



**Oregon**

Department  
of Agriculture

# Summary of the 2017 Field-Burning Season

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# **Summary of the 2017 Field-Burning Season**

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## **1. Introduction**

This summary is prepared annually by 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 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 smoke impacts to a minimum.

### **WINTER 2016-17 THROUGH MAY 2017**

The Willamette Valley experienced a particularly cold winter with several significant snow events in 2016-17. These colder-than-average conditions helped generate a healthy snowpack for Oregon’s upcoming dry season, and precipitation continued to be plentiful during spring. Oregon’s hydrology improved enough to take all areas of the state out of any drought status, with occasional rainfall from storms persisting until late May ahead of Memorial Day weekend.

### **JUNE-JULY**

The first three weeks of June brought cooler-than-average temperatures as the Willamette Valley experienced many days with marine cloud cover that slowed heating. The valley saw its first heat-wave of the season during the last week of June, as several daily record temperatures were broken. Temperatures climbed into the upper 90s at higher elevations and in excess of 100 degrees in the Willamette Valley. After a relatively moist spring, this heat wave brought enough hot, dry conditions to quickly dry and cure vegetation across northwestern Oregon.

After the heat wave broke, the North Pacific High that controls much of summer’s weather in the Pacific Northwest was displaced and slowly reformed near Hawaii. This allowed cooler air to shift south into the Gulf of Alaska, creating an upper-level trough that

persisted into mid-July and occasionally ejected dry disturbances out of the low Arctic and into the contiguous United States and Canada. These conditions helped keep temperatures near or below seasonal averages for the first half of July, slowing drying fields. Conditions were not conducive for burning until **Friday, July 14**. Weak onshore flow strengthened in the early afternoon as a thermal trough in Deschutes County increased, before increasing clouds east of the Cascades flattened pressure gradients. This brief window allowed for the burning of 249 acres with one hour of Moderate Impact and three hours of Light Impact registered in Mill City and one hour of Light Impact registered in Lyons. Four complaints were received.

A cooler period over the weekend returned temperatures to seasonal averages, as another upper-level trough formed off the coast of British Columbia and Washington state. The next opportunity for field burning came on **Tuesday, July 18**, as favorable onshore gradients aligned with west-southwesterly flow near the top of the afternoon's mixed layer. A total of 523 acres were burned ahead of a modest evening sea breeze. No impacts were registered and two complaints were received.

Overnight marine air remained west of the Willamette River, providing an opportunity for continued burning the afternoon of **Wednesday, July 19**. Onshore flow increased with daytime heating and a stronger sea breeze ahead of a marine push turned flow more westerly and maintained good mixing conditions into the evening, extending the burn window. A total of 1,589 acres were burned with no impacts registered and three complaints received.

A frontal boundary system swept across northwestern Oregon during the morning of Thursday, July 20, with widespread clouds that scattered with afternoon heating. No measurable rainfall was recorded south of McMinnville, but marine air struggled to heat up and mix out. Limited marine clouds pushed into the Willamette Valley overnight but quickly cleared up the morning of **Friday, July 21**, when 408 acres were burned. Four hours of Light Impact were registered in Mill City and one hour of Light Impact was registered in Lyons. Three complaints were received.

High pressure the following weekend helped elevate temperatures above seasonal averages and blocked damp marine air from intruding during the evening hours as a heat wave developed. Strong northerly winds and low afternoon humidity threatened to trigger State Fire Marshal burn-ban criteria on Monday, July 24. However, this week brought three consecutive days of preparatory burning. A total of 6 acres were prep burned on **Tuesday, July 25**; 12 acres on **Wednesday, July 26**; and 17 acres on **Thursday, July 27**. No impacts were registered and no complaints received all three days.

On **Friday, July 28**, onshore flow developed briefly in the afternoon, allowing 397 acres to be burned. No impacts were registered and no complaints were received. This closed out July with 3,201 acres burned.

