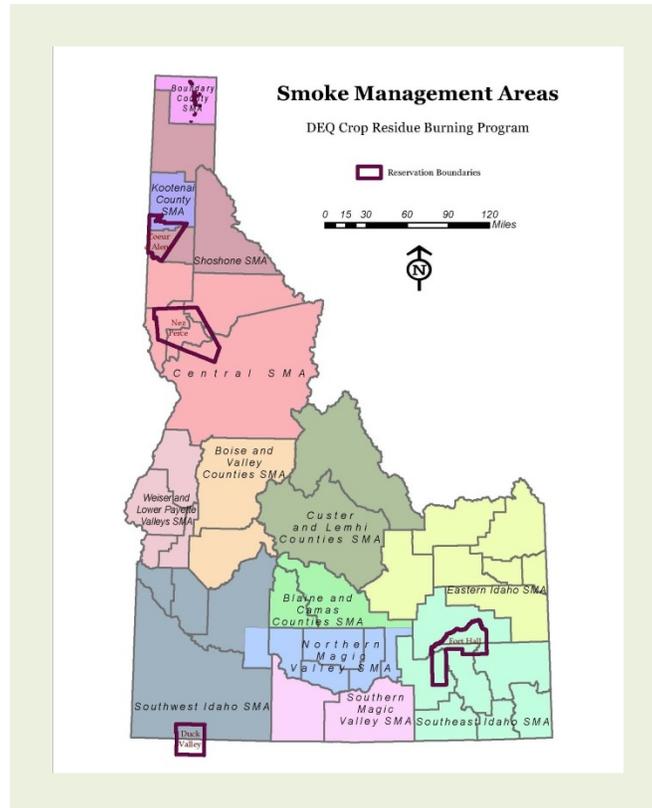


Crop Residue Burning Program 2013 Annual Report



**State of Idaho
Department of Environmental Quality**

May 2014



Printed on recycled paper, DEQ, May 2014, PID
CRBS, CA 81027. Costs associated with this
publication are available from the State of Idaho
Department of Environmental Quality in accordance
with Section 60-202, Idaho Code.

Table of Contents

Executive Summary	v
1. Introduction.....	1
2. Program Updates.....	1
3. Outreach for the 2013 Burn Season	5
4. Analysis of the Burn Season.....	7
4.1 Air Quality Impacts.....	8
4.1.1 Compliance with Program Concentration Limits	8
4.1.2 Institutions with Sensitive Populations.....	9
4.1.3 Evaluation of Possible Public Roadway Safety Impacts	15
4.1.4 Evaluation of Additional Burn Days.....	16
4.2 Complaints	17
4.3 Compliance and Enforcement	18
4.4 Crop Residue Burning Ambient Air Quality Monitoring Network	18
4.5 Meteorology	22
4.6 Smoke Management Area Summaries	23
4.6.1 Boundary County Smoke Management Area	24
4.6.2 Kootenai County Smoke Management Area	27
4.6.3 Central Smoke Management Area	30
4.6.4 Southwest Idaho Smoke Management Area	33
4.6.5 Weiser and Lower Payette Valleys Smoke Management Area	36
4.6.6 Blaine and Camas Counties Smoke Management Area	39
4.6.7 Southern Magic Valley Smoke Management Area	42
4.6.8 Northern Magic Valley Smoke Management Area	44
4.6.9 Southeast Idaho Smoke Management Area	47
4.6.10 Eastern Idaho Smoke Management Area.....	50
5. Recommendations to the CRB Advisory Committee and the Department's Decision	53
6. Conclusions.....	54

List of Tables

Table 1. Summary of complaints responded to by the crop residue burn program during 2013.. 18

Table 2. Summary of acres burned in the Boundary County Smoke Management Area. 25

Table 3. Summary of burn decisions for the Boundary County Smoke Management Area. 27

Table 4. Summary of acres burned in the Kootenai County Smoke Management Area. 28

Table 5. Summary of burn decisions for the Kootenai County Smoke Management Area..... 30

Table 6. Summary of acres burned in the Central Smoke Management Area..... 31

Table 7. Summary of burn decisions for the Central Smoke Management Area. 33

Table 8. Summary of acres burned in the Southwest Idaho Smoke Management Area..... 34

Table 9. Summary of burn decisions for the Southwest Idaho Smoke Management Area. 36

Table 10. Summary of acres burned in the Weiser and Lower Payette Valleys Smoke Management Area. 37

Table 11. Summary of burn decisions for the Weiser and Lower Payette Valleys Smoke Management Area. 39

Table 12. Summary of acres burned in the Blaine and Camas Counties Smoke Management Area. 40

Table 13. Summary of burn decisions for the Blaine and Camas Counties Smoke Management Area. 41

Table 14. Summary of acres burned in the Southern Magic Valley Smoke Management Area. . 42

Table 15. Summary of burn decisions for the Southern Magic Valley Smoke Management Area. 44

Table 16. Summary of acres burned in the Northern Magic Valley Smoke Management Area. . 45

Table 17. Summary of burn decisions for the Northern Magic Valley Smoke Management Area. 47

Table 18. Summary of acres burned in the Southeast Idaho Smoke Management Area..... 48

Table 19. Summary of burn decisions for the Southeast Idaho Smoke Management Area. 50

Table 20. Summary of acres burned in the Eastern Idaho Smoke Management Area. 51

Table 21. Summary of burn decisions for the Eastern Idaho Smoke Management Area. 53

List of Figures

Figure 1. Idaho smoke management areas.....	7
Figure 2. Air quality monitor locations for northern Idaho smoke management areas.	20
Figure 3. Air quality monitor locations for the central smoke management area.....	21
Figure 4. Air quality monitor locations for southern Idaho smoke management areas.....	22
Figure 5. Acres burned in northern Idaho smoke management areas.....	23
Figure 6. Acres burned in the southern Idaho smoke management areas.....	24
Figure 7. Location of 2013 burns in the Boundary County Smoke Management Area.	26
Figure 8. Location of 2013 burns in the Kootenai County Smoke Management Area.	29
Figure 9. Location of 2013 burns in the Central Smoke Management Area.	32
Figure 10. Location of 2013 burns in the Southwest Idaho Smoke Management Area.	35
Figure 11. Location of 2013 burns in the Weiser and Lower Payette Valleys Smoke Management Area.	38
Figure 12. Location of 2013 burns in the Blaine and Camas Counties Smoke Management Area.	41
Figure 13. Location of 2013 burns in the Southern Magic Valley Smoke Management Area.....	43
Figure 14. Location of 2013 burns in the Northern Magic Valley Smoke Management Area.....	46
Figure 15. Location of 2013 burns in the Southeast Idaho Smoke Management Area.	49
Figure 16. Location of 2013 burns in the Eastern Idaho Smoke Management Area.....	52

