



**Oregon**  
Department  
of Agriculture

## **SUMMARY OF THE 2008 FIELD-BURNING SEASON**

**Oregon Department of Agriculture  
Natural Resources Division  
Smoke Management Program**



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# SUMMARY OF THE 2008 FIELD-BURNING SEASON

Prepared By

The Oregon Department of Agriculture  
Natural Resources Division  
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## 1. Introduction

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

## 2. Weather Discussion

Willamette Valley weather is a variable that presents ongoing challenges to the Smoke Management Program. Predicting weather patterns that will promote the rapid lifting and evacuation of smoke away from populated areas is complicated by the unpredictability of the environment. Rapidly changing weather conditions, error in computer model forecasts, and unpredictable eddies of smoke down mixing can increase smoke impacts, along with inefficient ignition procedures.

### June

The summer of 2008 started off very cool, with June's monthly temperatures about 2°F below normal across most of the valley. Temperatures were below normal more than 20 days during the month. Average monthly temperatures would have been even lower had it not been for a couple of very warm days at the end of the month. June was also dry. The Willamette Valley rainfall totals were about half of normal shown in Figures 1 and 2.

Fields were not ready for burning prior to June 25. As part of a prearranged agreement with the Oregon Seed Council, ODA did not issue any burning permits from Wednesday, June 25 through Tuesday, July 8, 2008, due to the Olympic Trials in Eugene. Unfortunately, southerly flow aloft developed during the weekend of June 28-29 sending smoke from large California wildfires over Western Oregon. Nephelometers throughout the Willamette Valley registered significant smoke impacts beginning the night of Saturday, June 28 and continued through Tuesday, July 1. By Wednesday, July 2 the smoke levels had dropped below impact criteria, but it remained very hazy over the valley. A westerly flow aloft cleared the smoke from western Oregon skies on Friday, July 4.

### July

July was a very dry month across the Willamette Valley with some locations recording only a trace of precipitation for the month. The first half of July was dominated by above normal temperatures; the second half had below normal temperatures.

Preparatory burning (the burning of small amounts of acreage to prepare fields for open-burning) was authorized on Wednesday, July 16 and Friday, July 18 with no smoke impacts registered.

Preparatory burning was conducted Tuesday, July 22 and Wednesday, July 23 in anticipation of possible open-burning later that week. No impacts were registered.

The first open burning of the season was authorized on Friday, July 25, 2008, with southwesterly transport winds ahead of an approaching upper-level trough. A total of 5,035 acres were open field burned, in both the north and south Willamette Valley. Following this burn, Nephelometers recorded four hours of “light impact” (see page 11 for “impact” definition) in Lyons and one hour in Sweet Home.

Meteorological conditions similar to July 25 allowed for the open burning of 5,790 acres on Monday, July 28. One hour of light impact was registered in Lyons Monday evening with a return to baseline levels by 8 p.m. PDT.

Limited preparatory burning of 40 acres was completed on Tuesday, July 29 with the decision not to allow open burning because of strong south winds ahead of an approaching cold front. Westerly flow aloft allowed for limited preparatory burning of 77 acres on Wednesday, July 30. Open burning was not authorized due to northerly surface winds. No impacts were registered on either day.

An approaching upper-level trough turned the flow aloft southwesterly on Thursday, July 31 and allowed for the open burning of 3,789 acres into southwesterly transport winds. One hour of light smoke impact was registered in both Lyons and Sweet Home Thursday afternoon. Nephelometer readings at those locations returned to baseline levels by 7 p.m. PDT.

## **August**

August was warmer and wetter than normal. The month began with a cool upper-level trough of low pressure dropping over the Pacific Northwest. Areas of light rain moved into northwest Oregon during the morning of August 1 and left fields too damp for burning. Pilot-balloon (Pibal) readings were taken in Creswell ahead of an approaching cold front that afternoon. The decision not to burn was based on the inability to verify transport winds, due to cloud-cover and strong surface winds.