A building upper-level ridge over southeastern Oregon strengthened during the final weekend of the July and set the stage for August to begin with a regional heat wave. It also

created unsuitable conditions for smoke ventilation and increased the fire danger in the Willamette Valley.

## AUGUST

Temperatures soared into the triple digits during the first week of August, as a heat wave formed over the Pacific Northwest. Many locations broke previous daily records for Aug. 3-4, and a persistent Red Flag Warning for fire danger was in effect until the morning of Aug. 4 throughout the entire Willamette Valley. Significant smoke from multiple large forest fires in British Columbia, as well as from the Whitewater Fire near the Mount Jefferson Wilderness, all funneled south-southwest and degraded air quality in Oregon and across the Pacific Northwest. The combination of elevated fire danger and a compromised airshed prevented any field burning activities from occurring in the Silverton Hills.

As the atmosphere cooled and the Willamette Valley passed the historical peak of summer temperatures, the next opportunity for field burning came on **Tuesday, Aug. 15**. Enhanced mixing heights with favorable gradients allowed for the burning of 978 acres. Smoke was easily lofted and northwesterly transport winds evacuated the smoke. This included one “critical problem” field near a school. No impacts were registered and five complaints were received.

On **Wednesday, Aug. 16**, an onshore flow strengthened during the day and reached its apex late Wednesday night. Mixing conditions were amplified as moist, dense air brought in an early afternoon sea breeze, allowing for a total of 1,429 acres to burn through late afternoon. This included the second of two “critical problem” fields near a school. Transport winds helped ventilate smoke to the east-southeast, and incoming marine air prevented late afternoon down mixing. No impacts were registered and three complaints were received.

Overnight, a surge of cooling marine air brought cloud cover throughout the Willamette Valley on **Thursday, Aug. 17**. These clouds kept temperatures much closer to seasonal averages, but an incoming upper-level ridge began to warm the atmosphere and lower the elevated humidity Thursday evening. A total of 43 acres of preparatory burning was completed in the early afternoon with no impacts registered and one complaint received.

This warming trend persisted through the weekend leading up to the full solar eclipse on **Monday, Aug. 21**. **ODA and the Oregon Seed Council mandated a moratorium on all field burning due to the eclipse**. The upper-level ridge began to break down early on Monday morning, allowing onshore flow to return and begin cooling the atmosphere back closer to seasonal temperatures. Elevated wildfire smoke from the Cascades began to clear out **on Tuesday, Aug. 22**. A brief window of adequate weather allowed for 267 acres to be burned with no impacts registered and two complaints received.

Favorable burning conditions continued on **Wednesday, Aug. 23**. Onshore flow began to increase significantly by mid-afternoon, providing good mixing with widespread cloud cover across the Willamette Valley. Field burning began later in the day because of

lingering high humidity. A total of 1,342 acres were successfully burned ahead of a weakening storm front. Two hours of Light Impact were registered in Mill City and two complaints were received.

As the upper-level ridge moved over Oregon the final weekend of August, northerly winds prevailed and mixing of the atmosphere began to decrease. Temperatures once again rose well above seasonal averages throughout the Willamette Valley. A total of 60 acres of preparatory burning was completed on **Thursday, Aug. 24**, with no impacts registered and three complaints received. On **Friday, Aug. 25**, 41 acres of preparatory burning was completed with no impacts registered and no complaints received.

The last few days of August saw mostly unfavorable conditions, with the exception of **Wednesday, Aug. 30**. A weak disturbance passed over the Pacific Northwest without significant rainfall in Oregon. Timing favorable to mix out shallow marine air and improving onshore flow allowed for 919 acres to be burned late in the afternoon. Three hours of Light Impact were registered in Mill City and two hours of Light Impact were registered in Lyons. Thirteen complaints were received. It is believed that six hours of Light Impact to Heavy Impact in Detroit the morning (7 a.m. to noon) of Thursday, Aug. 31, were caused by wildfire smoke. This closed out August with 5,079 acres burned.