List of Appendices

- Appendix A. Background Ozone in the Idaho Region
- Appendix B. Rathdrum Prairie Burn Memo and Burn Day Analysis
- Appendix C. Burn Decision Summary
- Appendix D. Meteorological Summary for the Fall Burn Season
- Appendix E. Air Quality Evaluation of the Boundary County Smoke Management Area
- Appendix F. Air Quality Evaluation of the Kootenai County Smoke Management Area
- Appendix G. Air Quality Evaluation of the Central Smoke Management Area—Idaho and Clearwater Counties
- Appendix H. Air Quality Evaluation of the Central Smoke Management Area—Nez Perce County
- Appendix I. Air Quality Evaluation of the Central Smoke Management Area—Latah County
- Appendix J. Air Quality Evaluation of the Southwest Idaho Smoke Management Area
- Appendix K. Air Quality Evaluation of the Weiser and Lower Payette Valleys Smoke Management Area
- Appendix L. Air Quality Evaluation of the Blaine and Camas Counties Smoke Management Area
- Appendix M. Air Quality Evaluation of the Southern Magic Valley Smoke Management Area
- Appendix N. Air Quality Evaluation of the Northern Magic Valley Smoke Management Area
- Appendix O. Air Quality Evaluation of the Southeast Idaho Smoke Management Area
- Appendix P. Air Quality Evaluation of the Eastern Idaho Smoke Management Area

Executive Summary

The open burning of crop residue (crop residue burning) is a historic practice in Idaho and is considered an important tool for farmers. However, crop residue burning can also produce substantial air emissions and, if not managed properly, can lead to significant smoke effects that endanger human health.

This annual report reviews and analyzes the Idaho Department of Environmental Quality's (DEQ's) crop residue burning (CRB) program for the 2013 burn season. DEQ is required to prepare an annual report that includes, at a minimum, an analysis of the causes of any measured air pollutant levels above the program-defined concentration limits and an assessment of the circumstances associated with any reported endangerment to human health associated with a crop residue burn.

This report also includes a summary of outreach for the 2013 burn season and an analysis of the 2013 burn season, including air quality impacts, a discussion of DEQ's system for complaints and compliance, the air quality monitoring network, a meteorological summary, and an assessment of the burn-decision process and acres burned in each smoke management area (SMA). DEQ did not identify any program improvements during the burn season review. Therefore, no recommendations are included in this report.

Evaluation of the Burn Season

The 2013 burn season was influenced by a relatively dry winter and spring that enabled growers to get an earlier start to the growing season than during the last few years; it was a hot and dry summer that was characterized by record heat, numerous large wildfires, irrigation water shortages by summer's end, and periodic wetting rains during late summer and early fall. In northern Idaho, late season precipitation in the spring contributed to a decrease in the number of acres burned from 2012. During the fall, burning started earlier in the season with multiple excellent burn days. As September neared, burning was hampered by precipitation. However, northern Idaho completed almost all of its requested acreage and was in the normal range for acres burned. In southern Idaho, wildfire smoke during August occasionally hindered crop residue burn approval, but the greatest obstacle was the periodic rain that made much of September unsuitable for burn approvals.

Additional complications this year, especially in southern Idaho, were fire safety restrictions issued by several counties and the Idaho Department of Lands (IDL). With the high fire danger risk, several counties initiated bans on all open burning, including crop residue burning, covering the late summer through early fall time frame. IDL also initiated a Stage 1 Fire Restriction across southern and south-central Idaho. IDL was still issuing a fire safety permit for crop residue burning during this fire restriction; therefore, CRB was still allowed as long as the grower obtained an IDL fire safety permit. DEQ abided by all fire safety restrictions by approving no crop residue burning for locations under a fire safety burn ban, with the exception of the fields that were permitted by IDL.

Statewide, 54,438 acres were burned under the CRB program in 2013, which was a substantial decrease from the amount burned in 2012 (67,416 acres). For most of the SMAs in northern Idaho, the number of acres burned during 2013 was similar to the number of acres burned in

2012. While for most of the SMAs in southern Idaho, the number of acres burned decreased, with the exception of the Northern Magic Valley SMA, which saw a sizeable increase in acres burned.

Evaluation of Air Quality

DEQ operates the CRB program under guidelines and procedures designed to protect public health, avoid causing adverse impacts to institutions with sensitive populations (ISP), and avoid causing public roadway safety hazards. DEQ carefully evaluates the program's effectiveness in meeting these goals. That evaluation process is explained in detail within this report.

A thorough evaluation of the 2013 burn season showed that approved crop residue burning did not cause any measured air pollutant concentrations above the 1-hour or 24-hour program-defined concentration limits, nor did any approved crop residue burning result in an adverse impact to an ISP.

Recommended Improvements

Subsequent to the annual CRB program analysis, DEQ concluded that no improvements were needed at this time to protect public health or improve the effectiveness and efficiency of the program. However, the CRB Advisory Committee made several recommendations to DEQ. The following recommended improvements were approved by the DEQ director and will be implemented in 2014:

- Ozone in the Coeur d'Alene Area—Evaluate ozone and weather parameters used for the burn decisions in the Coeur d'Alene area on all days in summer and fall to evaluate the potential impact the ozone program concentration limit may have on burning on the Rathdrum Prairie.
- DEQ Public Website—Develop an alternative method to issue burn approvals and notify the public if the DEQ public website is down. The alternative method must be in accordance with Idaho statute, rules, and the State Implementation Plan.
- CRB Advisory Committee Members—Develop an introductory packet for new CRB Advisory Committee members.

The CRB Advisory Committee requested DEQ coordinate a conference call to summarize the information that has been presented about ozone and the CRB program. The committee also requested DEQ coordinate a second CRB Advisory Committee meeting after the conference call to discuss a path forward on the ozone issue. A summary of this second meeting will be provided on the DEQ website, which will include any additional recommendations that may result from the meeting.

1. Introduction

This report reviews and analyzes the Idaho Department of Environmental Quality's (DEQ's) crop residue burning (CRB) program for the 2013 burn season. DEQ is required by rule (IDAPA 58.01.01.622.02) to prepare an annual report that includes, at a minimum, an analysis of the causes of any exceedance of the program-defined ambient air pollutant concentration limits (hereafter referred to as the program concentration limits, or PCLs) and an assessment of the circumstances associated with any reported endangerment to human health associated with a crop residue burn. This report also summarizes program updates undertaken in 2013, outreach efforts over the past year, a detailed analysis of the 2013 burn season, and planned program improvements necessary to prevent future instances of measured pollutant concentrations above the PCL.

