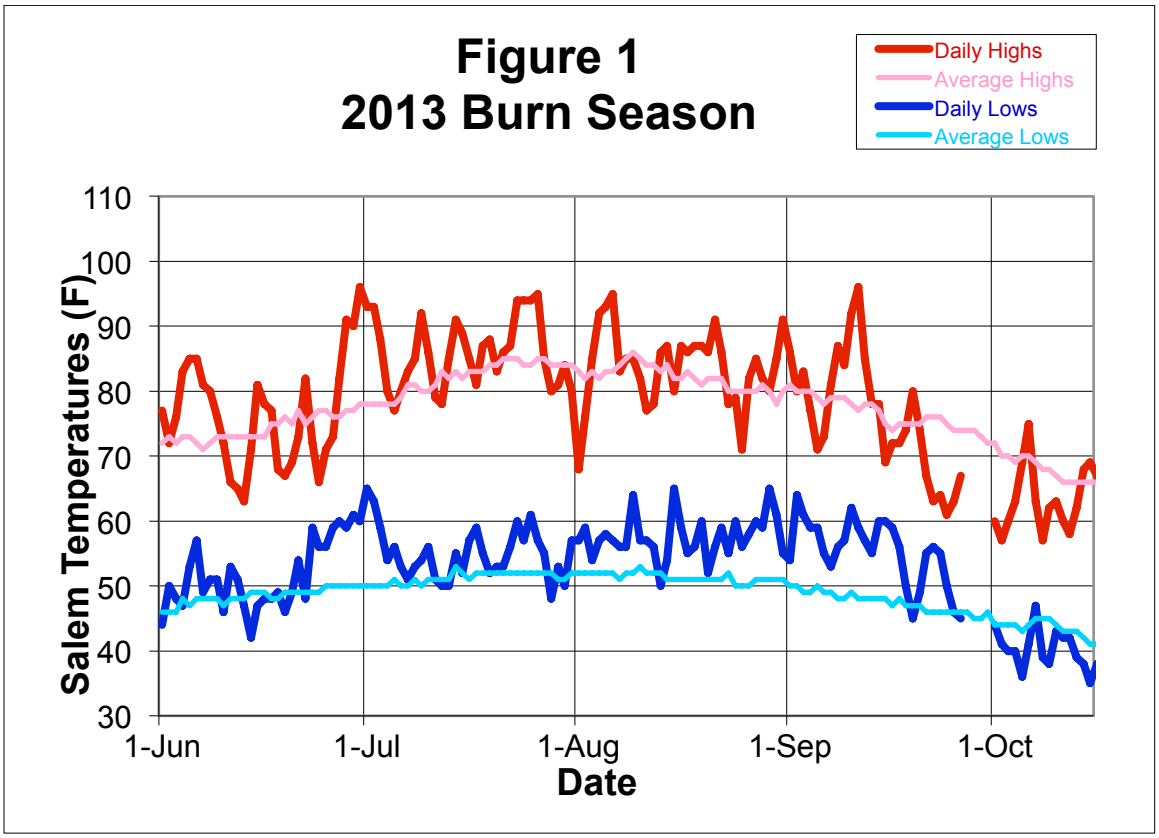
The spring and early summer of 2013 was warmer than average across the Willamette Valley, with just slightly below average total precipitation in Salem. The last few days of June into early July were the hottest weather of the summer.

In July, the Silverton Hills had a couple of days with drizzle or light showers, but the entire month of July was without measurable precipitation (as reported by the Salem Airport). Monthly precipitation totals were about average for August and well above average for September. Triple-digit heat did not occur this summer, with 96°F the warmest day reported (See Figure 1).

There were 14,728 acres of grass seed and cereal grain fields registered by the end of business on April 1, 2013, the on-time registration deadline for potential open field burning.

The first field burning opportunity was on Wednesday, July 10, an earlier start than in years past, occurring late in the day as an upper ridge weakened and surface northwesterly flow set in. The upper trough offshore was strengthening and high temperatures in the mid-80s occurred with a late northwesterly surface push. There were 66 acres of open field burning accomplished with no smoke impacts.

Figure 1
2013 Field-burning Season Observed Temperatures at the Salem Airport



Wind patterns were not favorable for burning on July 11. On July 12, upper troughing moved in from the west and a significant marine push occurred, 70 acres were field burned near Silverton during the early afternoon without impacts. The next several days were unfavorable for field burning. On Wednesday, July 17, two fields totaling 62 acres were burned, also without impacts. Field burning of small acreage was conducted daily July 18-25, totaling 87 acres and creating no smoke impacts.