A strong upper-level ridge of high pressure brought sunny and very warm weather to the region for most of the next week. No burning was allowed until Friday, August 8, when an approaching trough of low pressure turned the flow aloft southerly and allowed for the authorization of 906 acres to be open field burned. Transport winds were too southerly to allow for further open burning. No smoke impacts were registered.

A weak upper-level trough moved across Oregon during the weekend of August 9 -10 with a ridge rebuilding over the region Monday, August 11. Limited preparatory burning of 66 acres was allowed, but open burning was not permitted due to north-northeasterly transport winds.

An approaching cold front turned transport winds northwesterly on Tuesday, August 12 and 2,890 acres were open field burned throughout the valley, including the Creswell area. Lyons recorded one hour of moderate smoke impact with nephelometer readings returning to baseline levels by 6:00 p.m. PDT.

Northeasterly transport winds allowed for the burning of 279 acres on the west side of the valley near Philomath and Monroe around midday on Wednesday, August 13. As a strong upper-level ridge continued to build over the region, easterly transport winds allowed for the late-morning burning of 130 acres, near Philomath on Thursday, August 14. No impacts were registered on either day.

Temperatures climbed to over 100 degrees during the afternoon of Thursday, August 14 in the Willamette Valley breaking daily records in Portland, Hillsboro, and Eugene. The record warmth continued Friday, August 15 and Saturday, August 16. Morning minimums locally stayed in the low 70s, and afternoon highs climbed over the century mark. No burning was allowed. The strong ridge shifted east on Sunday, August 17 with southerly flow aloft bringing showers and thundershowers over much of western and central Oregon, along with cooler temperatures.

Increasing southerly flow aloft brought more showers and cooler temperatures to western Oregon on Monday, August 18. No burning was allowed due to damp field conditions. Transport winds were too southerly and strong for burning Tuesday, August 19 ahead of a cold front that dropped from one-tenth to one-quarter of an inch of rain across the Willamette Valley Tuesday night. Fields were too damp for burning on Wednesday, August 20. Another one-tenth to one-third of an inch of rain fell across the Willamette Valley the night of August 20 leaving fields too damp for burning the remainder of the week. An additional one-quarter to two-thirds of an inch of rain fell late Sunday, August 24. Fields remained too damp for burning until the afternoon of Wednesday, August 27 when a dry cold front stalled over the central Willamette Valley. That created excellent ventilation conditions, and 4,159 acres were open burned with no impacts registered.

Limited preparatory burning was allowed Thursday, August 28 in anticipation of good ventilation conditions for open burning the next day. On Friday, August 29 ahead of an approaching upper-level trough, 3,099 acres were open burned with two hours of light smoke impact registered in Lyons.

## **September**

September was warmer and drier than normal across the Willamette Valley. The first half of the month was dominated by dry northerly winds that did not allow for many burning opportunities. No rain fell until after September 20. The warmest temperatures occurred during the second week, when highs climbed into the low 90s.

Northerly transport winds on Tuesday, September 2 became north-northeasterly Wednesday through Friday. Limited preparatory burning was conducted Tuesday through Friday. The only open burning conducted this week was a 24-acre test fire near Corvallis in the early afternoon on Friday, September 5. No impacts were registered during this week.

Northerly transport winds continued to prevail during the second week of September. No burning was done on Monday, September 8. Limited preparatory burning was done Tuesday and Wednesday. In the north valley, 485 acres were open burned on Tuesday, September 9. Northeasterly transport winds allowed for 310 acres to be burned on Wednesday, September 10. State Fire Marshal conditions prohibited any burning September 11 and 12.

A strong upper-level ridge of high pressure built over the Pacific Northwest during the weekend of September 13 and 14. By Monday, September 15, a southerly flow aloft began sending wildfire smoke over Oregon. Hazy conditions developed late Monday and continued through Wednesday. Nephelometer readings became elevated due to wildfire smoke. No field burning was conducted. The Willamette Valley experienced a strong intrusion of marine during the night on Wednesday, September 17. The marine air helped to clear wildfire smoke from the low-levels of the atmosphere.