This report only presents information specific to the 2013 burn season. For more in-depth information on the CRB program design, please refer to the 2008 annual report available at www.deq.idaho.gov/air-quality/burning/crop-residue-burning.aspx.

2. Program Updates

In the 2012 annual report, and at the CRB Advisory Committee meetings held in March 2013, DEQ did not recommend any updates to the CRB program. However, the CRB Advisory Committee did make several recommendations to DEQ. This section summarizes the status of the recommendations approved by the DEQ director.

- **Spot and bale burn permit:** *Audit this program portion after the first year to evaluate compliance. Evaluate implementation to determine if the \$20 fee covers the cost.*

DEQ issued 11 spot and bale burn permits during 2013, 4 in northern Idaho and 7 in southern Idaho. In December 2013, DEQ mailed requests to each grower who was issued a spot and bale burn permit asking for records required by the permit. These records include dates and times that burning was conducted, what was burned, and amount burned. A review of the records showed that only a small amount of burning was conducted using the spot and bale permits, with some permittees not conducting any burning with their spot and bale permit and other permittees burning within the 1 acre per day and 10 acre per year permit limits. The records do show that there were some instances of failure to comply with some of the permit conditions such as the approved burn window. These instances will be handled through the Air Quality Compliance and Enforcement Program.

- **Ozone:** *Summarize current information regarding background concentrations. Evaluate what portion of the ozone background is natural versus man-made. Contact other states for information on their measured ozone concentrations.*

DEQ conducted research on background ozone concentrations in Idaho and the surrounding region. Information reviewed indicates that the regional background ozone for rural Idaho ranges from 55 parts per billion (ppb) to 72 ppb. Ozone concentrations in north-central Idaho, from Benewah County to Grangeville, is best represented by

Washington's Cheney-Turnball monitor in the rural Palouse area southwest of Spokane (~57 ppb). Rural ozone in southern Idaho is best typified by the monitor at the Craters of the Moon National Monument (~61 ppb). The ozone is lowest in northern Idaho (~55 ppb) and higher in the southeastern corner of Idaho (~65 ppb), while the highest levels in the Treasure Valley where modeled ozone reaches ~72 ppb as a result of urban precursor emissions.

The source origins contributing to these regional background concentrations may be only roughly approximated. Generally, for areas throughout Idaho, regional background concentrations are comprised of the following:

- Natural background contributes ~55% to 70 %.
- Transoceanic transport (plus anthropogenic methane) contributes ~10% to 20%.
- North American human activity, including local urban emissions contributes ~10% to 31%.

A detailed summary of the ozone regional background is presented in Appendix A.

- ***Boundary County:*** *Execute a pilot project in Boundary County to conduct burning under high pressure events, when temperatures are in the range of 80°F to 90°F.*

Although there was not a day that met the criteria for the pilot project, DEQ identified 3 burn days during the fall burn season that provide useful information to help improve crop residue burn decisions in Boundary County. Additional supporting field data including photographs, field measurements, and web camera information is available for these days.

August 9: Ventilation was forecasted to be marginal during the afternoon with partly cloudy skies and temperatures around 90°F with moderate surface (3–10 miles per hour [mph]) and light transport (5 mph) winds and a mixing height of about 4,000 feet aboveground level (ft agl). Field observations confirmed the forecasted conditions. Two cereal grain fields (80 and 20 acres) were approved and burned. The fields were completed in about 5 minutes (20 acres) and 15 minutes (80) areas. The resulting smoke dispersion was better than expected. Field observations indicated that the smoke plume reached approximately 4,000+ ft agl. Dry fuel conditions, moderate surface winds, quick ignition and a fast burn, and sufficient mixing height were important to the success of the burns.

August 20: Ventilation was forecasted to be good during the afternoon with mostly sunny skies and temperatures in the mid-80s with moderate to high surface (5–15 mph) and transport (10–15 mph) winds and a mixing height of about 5,000 ft agl. There was a concern about the winds becoming too strong later in the afternoon (i.e., winds above 12 mph). Field observations indicated light surface winds (~3 mph) and temperatures in the low 80s. A 70-acre cereal grain field was burned first as a test burn. After a successful test burn, 4 other fields (totaling 387 acres) were approved. The resulting smoke dispersion was good to excellent. Field observations indicated that the smoke plume reached approximately 5,000–6,000 ft agl with easterly transport winds. DEQ determined that this type of day was an ideal day to approve more acres in Boundary County.

August 22: Ventilation was forecasted to be marginal during the afternoon with partly cloudy skies and temperatures in the upper 80s with moderate surface (3–8 mph) and light transport (5–10 mph) winds and a mixing height of between 2,000–4,000 ft agl. Field observations indicated light winds and temperatures in the low 80s and about 50% cloud cover. One field, 55 acres, was burned. The resulting smoke dispersion was marginal. The plume reached the top of the mixed layer at approximately 2,000 ft agl. However, the small field size and fast ignition allowed the smoke to disperse adequately. Accurately forecasting the mixing height continues to be very important for improving burn decisions in Boundary County. Ideal field conditions, dry fuel, and quick ignition techniques are also key to achieving good to excellent smoke dispersion.

- ***Compliance and Enforcement:*** Clarify the relationship between compliance assistance and enforcement.

DEQ operates under a formalized enforcement process where many factors are considered in deciding the appropriate enforcement action. These factors include the number of previous violations, seriousness and types of violations, and willingness to comply. There are also a number of situations where a less formal approach is more effective at achieving compliance. These situations typically involve first time violations of a minor nature and therefore may be issued a Notice to Comply. Enforcement actions can include the following:

1. Issuing a Notice to Comply
2. Issuing a Notice of Violation
3. Referring the case to the Attorney General’s office for civil or criminal enforcement
4. Referring the case to other relevant local, state, or federal agencies for enforcement consideration

Compliance assistance may be proactive, such as outreach to the regulated community to explain current or new requirements to achieve greater overall compliance, or it may be a notice to comply where a violation has occurred or is suspected to have occurred. Notices to comply inform the responsible party of apparent, or suspected, deficiencies or violations and request compliance or corrective action. DEQ may choose to issue a notice to comply to address violations that are few in number, minor, and easily corrected. Notices to comply are not to be used as an enforcement action where major or serious violations have been documented. Notices to comply may sometimes be used as a form of *enforcement discretion* where for reasons of lack of evidence or the context of the alleged violation, DEQ decides that a notice to comply is more appropriate than a notice of violation.

- ***Monitoring Network:*** Evaluate the existing air quality monitoring network to identify if new monitors are needed and/or if current monitors need to be relocated. Include a prioritization for the monitoring network for the CRB program. Work with the United States Environmental Protection Agency to evaluate the usefulness of new portable PM_{2.5} (handheld) monitors.