The upper ridge axis was drifting to the east beginning July 24 with southwesterly flow aloft developing. On July 26, 223 acres were field burned without smoke impacts. By July 27, an onshore pattern set in and upper troughing became progressive and was moving onshore. On July 29, 663 acres were field burned without impacts. July 30 and July 31 had a total of 70 acres burned without impacts. On July 31, thunderstorms developed to the east, creating unfavorable low-level gradients, precluding any field burning. The month of July finished with a total of 1,241 acres being open field burned and no impacts were registered.

On Friday, August 2, 402 acres of open burning was conducted during the late afternoon and an unexpected strengthening of a northerly flow occurred. Some down mixing of smoke occurred late in the day with the Sweet Home Nephelometer reporting1 hour of light and 1 hour of moderate smoke impacts.

On Monday, August 5, a north-northwesterly flow through the mixing layer allowed for the open field burning of 150 acres late in the afternoon. Upper ridging persisted through August 6 with only 14 acres of prep burning completed. Beginning August 7, an upper closed low was approaching from the southwest and 171 acres were burned with a strong westerly wind component. On August 8, unfavorable gradients prevented burning as an upper low remained off the coast. There were no impacts reported August 5-7.

On Friday, August 9, favorable mid-afternoon winds and good mixing heights allowed for 1,007 acres to be field burned. However, unexpected thunderstorms approached rapidly from the south, halting open field burning, and creating 2 hours of moderate and 2 hours of light smoke impacts in Lyons; 1 hour of moderate and 1 hour of light smoke impacts in Salem; and 3 hours of moderate and 5 hours of light smoke impacts in Silverton.

A southwesterly flow aloft developed Monday, August 12, with moderate mixing heights allowing for the burning of 189 acres late in the day with no impacts. On August 13, a moderately strong long wave trough centered well off the Pacific coast developed allowing 99 acres to be open burned. On Wednesday, August 14, a well-predicted onshore push created excellent burning conditions and 3,722 acres were burned with 1 hour of light smoke impact reported in Lyons. On August 15, under a southwesterly flow aloft, relative humidity remained elevated all day and only a few test fires were performed with 185 acres completed with no impacts. High relative humidity and poor gradient stacking precluded all field burning on August 16.

Flat upper ridging was in place on Monday, August 19, with warm and dry conditions at the surface, 969 acres were burned with 1 hour of light and 1 hour of moderate impacts reported in Lyons. On Tuesday, August 20, a north-northeasterly flow aloft settled in for the next few days and no burning was conducted. On Friday, August 23, mostly cloudy conditions were observed with some late afternoon clearing. One small burn of 40 acres was accomplished late in the day; however, wet fields were a limiting issue.

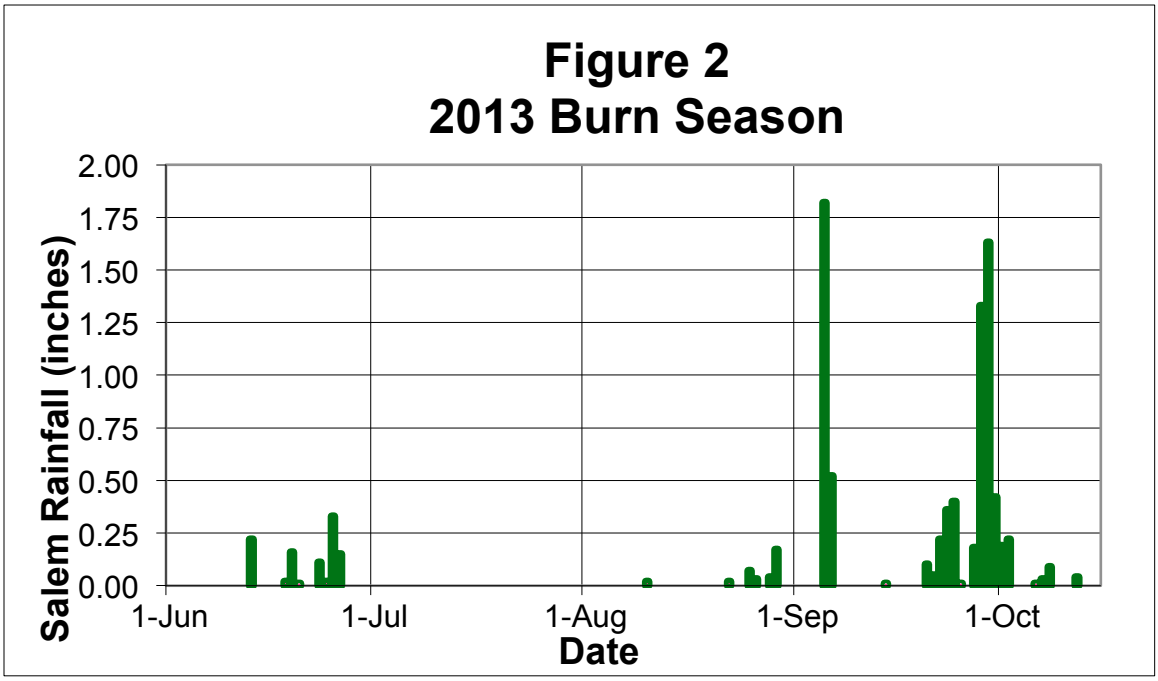
On Monday, August 26, a 47-acre test fire was conducted. Observations of this field burn concluded that conditions were too windy for open field burning. On August 27, a strong southwesterly flow aloft and favorable pressure gradient patterns in the early afternoon allowed for 1,419 acres to be burned with no impacts. The overall weather pattern was similar August 28, allowing for 1,093 acres to be burned with 1 hour of light and 1 hour moderate impacts reported in Lyons. Significant rain occurred overnight into August 29, and with limited heating and little onshore flow, fields were still too wet on August 30.