## **SEPTEMBER**

September began with a strong upper-level ridge building over Oregon from the Pacific, causing temperatures to rise well above seasonal averages. Offshore flow began to pull wildfire smoke across the Cascades and into the Willamette Valley. This heat wave built up over Labor Day weekend with significant air quality impacts. A wildfire that was sparked in the Columbia River Gorge created immediate hazards and evacuations. The Eagle Creek Fire eventually merged with the Indian Creek Fire and brought active smoke emissions throughout western Oregon through much of the first full week of September.

The heat wave was finally broken on Thursday, Sept. 7, as isolated thundershowers formed over the southern Willamette Valley and slowly tracked north along the Cascade foothills. Breezy winds from weak showers, plus limited rainfall, helped improve the air quality and begin cooling the atmosphere.

On Sept. 11, a brush fire near Corban University spread to several structures and sent up a significant amount of smoke just outside of the Salem city limits. An approaching upper-level trough began to shift south out of Canada that night, turning flow aloft more westerly and increasing the onshore flow on **Tuesday, Sept. 12**. As a result of this cooler air, field burning resumed and a total of 2,193 acres were burned with two hours of Light Impact registered in Mill City and 29 complaints received.

On **Wednesday, Sept. 13**, onshore gradients remained stronger over the Cascades than over the coastal mountains, limiting burning to 212 acres before the dry frontal system moved through overnight. One hour of Light Impact was registered in Mill City and one complaint was received.

An early passage of this weakened system allowed the onshore gradients to recover while mixing was still enhanced; this provided opportunities to begin field burning earlier in the day on **Thursday, Sept. 14**. A total of 1,352 acres were burned. Impacts were registered as follows: Detroit (two hours Moderate, one hour Light); Mill City (two hours Moderate, one hour Light); Lyons (two hours Moderate). Eighteen complaints were received.

A weak area of high pressure formed over the Oregon Coast on Thursday night and persisted into Friday. As a result, on **Friday, Sept. 15**, eight fields were burned totaling 244 acres. No impacts were registered and seven complaints and one call of support were received.

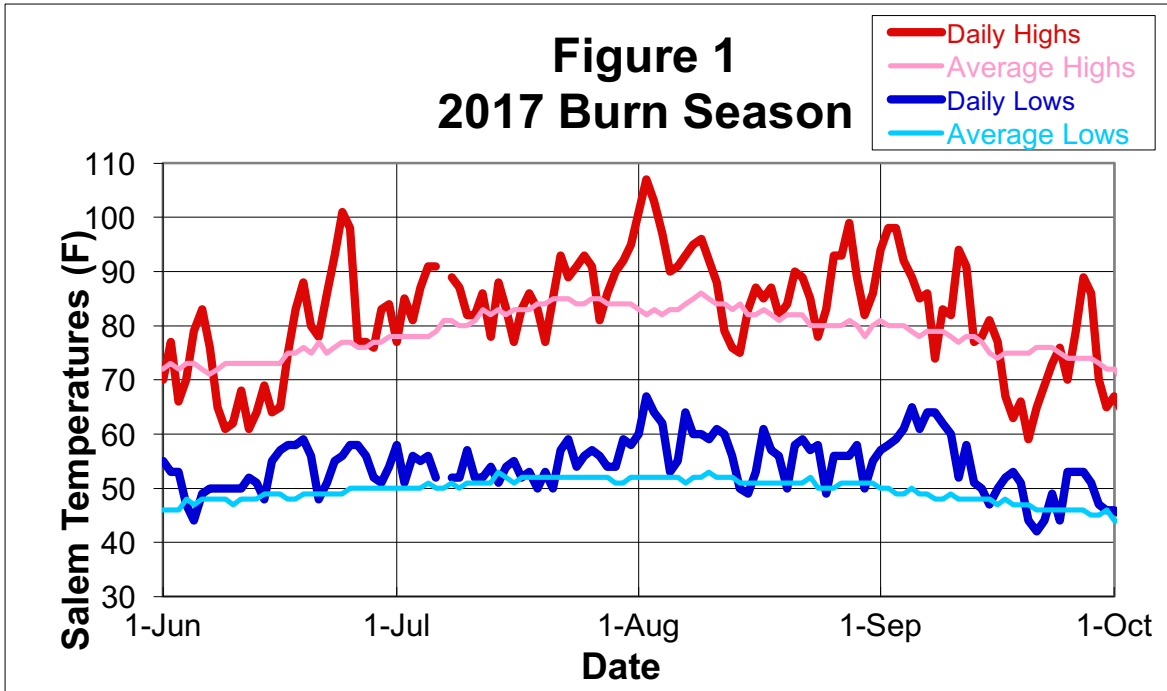
Shifting winds ahead of a major storm system prevented Saturday, Sept. 16, from being favorable to finish the remaining fields. But Sunday, Sept. 17, showed promise. An Oregon Department of Forestry meteorologist coordinated with staffers with ODA's Smoke Management Program, understanding that the window of opportunity would be brief for rare field burning on a weekend. Unfortunately, showers moved in shortly after noon and dropped just enough rainfall to prevent any field burning.