DEQ evaluated the current PM_{2.5} and ozone monitoring network used in the CRB program. DEQ only operates ozone monitors in the Treasure Valley but included ozone monitors operated by other agencies in this evaluation. DEQ also evaluated the usefulness of the new portable PM_{2.5} handheld monitors to the CRB program.

DEQ uses monitors to answer two main questions for the CRB program:

1. Does the air quality, prior to burning, exceed the program concentration limits (i.e., is crop residue burning approvable)?
2. Does the air quality, after approved crop residue burning, exceed any program concentration levels or enhanced documentation triggers (i.e., was there a possible smoke impact due to crop residue burning)?

This evaluation showed that while additional PM_{2.5} and ozone monitors would be useful for implementing the CRB program, DEQ does not have the resources available to add monitors. The handheld monitors are useful in complaint response but are not appropriate for regulatory or enforcement purposes. Given the CRB program is regulatory in nature, the use of these handheld monitors would not be appropriate for use in the program.

DEQ specifically evaluated the CRB monitors (nephelometers) and their locations in proximity to where burning occurs. After evaluating these locations, registered fields (2008–2012), institutions with sensitive populations (ISP), terrain, meteorology, and field observations, DEQ determined that all monitors are appropriately located. DEQ will continue to evaluate the CRB monitors annually.

DEQ's priority continues to maintain the current monitoring network and replace malfunctioning equipment as needed and resources are available.

- ***Institutions with Sensitive Populations:*** *Develop a process for evaluating when an ISP is repeatedly impacted (i.e., when enhanced documentation is triggered).* Evaluate meteorological conditions, field conditions, ignition technique, and fire behavior. Attempt to identify patterns and areas to focus on for improvement—for example, if a certain ISP is repeatedly impacted above the ISP trigger (26.5 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]) on marginal ventilation days.

DEQ has developed a tracking procedure that will be used to track all instances of enhanced documentation being triggered, which includes a section to track any ISPs that have been impacted. The tracking procedure will help DEQ to determine if there is a pattern or if factors can be identified to minimize any future smoke impacts. The tracking procedure will be accessible to all CRB staff and will track the date, location, ISPs affected and reason the incident is being tracked; the DEQ staff responsible for completing enhanced documentation; the completion date for the enhanced documentation; and a summary of recommendations. The CRB Program Operating Guide will be updated to include the enhanced documentation tracking procedure.

- ***Critical fields and/or areas:*** *On critical fields and/or areas, execute research to characterize optimum burn conditions from good burn experiences.*

Burning crop residue, specifically Kentucky Bluegrass, on the Rathdrum Prairie is very difficult. The fields are surrounded by houses and main roadways. Burning must be conducted under very specific wind directions and unstable air to allow for smoke to reach the transport layer and disperse. August 7, 2013, was forecasted to be a conditional burn day for the Rathdrum Prairie due to wind directions. However, ventilation was forecasted to be good with mostly sunny skies and temperatures around 90°F. Field observations and resulting PM_{2.5} air quality monitoring data indicated that this was a successful burn day on the Rathdrum Prairie. However, the Greenbluff ozone monitor operated by Washington Department of Ecology recorded a maximum 8-hour average of 62 ppb, which is above the program concentration limit for ozone. As a result, DEQ requested its contract meteorologist to conduct a burn day analysis to help identify the important parameters that made this a successful burn day. The goal is to improve the burn decisions for the Rathdrum Prairie. The burn day analysis, as well as the DEQ burn day memo, are provided in Appendix B

3. Outreach for the 2013 Burn Season

Outreach remains an important component of the CRB program. DEQ's outreach effort has two main objectives: public awareness and grower education. Many of the same outreach methods used in previous years were again used in 2013, including distributing brochures; providing telephone hotlines; maintaining an Internet website with public and grower sections; maintaining an e-mail list service; communicating directly with fire and sheriff departments; attending and providing information at agricultural expos and county fairs; and visiting ISPs (such as schools, hospitals, and assisted-living facilities). DEQ conducted the following new or enhanced methods of outreach in 2013:

- ***Remodeled CRB web application***

DEQ completely remodeled the CRB web application with the intent to make the application easier and more intuitive for growers to use.

- ***Grower education***

On-site field assistance continues to be an effective outreach technique for DEQ as it provides an opportunity to meet growers, develop a positive working relationship, and emphasize good burning strategies and techniques.

At this point, many growers seem familiar with the CRB program and successfully navigate the registration process. However, we continue to invest extra time with growers who are new to the program, have never completed a registration, or do not have Internet access. A continuing emphasis of our grower education has been reminding growers to obtain all necessary fire safety permits and to consult with the Idaho Transportation Department (ITD) or applicable county road department regarding public roadway safety requirements.

- ***Collaboration with fire departments***

DEQ representatives met with several fire chiefs on an individual basis and in group settings to present information about the CRB program and to help ensure that fire

department personnel and DEQ are providing the public with consistent and accurate information about the CRB program. DEQ also mailed fire chiefs and sheriff's offices correspondence detailing the CRB program and website tools.

- ***Public outreach through mass media***

DEQ used radio advertisements and newspaper articles to reach members of the general public and growers who may not have been reached by previous outreach methods. These efforts included radio public service announcements in which DEQ used two advertisements: one intended for the general public and one intended for the grower community.

- ***Outreach to ISPs***

Each offseason, DEQ representatives contact many ISPs, with an emphasis on those ISPs in areas where we have approved burns or anticipate approving burns in the future. This outreach, either in person or by telephone, gives DEQ an opportunity to explain the CRB program; confirm the ISP's location, status, and contact person; and provide DEQ contact information to the ISP. During the burn season, as part of DEQ's field observation exemption procedure, ISPs must be contacted prior to the start of any burn within 3 miles of a field that is approved to be burned without DEQ being present. This outreach provides DEQ another opportunity to explain the program and provide contact information, as well as to provide information about the nearby burning that has been approved for that day.

4. Analysis of the Burn Season

For management of the CRB program, the state is divided into 13 smoke management areas (SMAs) based on the similarity of meteorological conditions and topography, as well as proximity to DEQ regional offices (Figure 1). This analysis of the burn season includes examining statewide air quality impacts, complaints, compliance and enforcement, the monitoring network, meteorology, and specific summaries for each SMA.