During the month of August, 9,507 acres were burned with 12 hours of light and 9 hours of moderate impacts occurring in the Willamette Valley. The total acreage burned as of September 1 was 10,748 acres.

On Tuesday, September 3, with a deep southerly flow, deep mixing heights, and high relative humidity, 98 acres of test fires were field burned with no impacts. An upper low continued to spin off the coast on September 4, but very weak surface winds allowed for

113 acres to be field burned with no impacts. Thursday, September 5, marked the first fall-like weather system to move onshore from the southwest brining heavy rains (See Figure 2) and extensive convection late in the afternoon through the night. The weather remained unfavorable for field burning until September 12. On Thursday, September 12, the final field of the 2013 Field-burning Season was conducted with 21-acres burned without impacts. There were 10,980 total acres open field burned during the 2013 Field-burning Season.

Figure 2
Salem Precipitation Observations for the 2013 Field-burning Season



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 amounts only show "on-time" registered acres. Registration totals can fluctuate slightly after "late-registration" is conducted.

Figure 3
2013 Acres Registered On-time and Total Burned

Type	Limitation (Maximum burnable acres)	Acres Registered (As of April 2, 2013)	Allocation	2013 Acres Burned
Identified Species & Steep Terrain	**15,000**	**14,728**	**100%**	**10,980**

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.

Type: Propane Flaming

- Is no longer allowed as of December 31, 2012.

4. Enforcement

The 2013 Field-burning Season marked the sixteenth 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 two enforcement contacts during the 2013 Field-burning Season. One 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 2013 are outlined in Figure 4. There were a total of 12 hours of light impacts and 9 hours of moderate impacts recorded during the 2013 Field-burning Season.

Figure 4
2013 Open Field Burning Impacts*

Date	Acres Burned	Impact Hours			Location
		Heavy	Moderate	Light	
August 2, 2013	402		1	1	Sweet Home
August 9, 2013	1,007		2	2	Lyons
August 9, 2013	1,007		1	1	Salem
August 9, 2013	1,007		3	5	Silverton
August 14, 2013	3,722			1	Lyons
August 19, 2013	966		1	1	Lyons
August 28, 2013	1,108		1	1	Lyons

6. Complaints

Open field burning complaints received from Willamette Valley residents by the Smoke Management Program, totaled 66 for the 2013 Field-burning Season. Figure 5 identifies the number of field burning complaints originating from individual cities for the 2013 Field-burning Season.

Figure 5
2013 Open Field Burning Complaints by City

Albany	**0**	**South Willamette Valley**	**0**
Detroit	**0**		
Eugene/Springfield	**0**	**Salem/Keizer**	**4**
Idanha	**1**	**Scio**	**2**
Lebanon	**2**	**Silverton**	**10**
Lyons/Mehama	**9**	**Stayton**	**17**
Mill City/Gates	**6**	**Sublimity**	**6**
Other	**8**	**Unknown**	**1**
Portland Metro	**0**	**Total**	**66**

*As defined in Oregon Administrative Rule (OAR) 603-077-0105, cumulative hours of smoke impact result in hourly nephelometer measurements that exceed 1.8 x 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 x 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 x 10^{-4} to 5.0 x 10^{-4} b-scat above background (equivalent to visual range of 12 miles or less); and "light" hours of smoke impact are 1.0 x 10^{-4} to 1.8 x 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.