Fall-like conditions with widespread rain showers, occasional thunderstorms, and a significant drop in temperatures (10 degrees to 15 degrees below seasonal averages) began on Sunday afternoon and persisted through Thursday, Sept. 21. The snow level dropped rapidly as a pool of cold air from the Arctic shifted into southern British Columbia, and the Cascades received their first snowfall of the season.

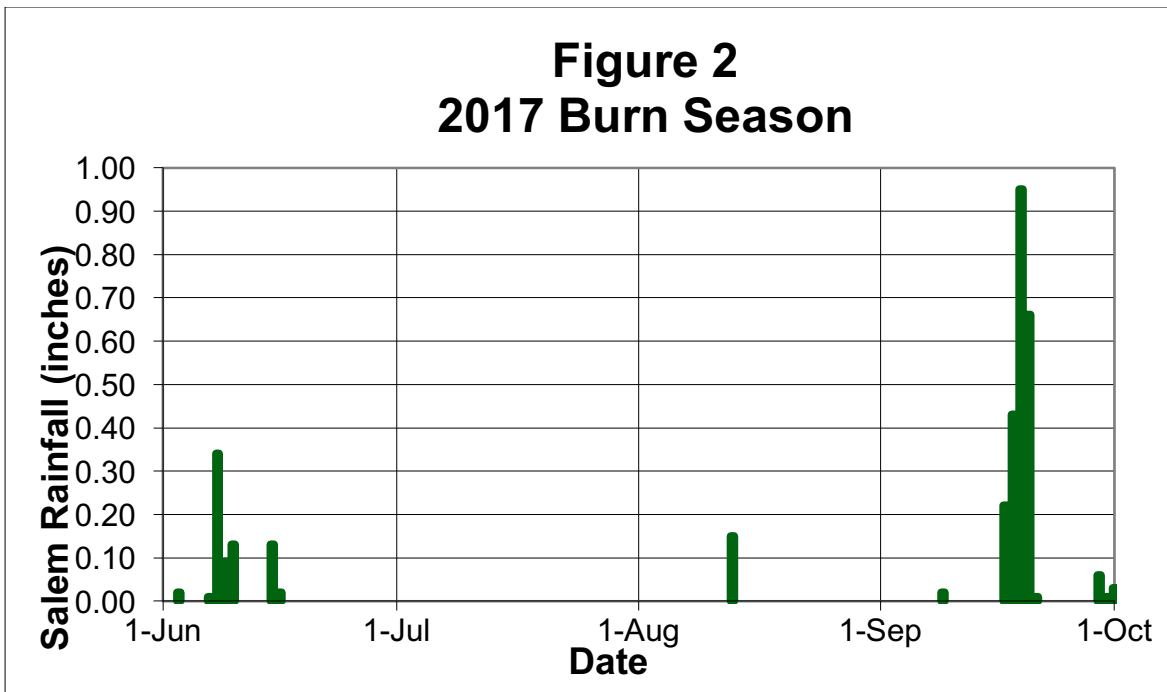
An upper-level ridge began building into the Oregon Coast and helped to form a broad area of high surface pressure east of the Cascades. This created persistent offshore flow across western Oregon until **Thursday, Sept. 28**. Southwest flow aloft turned onshore, introducing cooler marine air that increased mixing and improve air quality. The final 431 acres of the 2017 season were burned with no impacts registered and one complaint received. This closed out September with 4,432 acres burned, and ended the 2017 field burning season.