On Thursday, September 18, 263 acres were field burned during the afternoon. Concurrently, an increasing southerly flow aloft transported additional wildfire smoke into the region. Increasing nephelometer readings in Lyons later that day likely reflected the combination of both field burning and wildfire smoke. The elevated readings overnight were likely due to wildfire smoke. It was estimated that field burning was responsible for approximately four hours of moderate smoke impact in Lyons during the late afternoon of Thursday, September 18. Nephelometer readings remained elevated due to wildfire smoke on Friday, September 19. No burning was conducted on Friday.

A major change in the weather pattern occurred on Saturday, September 20\*, as the flow aloft turned westerly, wildfire smoke began clearing from western Oregon. Southwesterly transport winds and high mixing heights allowed for the open burning of 8,081 acres; with one hour of light smoke impact registered in Sweet Home. Light rain fell across the region Saturday night with damp fields prohibiting field burning on Sunday, September 21 and Monday, September 22.

A transitory ridge of high pressure brought back northeasterly transport winds on Tuesday, September 23 that aided in the drying of damp fields but did not permit any burning. A vigorous upper-level trough turned the transport winds southerly Wednesday, September 24, but surface winds became too strong to permit field burning. Rain dampened fields across the north valley on Wednesday night.

South-valley fields were dry enough for the burning of two fields totaling 160 acres on Thursday, September 25. One hour of light smoke impact was registered in Lyons.

An approaching upper-level trough turned transport winds westerly and allowed for 1,660 acres of open burning during the afternoon of Friday, September 26. South-valley field burning was completed for the season. No impacts were registered. A strong ridge of high pressure did not allow for additional burning in September.