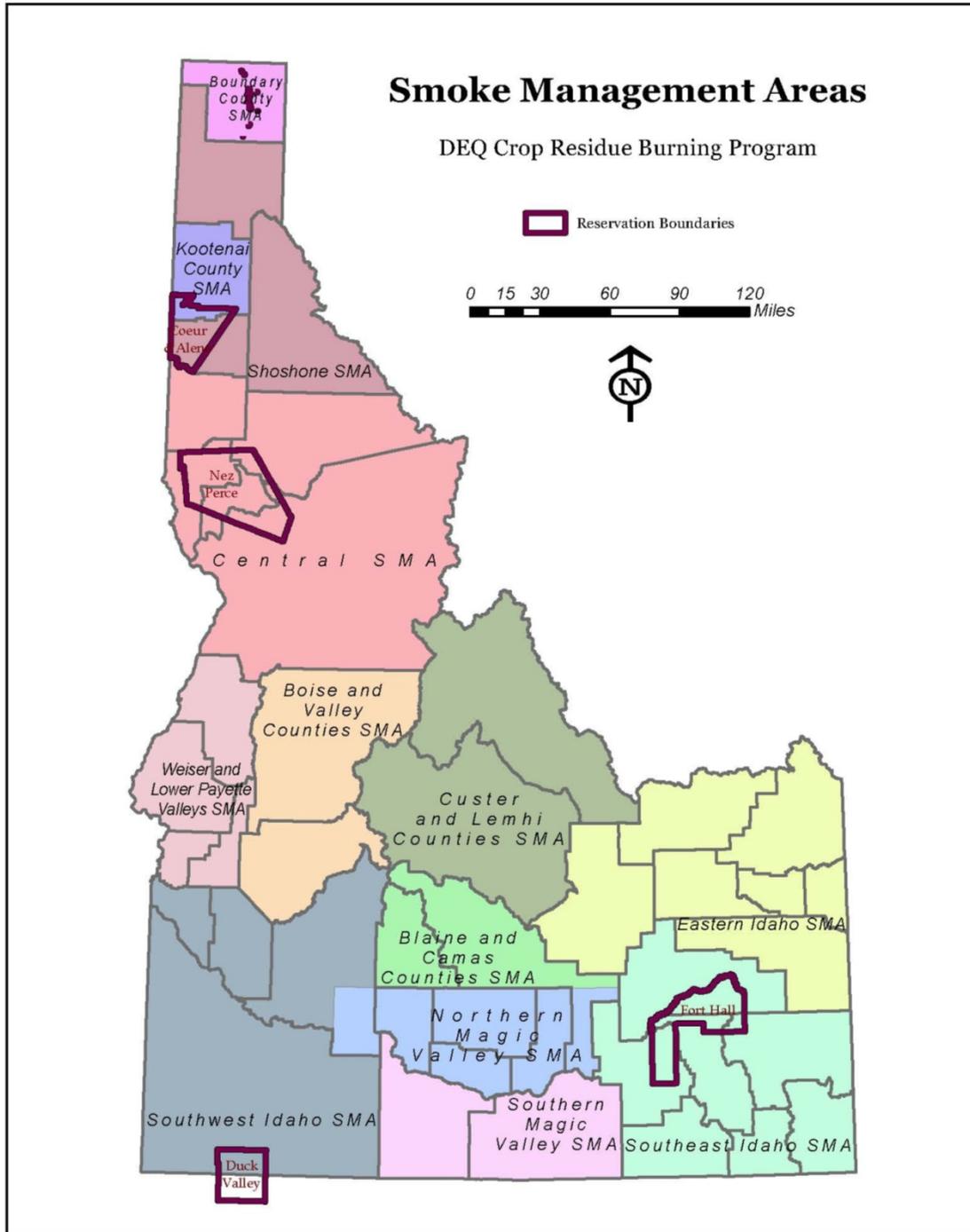


Figure 1. Idaho smoke management areas.

The SMA summaries include area geography descriptions, acres burned, and a summary of daily burn decisions and air quality conditions in 2013. Appendix C includes a daily summary of burn decisions from August through October, the peak burning period, for the northern SMAs (Tables C1–C3) and southern SMAs (Tables C4–C6). No crop residue burning was conducted in Lewis County in the Central SMA, the Shoshone SMA, or the Boise and Valley Counties SMA during 2013; therefore, these SMAs are not discussed further. Also, the Custer and Lemhi Counties SMA has not been included in the statewide summaries since negligible burning has been conducted in this SMA over the last 3 years.

4.1 Air Quality Impacts

This section evaluates CRB program compliance with PCLs, circumstances surrounding approved burning on days when measured pollutant concentrations were above the PCLs, possible adverse impacts to ISPs, and additional burn days. DEQ evaluated additional burn days in two circumstances: 1) when approved burning was conducted and measured PM_{2.5} concentrations were above the program-defined 4-hour average preburn or postburn trigger levels or the 24-hour average preburn trigger levels and 2) to evaluate possible public roadway safety visibility impacts.

4.1.1 Compliance with Program Concentration Limits

To approve a request to burn, DEQ must determine that ambient air quality levels meet three criteria: 1) do not exceed 75% of the level of any National Ambient Air Quality Standard (NAAQS) on any day, 2) are not projected to exceed such level over the next 24 hours, and 3) have not reached, and are not forecasted to reach and persist at 80% of the 1-hour action criteria for particulate matter. The PCLs for the pollutants of concern for crop residue burning—given as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of PM_{2.5} or PM₁₀ or parts per billion (ppb) of ozone—are defined as follows:

- PM_{2.5} 1-hour average ($64 \mu\text{g}/\text{m}^3$)
- PM_{2.5} 24-hour average ($26.25 \mu\text{g}/\text{m}^3$)
- PM₁₀ 1-hour average ($308 \mu\text{g}/\text{m}^3$)
- PM₁₀ 24-hour average ($112 \mu\text{g}/\text{m}^3$)
- Ozone 8-hour average (56 ppb)

During 2013, ambient air quality monitors across Idaho recorded values above the PCLs in many instances. However, on most of these days no crop residue burning was approved. For days when measured PM_{2.5} or ozone levels were above the PCLs and crop residue burning was approved and conducted, DEQ evaluated the location and time of the burn in relation to the air quality monitoring data.

Burning under the CRB program was reasonably suspected to have caused or contributed to a measured concentration above a PCL only when both of the following conditions were true:

- An approved crop residue burn occurred during, or shortly prior to, the recorded concentration.
- Wind direction and proximity of the burn were such that smoke from the burn was transported toward the monitor.

DEQ uses real-time ambient ozone monitoring data from the National Park Service monitors at Craters of the Moon National Monument, Yellowstone National Park, and Grand Teton National Park in combination with ozone monitoring data from Logan, Utah, (Utah DEQ), Spokane, Washington (Washington Department of Ecology), and ozone forecast models from the National Weather Service (NWS) and Washington State University. This data provided sufficient coverage of southern Idaho and Kootenai County in northern Idaho so that DEQ could forecast ozone concentrations and use those forecasts in the daily burn-decision process. DEQ forecasted many days during the late spring, summer, and early fall when ozone concentrations were expected to reach or exceed the PCL in locations that had requests to burn. As a result, DEQ issued several *no-burn* decisions based on the ozone forecasts.