A total of 12,712 acres were burned during the 2017 field-burning season.

**Figure 1**  
**Observed Temperatures at McNary Field (Salem Municipal Airport)**



**Figure 2**  
**Observed Precipitation at McNary Field (Salem Municipal Airport)**





### 3. Registered and Burned Acres

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

**Table 1**  
**Acres Registered On-time and Total Burned**

<b>Type</b>	<b>Limitation</b> (Maximum burnable acres)	<b>Acres Registered</b> (As of April 3, 2017)	<b>Allocation</b>	<b>2017 Acres Burned</b>
<b>Identified Species and Steep Terrain</b>	<b>15,000</b>	<b>13,568</b>	<b>100%</b>	<b>12,712</b>

### 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, and the perennial varieties of grass seed grown prevent erosion on steep hillsides.

### 4. Enforcement

The 2017 field-burning season marked the 20th 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 was one enforcement contact during the 2017 field-burning season. The enforcement action resulted in a Notice of Noncompliance.

During the 2016 field-burning season, there was one enforcement contact. The enforcement action resulted in a Letter of Warning.

### 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 speeds, and wind directions, along with inefficient lighting techniques, can all contribute to the occurrence of impacts.

The number of hours recorded for smoke impacts in 2017 in cities monitored are outlined in Table 2 (below).

*There were a total of 21 days when burning was conducted; 7 of the 21 days resulted in impacts during the 2017 season.*

**Table 2**  
**2017 Open Field Burning Impacts**

Date	Acres Burned	Impact Hours			Location
		Heavy	Moderate	Light	
July 14, 2017	249			1	Lyons
			1	3	Mill City
July 21, 2017	408			1	Lyons
				4	Mill City
Aug. 23, 2017	1,342			2	Mill City
Aug. 30, 2017	919			2	Lyons
				3	Mill City
Sept. 12, 2017	2,193			2	Mill City
Sept. 13, 2017	212			1	Mill City
Sept. 14, 2017	1,352		2	1	Detroit
			2		Lyons
			2	1	Mill City
<b>Totals</b>		<b>0</b>	<b>7</b>	<b>21</b>	

As defined in Oregon Administrative Rule (OAR) 603-077-0105, cumulative hours of smoke impact result in hourly nephelometer measurements that exceed  $1.8 \times 10^{-4}$  b-scat above the average prior three-hour background levels. For the purposes of this report, “heavy” hours of smoke impact are  $5.0 \times 10^{-4}$  b-scat or more above background (equivalent to visual range of 5 miles or less); “moderate” hours of smoke impact are  $1.8 \times 10^{-4}$  to  $5.0 \times 10^{-4}$  b-scat above background (equivalent to visual range of 12 miles or less); and “light” hours of smoke impact are  $1.0 \times 10^{-4}$  to  $1.8 \times 10^{-4}$  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, Detroit, Eugene, Lyons, Mill City, Portland, Salem, Silverton, Springfield, and Sweet Home.

## 6. Complaints

A total of 103 Willamette Valley residents submitted complaints to the Smoke Management Program during the 2017 field-burning season. Table 3 (below) identifies the number of field-burning complaints originating from individual cities/areas.

**Table 3**  
**Complaints by City/Area**

Albany	1	Salem/Keizer	2
Detroit	0	Scio	1
Eugene/Springfield	0	Silverton	10
Idanha	3	Stayton	15
Lebanon	2	Sublimity	5
Lyons/Mehama	29	Unknown	7
Mill City/Gates	17		
Other	11		
Portland Metro	0	<b>Total</b>	103