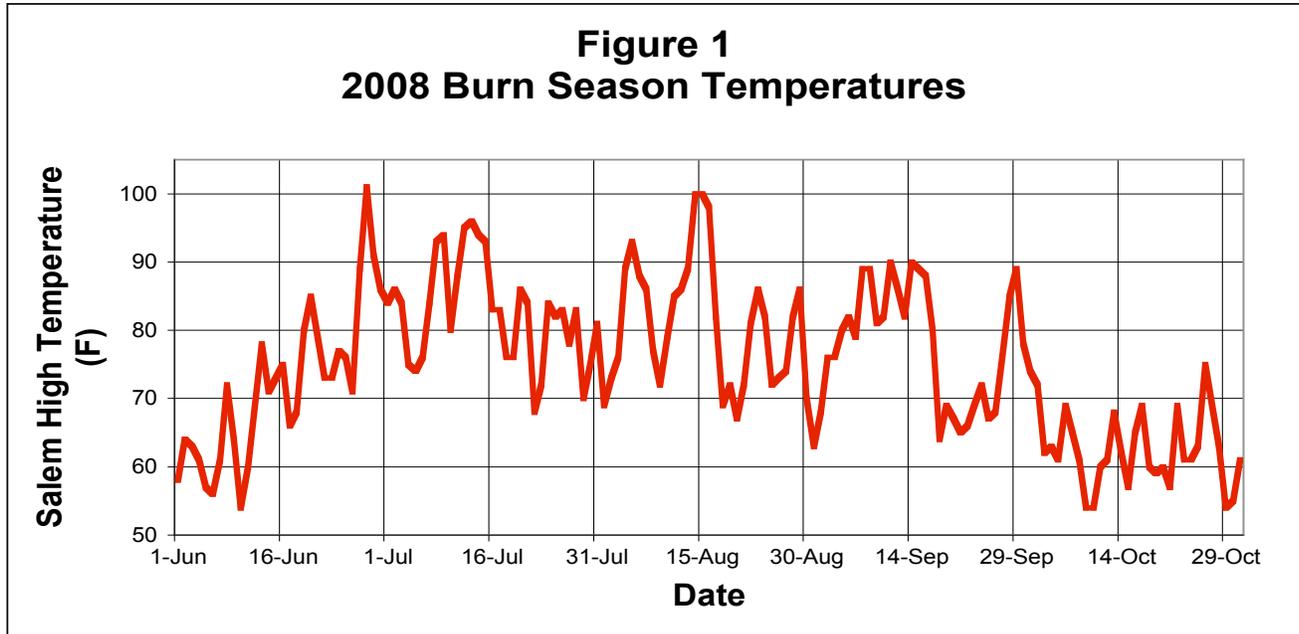
## **October**

October was also a dry month, but unlike September, cooler than normal. Most of the month's rainfall fell during the first week, making for damp field conditions and delaying the end of the 2008 field-burning season until mid-month. Cold northerly flow led to record cold minimum temperatures the morning of Saturday, October 11. Most of the valley saw below freezing temperatures.

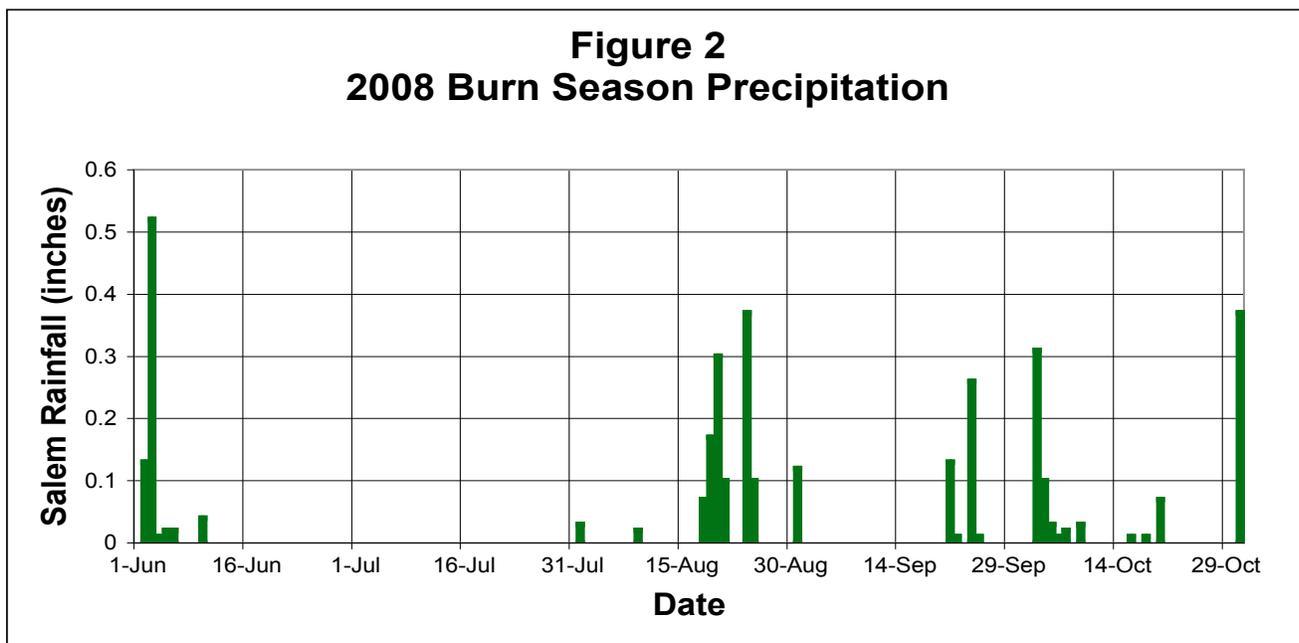
\*Restrictions limiting weekend burning end on September 15 of each year.

The first field burning of the month took place on Monday, October 13 as an approaching upper-level trough turned transport winds westerly and raised mixing heights to near 4,000 feet. In the North Valley, 312 acres were open burned with no impacts registered. Continued dry weather allowed for the burning of the two remaining north-valley fields totaling 41 acres on Friday, October 17. No impacts were registered.