Typically, in this section of the report DEQ discusses days when air quality monitors recorded concentrations above a PCL and crop residue burning was conducted within the same SMA. However, this year there were no such days where the PCL for PM_{2.5} was exceeded. The Nez Perce Tribe, Kootenai Tribe of Idaho, , and BC Environment operate air quality monitors that provide additional data for DEQ program decisions and evaluations. Potential adverse impacts and PCL exceedances are not evaluated for these monitors because they are not owned or operated by DEQ. The Greenbluff ozone monitor operated by Washington Department of Ecology is located near Spokane, Washington, and is used to forecast ozone concentrations in Kootenai County.

Ozone Concentrations Above the Program Concentration Limit in Southern Idaho

There were days when ozone concentrations were forecasted to be below the PCL and crop residue burning was approved and conducted, but one or more ozone monitors recorded an 8-hour average ozone concentration above the PCL. Rather than explain each of these days, as is done below for PM_{2.5} concentrations above the PCL, a general explanation is provided here. Modeling studies have shown that the amount of smoke that is typical of crop residue burning has negligible effects on maximum daily 8-hour average ozone concentrations.

Because the available ozone monitors are widely dispersed (three of the monitors used for southern Idaho are not even within Idaho and the one monitor used for northern Idaho is in Spokane, Washington), the approved crop residue burning was typically at least 50 miles, and in many cases 80–100 miles or more, from an ozone monitor. Because of the large distance from the monitors to the burn locations, it is reasonable to conclude that the approved burning had a negligible effect, or no effect at all, on the ozone concentration at a monitor.

The results of an analysis of the burn days is that DEQ is unable to determine that approved crop residue burning had any effect on measured ozone concentrations.

4.1.2 Institutions with Sensitive Populations

DEQ is prohibited from approving a request to burn if conditions are such that ISPs will be adversely impacted or when the plume is predicted to impact such institutions. To safeguard these populations, DEQ uses many procedures, including maintaining a current database of all known ISPs that includes the name, type of institution, and location; reviewing all registrations for field location relative to the location of ISPs; attaching restrictive permit conditions for all fields within 3 miles of an ISP; and requiring that DEQ personnel be on site and provide final approval to burn for fields within 3 miles of an ISP (with some exceptions). DEQ field

coordinators frequently conduct an in-person examination of ISPs that are near proposed crop residue burns prior to ignition to ensure that the location and operational status of the ISP are understood.

DEQ uses the following procedure to evaluate whether an adverse impact at an ISP occurred.

- When a monitor is present and the maximum hourly PM_{2.5} concentration is below 20 µg/m³ (or visibility is at least 10 miles if no monitor is available):
 - Conclude that no adverse impact occurred
 - No additional documentation needed unless DEQ receives a complaint from an ISP
 - If a complaint was received from an ISP, full evaluation and enhanced documentation will be completed.
- When a monitor is present and the maximum hourly PM_{2.5} concentration is between 20 and 26.25 µg/m³:
 - Conclude adverse impact unlikely
 - Brief evaluation needed to determine whether an adverse impact occurred. The following items will be reviewed for the evaluation:
 - Monitoring data
 - Weather data
 - Field notes
 - If a complaint was received from an ISP, full enhanced documentation and evaluation will be completed.
- When a monitor is present and the maximum hourly PM_{2.5} concentration is greater than 26.25 µg/m³ (or visibility is less than 10 miles if no monitor is available):
 - Adverse impact possibly occurred
 - Full enhanced documentation and evaluation will be completed to determine whether an adverse impact occurred. The full evaluation will include reviewing the following:
 - Monitoring data
 - Weather data
 - Field notes
 - Contact with the ISP—questions identified on the enhanced documentation form will be asked to the ISP and responses documented

Discussed below are days when approved crop residue burning was conducted and an ambient air quality monitor located at or near an ISP (such as St. Luke's Hospital in Meridian) recorded a 1-hour average PM_{2.5} concentration of 26 µg/m³ or more.

April 1—Grangeville Monitor in the Central SMA

April 1 was a burn day in the Central SMA, where 363 acres were burned at four fields in Idaho County. The Grangeville monitor (about 5.2 miles west of the field) recorded 1-hour average concentrations of 26.9 µg/m³ for the hour ending at 9:00 p.m. and 28.6 µg/m³ at 10:00 p.m. All DEQ-approved burning was completed by 4:00 p.m. Surface winds at the time of the monitor impacts were from the south-southeast, south, and south-southwest. Wood-stove

smoke was suspected to be the cause of the elevated concentrations in the late evening hours on this day. Enhanced documentation was not conducted because it was determined that the approved crop residue burns did not contribute to the measured concentration.

May 2—Idaho Falls Monitor in the Eastern Idaho SMA

May 2 was a burn day in the Eastern Idaho SMA, where 75 acres were burned at one field in Bonneville County. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 50.7 µg/m³ for the hour ending at 8:00 p.m. The approved burn was approximately 12 miles to the east of Idaho Falls. The field was burned during the afternoon, at which time the wind direction was from the north through northwest. Thus, the wind would have dispersed the smoke from the approved burn away from Idaho Falls. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning. Enhanced documentation was not conducted because it was determined the approved crop residue burn did not contribute to the measured concentration.

July 24—Nampa Monitor in the Southwest Idaho SMA

July 24 was a burn day in the Southwest Idaho SMA, where 106 acres were burned at four fields in Owyhee County. The PM_{2.5} monitor in Nampa recorded a 1-hour average concentration of 61.1 µg/m³ for the hour ending at 5:00 p.m. The approved burns were approximately 10 miles to the west of Nampa. The fields were burned during the afternoon, at which time the wind direction was from the north through northwest. Thus, the wind would not have carried the smoke from the approved burns toward Nampa. No other 1-hour average concentrations were elevated this day. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

July 26—Nampa and Meridian Monitors in the Southwest Idaho SMA

July 26 was a burn day in the Southwest Idaho SMA, where 59 acres were burned at two fields in Owyhee County. The PM_{2.5} monitor in Nampa recorded a 1-hour average concentration of 30.6 µg/m³ for the hour ending at 5:00 p.m. The PM_{2.5} monitor in Meridian recorded a 1-hour average concentration of 43.2 µg/m³ for the hour ending at 9:00 p.m. The approved burns were approximately 12 miles to the west of Nampa and 25 miles to the west of Meridian. The fields were burned during the afternoon, at which time the wind direction was generally from the northwest. Thus, the wind would not have carried the smoke from the approved burns toward Nampa or Meridian. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

July 30—Nampa Monitor in the Southwest Idaho SMA

July 30 was a burn day in the Southwest Idaho SMA, where 70 acres were burned at one field in Owyhee County. The PM_{2.5} monitor in Nampa recorded a 1-hour average concentration of 30.9 µg/m³ for the hour ending at 10:00 p.m. The approved burn was approximately 10 miles to the west of Nampa. The field was burned during the afternoon, at which time the wind direction was generally from the north. Thus, the wind would not have carried the smoke from the approved burn toward Nampa. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning. Enhanced documentation was not conducted because

it was determined the approved crop residue burn did not contribute to the measured concentration.