**Figure 1**  
**2008 Burn Season Temperatures**



**Figure 2**  
**2008 Burn Season Precipitation**



### 3. Four-Day Burn Percentage

During the 2008 field-burning season, 60% of all acreage open field burned occurred over 4 days, with 78% of all acres open field burned occurring over 6 days. This compares with 77% of all acreage open field burned over 4 days in 2007, and 56% in 2006. Figure 3 below outlines the 2008 season.

**Figure 3**  
**Percentage of Total Acres Burned Over Four Days**

Fri. 7/25/08	Mon. 7/28/08	Wed. 8/27/08	Sat. 9/20/08	<b>4 Day Total</b>	<b>Percent</b>
5,035	5,790	4,159	8,081	<b>23,065</b>	<b>60%</b>

### 4. Registered Acres

Open field burning and propane flaming acreage pre-registration began on March 15 and continued through April 1. Figure 4 below shows the breakdown of acres registered by the type, the statutory limitation of each type, and the final allocation of each type as imposed by the statutory limitation. (Figures show “on-time” registered acres. Figures fluctuate slightly after “late-registration” is completed.)

**Figure 4**  
**Acres Registered (as of April 2, 2008) by Grass Seed Type**

Type	Limitation	Acres Registered	Allocation
<b>Regular</b>	40,000	67,445	59%
<b>Identified Species</b>	22,000	17,238	100%
<b>Steep Terrain</b>	3,000	998	100%
<b>Propane Flame</b>	37,500	806	100%

#### Definitions

##### **Type: Open Field Burning**

- **Regular:** Perennial or annual grass seed, or cereal grain residue.
- **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:** Locations in the Willamette Valley where grass seed is grown, but because of the steepness of the terrain it is extremely difficult to apply alternatives to open field burning.

##### **Type: Propane Flaming**

- The process of sanitizing (burning) regular and identified species fields with a propane flamer; a mobile, fire-producing, sanitation device.

## 5. Open Field Burning

In 2008, a total of 86,309 acres (including “late” registration acres) were registered for open field burning, compared to 102,385 acres registered in 2007. Registration included 68,095 acres of regular, 17,238 acres of identified species, and 976 acres of steep terrain. Regular registration exceeded the legislatively mandated limitation of 40,000 acres; therefore, the regular open field burning allocation rate for 2008 was 59%. The allocation rate for identified species and steep terrain for 2008 was 100%.

A total of 38,173 acres were open field burned during the 2008 burn season (24,732 regular limitation; 12,570 identified species; and 871 steep terrain). By comparison, a total of 32,322 acres were open burned in 2007; 49,017 acres were open burned in 2006; 49,225 acres were open burned in 2005; and 49,553 acres were open burned in 2004. Figures 5 and 6 below show the number of acres field burned by species and their percentages to the total number of acres burned.

## 6. Propane Flaming

The maximum allowable acreage to be propane flamed is 37,500 acres (as set by the 1995 Oregon Legislature). In 2008, growers registered 984 acres to be propane flamed and burned 235 acres. This compares to 788 acres propane flamed in 2007; 1,466 acres propane flamed in 2006; 1,631 acres propane flamed in 2005; and 1,067 acres in 2004.

**Figure 5**

**Acres Field Burned by Crop (Open field burning and propane flaming)**

<b>Species</b>	<b>Burned (acres)</b>
Annual Ryegrass	19,794
Cereal Grain	1,801
Chewings Fescue	8,918
Creeping Red Fescue	3,431
Fine Fescue	404
Highland Bentgrass	221
Kentucky Bluegrass	71
Orchard grass	0
Perennial Ryegrass	3,264
Tall Fescue	504
<b>TOTAL</b>	<b>38,408</b>