August 6—Nampa and Meridian Monitors in the Southwest Idaho SMA

August 6 was a burn day in the Southwest Idaho SMA, where 135 acres were burned at four fields in Owyhee County. The PM_{2.5} monitor in Nampa recorded a 1-hour average concentration of 28.9 µg/m³ for the hour ending at 9:00 p.m. The PM_{2.5} monitor in Meridian recorded a 1-hour average concentration of 27.5 µg/m³ for the hour ending at 9:00 p.m. The approved burns were approximately 12 miles to the west of Nampa and 25 miles to the west of Meridian. The fields were burned during the afternoon, at which time the wind direction was generally from the north. Thus, the wind would not have carried the smoke from the approved burns toward Nampa or Meridian. Wildfire smoke was suspected to be the cause of the elevated concentrations in the late evening hours on this day. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

August 9—Meridian Monitor in the Southwest Idaho SMA

August 9 was a burn day in the Southwest Idaho SMA, where 403 acres were burned at nine fields in Owyhee, Canyon, and Elmore Counties. The PM_{2.5} monitor in Meridian recorded a 1-hour average concentration of 39.6 µg/m³ for the hour ending at 10:00 p.m. None of the approved burns were near the Meridian monitor, with the nearest being several fields in far western Canyon and Owyhee Counties, which were approximately 25 miles west of Meridian. The fields were burned during the afternoon, at which time the winds were light and the wind direction was somewhat variable. Thus, because of the large distances involved and the light and variable winds, smoke from the approved crop residue burning would not have had an effect on the measured PM_{2.5} concentration at the Meridian monitor. Wildfire smoke was suspected to be the cause of the elevated concentrations in the late evening on this day. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

August 13—Nampa and Meridian Monitors in the Southwest Idaho SMA

August 13 was a burn day in the Southwest Idaho SMA, where 122 acres were burned at four fields in Owyhee County. The PM_{2.5} monitor in Nampa recorded a 1-hour average concentration of 32.0 µg/m³ for the hour ending at 12:00 a.m. (midnight). The PM_{2.5} monitor in Meridian recorded a 1-hour average concentration of 30.0 µg/m³ for the hour ending at 11:00 p.m. The approved burns were approximately 10 miles to the west of Nampa and 20–25 miles to the west of Meridian. On this day, wildfire smoke was unexpectedly blown into the Treasure Valley in the early afternoon when the burn approvals for the day had already been made and growers had already started burning their fields. The smoke intrusion showed up as slightly elevated concentrations during most of the afternoon and evening hours, peaking in the late evening. Reports from the field indicated that the vicinity of the approved crop residue burning remained mostly free of wildfire smoke. None of the measured concentrations exceeded any of the program concentration limits. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

August 13—Twin Falls and Paul Monitors in the Northern Magic Valley and Southern Magic Valley SMAs

August 13 was a burn day in the Northern Magic Valley SMA, where 818 acres were burned at 16 fields and a burn day in the Southern Magic Valley SMA, where 19 acres were burned at one field in western Twin Falls County. The PM_{2.5} monitor in Twin Falls recorded a 1-hour average concentration of 32.0 µg/m³ for the hour ending at 2:00 p.m. and 33.5 µg/m³ for the hour ending at 9:00 p.m. The PM_{2.5} monitor in Paul recorded a 1-hour average concentration of 32.4 µg/m³ for the hour ending at 8:00 p.m. The approved burn was approximately 20 miles to the west of Twin Falls and approximately 70 miles to the west of Paul. On this day, wildfire smoke was unexpectedly blown into the Magic Valley in the early afternoon when the burn approvals for the day had already been made and growers had already started burning their fields. The wildfire smoke intrusion showed up as slightly elevated concentrations during most of the afternoon and evening hours, peaking in the evening. None of the measured concentrations exceeded any of the program concentration limits. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

August 14—Idaho Falls and Rexburg Monitors in the Eastern Idaho SMA

August 14 was a burn day in the Eastern Idaho SMA, where 179 acres were burned at one field in Clark County. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 30.6 µg/m³ for the hour ending at 3:00 p.m. The PM_{2.5} monitor in Rexburg recorded a 1-hour average concentration of 27.3 µg/m³ for the hour ending at 6:00 p.m. The approved burn was approximately 40 miles to the north of Idaho Falls and 30 miles to the northwest of Rexburg. Winds this day started out somewhat variable in direction but settled into being from the southwest through southeast, which would not have carried smoke from the approved burns toward the Idaho Falls or Rexburg monitors. The source of the elevated concentrations was likely to be smoke from wildfires. Enhanced documentation was not conducted because it was determined the approved crop residue burn did not contribute to the measured concentration.

August 19—Pocatello Monitor in the Southeast Idaho SMA

August 19 was a burn day in the Southeast Idaho SMA, where 337 acres were burned at two fields in Bingham County. The PM_{2.5} monitor in Pocatello recorded a 1-hour average concentration of 28.5 µg/m³ for the hour ending at 1:00 p.m. The two approved burns were approximately 20 miles northwest and 30 miles north of Pocatello, respectively. The fields were burned during the afternoon, during which time the winds were generally out of the west. The Pocatello monitor experienced a power failure during the hour ending at 12:00 p.m., and it is typical for these monitors to produce inaccurate data during the first hour back in operation. No other elevated readings were recorded and the wind direction and distance were such that smoke from the approved burns would not have reached the monitor. This reading appears to have been an instrument error and not an accurate representation of the ambient air quality in Franklin at that time. Enhanced documentation was not conducted because it was determined that this was an instrument error.