**Figure 6**

**Percentage of Total Acres Burned by Crop (Open field burning and propane flaming)**

<b>Species</b>	<b>Percentage of Total</b>
Annual Ryegrass	52.0%
Chewings Fescue	23.0%
Creeping Red Fescue	9.0%
Perennial Ryegrass	8.0%
All remaining species	8.0%
<b>TOTAL</b>	<b>100%</b>

**7. Stack Burning**

Stack burning does not have an imposed acreage limitation, and registration is not required. Growers are obligated to secure a stack-burning permit containing the responsible party's name, location of the burn, and acreage represented by the accumulated residue prior to ignition. The stack-burning season lasts from April 1 to March 31 of the following year. As of October 31, 2008, growers had stack burned 605 acres since April 1, 2008. Previous years are shown below in Figure 7.

**Figure 7**

**Historical Stack Burn Statistics**

<b>Year</b>	<b>April 1 - October 31</b>	<b>November 1 - March 31</b>
2008-2009	605	N/A
2007-2008	931	1,121
2006-2007	1,061	1,208
2005-2006	1,366	1,692
2004-2005	1,667	1,864

**8. Total Acres Field Burned**

Figure 8 below shows the figures for total thermal residue management, including propane flaming acreages. Figure 9 shows the five-year comparative of field burning data.

**Figure 8**

**Historical Field Burned Acres**

<b>Burn Type</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>	<b>2004</b>
Open Field Burning	38,173	32,322	49,017	49,225	49,553
Propane Flaming	235	788	1,466	1,631	1,067
<b>Total</b>	<b>38,408</b>	<b>33,110</b>	<b>50,483</b>	<b>50,856</b>	<b>50,620</b>

**Figure 9**  
**5 Year Historical Comparative Open Field Burning Data**

<b>Season</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>	<b>2004</b>
Acres Registered*	87,293	103,314	116,328	114,299	91,933
Acres Open Field Burned	38,173	32,332	49,017	49,225	49,553
Most burned in one day	8,081	8,810	8,412	9,311	10,252
Burn days accounting for 75% of total acres	6 (78%)	4 (77%)	7	10	7
Weekend burn days allowed	1	1	0	0	1
<b>Number of Burn Days<sup>†</sup></b>					
300 – 999 acres burned	4	2	15	15	8
1,000 – 4,999 acres burned	5	4	5	10	5
5,000 – 9,999 acres burned	3	2	4	2	3
10,000 or greater burned	0	0	0	0	1
<b>Total Burn Days</b>	<b>12</b>	<b>8</b>	<b>24</b>	<b>27</b>	<b>17</b>

## 9. Enforcement

The 2008 burn season marked the twelfth year that ODA has performed the enforcement function of the Smoke Management Program (as stipulated under a Memorandum of Understanding with the Oregon Department of Environmental Quality, pursuant to Oregon Revised Statutes 468A.585).

There were three enforcement contacts during the 2008 season (as of December 31, 2008). This compares with six enforcement contacts in 2007, five enforcement contacts during the 2006 season, seventeen enforcement contacts in 2005, and twenty-one contacts in 2004.

Of the three enforcement contacts in 2008, one resulted in a letter of warning, and two resulted in notices of non-compliance.

## 10. Smoke Impacts

It is the goal of the ODA Smoke Management Program with the cooperation of the Willamette Valley growers, to reduce or eliminate smoke impacts in populated areas. The combination of accurate weather prediction for burning, ODA field personnel observations, and grower experience all contribute to alleviate smoke impacts; however, smoke impacts still occur. Unexpected wind shifts, rapidly changing mixing heights, rapidly decreasing transport wind speeds and directions, other meteorological factors, and inefficient lighting techniques all contribute to the occurrence of impacts.

\* All registered acres (including “late” registered acres) regular, identified species, and steep terrain open field-burning acres plus registered propane acres.

† Days with less than 300 acres burned are not counted as open field burning days.

Smoke impacts attributable to open field burning occurred on 8 days in 2008. Previous years totals included 12 days in 2007, 7 days in 2006, 15 days in 2005, and 10 days in 2004.

The number of hours of recorded smoke impacts in cities monitored for smoke intrusions in 2008 are outlined below in Figure 10. The total number of hours of field burning impacts in cities monitored for smoke intrusion, and over how many days the impacts occurred is outlined in Figure 11.

**Figure 10**  
**2008 Open Field Burning Impacts<sup>‡</sup>**

Date	Acres Burned	Impact Hours			Location
		Heavy	Moderate	Light	
July 25	5,035			4	Lyons
July 25	5,035			1	Sweet Home
July 28	5,990			1	Lyons
July 31	3,789			1	Lyons
July 31	3,789			1	Sweet Home
Aug 12	2,890		1		Lyons
Aug 29	3,099			2	Lyons
Sept 18	263		4		Lyons
Sept 20	8,081			1	Sweet Home
Sept 25	160			1	Lyons

<sup>‡</sup> As defined in Oregon Administrative Rule (OAR) 603-077-105, cumulative hours of smoke impact result in hourly nephelometer measurements that exceed  $1.8 \times 10^{-4}$  b-scat above the average prior 3-hour background levels. For the purposes of this report, “heavy” hours of smoke impact are  $5.0 \times 10^{-4}$  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 prior to 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 Portland, Salem, Corvallis, Carus, Lyons, Sweet Home, Eugene, and Springfield.

**Figure 11**  
**Total Hours of Open Field Burning Impacts**

<i>Smoke Impact Hours</i>	<i>2008</i>				<i>2007</i>				<i>2006</i>			
	<i>H</i>	<i>M</i>	<i>L</i>	<i>days</i>	<i>H</i>	<i>M</i>	<i>L</i>	<i>days</i>	<i>H</i>	<i>M</i>	<i>L</i>	<i>days</i>
Portland												
Salem												
Corvallis					2			1				
Carus												
Lyons		5	9	7		11	23	9		8	11	5
Sweet Home			3	3		4	9	3		3	5	5
Eugene												
Springfield												

**11. Complaints**

Open field burning complaints received from Willamette Valley residents by the Smoke Management Program<sup>§</sup> totaled 463 for the 2008 field-burning season. This compares to 776 complaints received during the 2007 field-burning season; 1,182 complaints received during the 2006 field-burning season; 1,106 complaints received during the 2005 season; 475 in 2004; 206 in 2003. Figure 12 below identifies the number of field burning complaints originating from individual cities.

**Figure 12**  
**2008 Open Field Burning Complaints by City**

Albany	4	Noti	4
Brownsville	2	Portland Metro	0
Corvallis	2	Salem/Keizer	3
Cottage Grove/Lorane	5	Scio	0
Creswell	52	Silverton	7
Eugene	134	Springfield	11
Harrisburg	37	Stayton	23
Junction City/Monroe	13	Sublimity	7
Lebanon	57	Sweet Home	27
Lyons/Mehama	25	Veneta/Elmira	16
Mill City/Gates	18	Other	5
Mohawk Valley	4	Unknown	7
		<b>Total</b>	<b>463</b>

<sup>§</sup> Complaints received by the Lane Regional Air Protection Agency (LRAPA) are forwarded to ODA during the field-burning season. Those complaints are included in the total presented in this report.

## Breakdown of 2008 Open Field Burning Complaint Calls\*\*

ODA tracks the number of complaint calls by individuals to determine the amount of repeat callers. Figure 13 identifies how many times individual people called.

**Figure 13**  
**Number of Complaint Calls Per Individual**

<b>Number of People</b>	<b>Times Called</b>	<b>Number of Complaints</b>
239	1	239
32	2	64
6	3	18
5	4	20
4	5	20
2	7	14
1	8	8
80	Unknown	80
<b>Total</b>		<b>463</b>

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\*\* Chart outlines the number of individuals and how many times they called. For example: 6 people called 3 times each for a total of 18 complaints; 80 callers chose not to provide identifying information; therefore, it is unknown if those callers called multiple times.