August 26—Meridian Monitor in the Southwest Idaho SMA

August 26 was a burn day in the Southwest Idaho SMA, where 164 acres were burned at four fields in western Owyhee County. The PM_{2.5} monitor in Meridian recorded a 1-hour average

concentration of $29.9 \mu\text{g}/\text{m}^3$ for the hour ending at 9:00 p.m. The approved burns were all approximately 25 miles west of the Meridian monitor. The fields were burned during the afternoon, at which time the winds were light and the wind direction was variable. Thus, because of the large distances involved and the light and variable winds, smoke from the approved crop residue burning would not have had an effect on the measured $\text{PM}_{2.5}$ concentration at the Meridian monitor. The source of the elevated $\text{PM}_{2.5}$ concentration is unknown, but it was not the approved crop residue burning. Enhanced documentation was not conducted because it was determined the approved crop residue burns did not contribute to the measured concentration.

August 26—Grangeville Monitor in the Central SMA

August 26 was a burn day in the Central SMA, where 244 acres were burned at three fields in Idaho County. The Grangeville monitor (about 4.6 miles east of the field) recorded 1-hour average concentration of $29.5 \mu\text{g}/\text{m}^3$ for the hour ending at 6:00 p.m. All DEQ-approved burning was completed by 4:00 p.m. DEQ staff noted that the burns went well. Surface winds at the time of the monitor impacts were from the south-southeast, south, and south-southwest. Based on $\text{PM}_{2.5}$ concentrations and staff observations, enhanced documentation was completed. However, due to a staff oversight ISPs were not contacted. DEQ concluded that the elevated concentrations were possibly related to DEQ-approved crop residue burning although other agency burning did occur in the area.

August 29—Grangeville Monitor in the Central SMA

August 29 was a burn day in the Central SMA, where 399 acres were burned at eight fields in Idaho County. The Grangeville monitor (about 4.2 miles east of the field) recorded 1-hour average concentrations of $22.9 \mu\text{g}/\text{m}^3$ for the hour ending at 11:00 a.m. and $34.8 \mu\text{g}/\text{m}^3$ at 12:00 p.m. All DEQ approved burning was completed by 4:00 p.m. DEQ staff noted that smoke from a DEQ-approved burn impacted the Grangeville monitor. Surface winds at the time of the monitor impacts were from the east and east-northeast at 11:00 a.m. and the southwest, west-southwest, west, and west-northwest at 12:00 p.m. Based on $\text{PM}_{2.5}$ concentrations and staff observations, enhanced documentation was completed. ISPs did not report impacts. DEQ concluded that the elevated concentrations were a result of DEQ-approved crop residue burning.

September 4—Grangeville Monitor in the Central SMA

September 4 was a burn day in the Central SMA, where 453 acres were burned at four fields in Idaho County. The Grangeville monitor (about 3.7 miles east of the nearest field) recorded 1-hour average concentrations of $51.7 \mu\text{g}/\text{m}^3$ for the hour ending at 3:00 p.m. and $20.6 \mu\text{g}/\text{m}^3$ at 6:00 p.m. Other agency burning occurred in the area. Surface winds at the time of the monitor impacts were unavailable due to a monitor power failure, but staff recorded westerly winds. Based on $\text{PM}_{2.5}$ concentrations and staff observations, enhanced documentation was completed. ISPs did not report impacts. DEQ concluded that the elevated concentrations were a result of other agency burning.

September 10—Grangeville Monitor in the Central SMA

September 10 was a burn day in the Central SMA, where 1,124 acres were burned at eleven fields in Idaho County. The Grangeville monitor (about 3.2 miles east of the nearest field) recorded a 1-hour average concentration of $24.3 \mu\text{g}/\text{m}^3$ for the hour ending at 1:00 p.m. The on-

site DEQ field coordinator noted that he could smell smoke in Grangeville at 1:12 p.m. with a north wind. He contacted the only burner to the north of town and instructed the burner to shut down burning. Monitor levels returned to acceptable levels. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. DEQ concluded that the elevated concentrations were a result of DEQ-approved burning.

October 23—Cottonwood and Grangeville Monitors in the Central SMA

October 23 was a burn day in the Central SMA, where 168 acres were burned at four fields in Idaho County. The Cottonwood monitor (about 7.5 miles northeast of the field) recorded 1-hour average concentrations of 22.6 µg/m³ for the hour ending at 6:00 p.m., 41.4 µg/m³ at 7:00 p.m., 39.7 µg/m³ at 8:00 p.m., 61.9 µg/m³ at 9:00 p.m., and 20.4 µg/m³ at 10:00 p.m. The Grangeville monitor (about 5.2 miles east of the field) recorded 1-hour average concentrations of 33.8 µg/m³ for the hour ending at 8:00 p.m., 31.3 µg/m³ at 9:00 p.m., and 33 µg/m³ at 10:00 p.m. Prescribed burning was occurring in the area surrounding the ISPs and the monitor. Surface winds at the time of the monitor impacts were from the west, west-southwest, and southwest. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. Other-agency burning was suspected to be the cause of the elevated concentrations on this day. Enhanced documentation was not conducted because it was determined that the DEQ-approved crop residue burns did not contribute to the measured concentration.

October 25—Moscow Monitor in the Central SMA

October 25 was a burn day in the Central SMA, where 120 acres were burned in Latah County (located about 20 miles northeast of the monitor). The PM_{2.5} monitor in Moscow recorded 1-hour average concentration postburn triggers of 24.8 µg/m³ for the hour ending at 3:00 p.m., 37 µg/m³ at 4:00 p.m., 20.3 µg/m³ at 5:00 p.m., 27.3 µg/m³ at 6:00 p.m., 28.8 µg/m³ at 7:00 p.m., 25.2 µg/m³ at 8:00 p.m., 24.7 µg/m³ at 9:00 p.m., and 24.5 µg/m³ at 10:00 p.m. DEQ staff observed the burns and noted that surface winds were from the west. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. Other-agency burning was suspected to be the cause of the elevated concentrations on this day. Enhanced documentation was not conducted because it was determined that the DEQ-approved crop residue burns did not contribute to the measured concentration.

4.1.3 Evaluation of Possible Public Roadway Safety Impacts

August 13—Public Roadway Safety in the Northern Magic Valley SMA

August 13 was a burn day in the Northern Magic Valley SMA, where a 73-acre field was burned in southern Minidoka County just to the north of Interstate 84. A DEQ field coordinator was onsite to observe the burn. The grower initially ignited a test burn at the east end of the field with light winds from the east-southeast. The DEQ field coordinator observed that the smoke dispersed to the west-northwest as expected. The grower then ignited a back burn at the southeast corner of the field, at which time the wind direction shifted so that the light wind was from the northeast. This caused smoke to begin to drift across the interstate. The grower immediately extinguished the fire. The DEQ field coordinator noted that light smoke drifted across the roadway for about 5 minutes, estimating that visibility remained at least 1,000 feet during this episode. The posted speed limit on the interstate is 75 miles per hour; thus, from the CRB operating guide, the minimum stopping sight distance is 820 feet. The coordinator determined

that the light smoke over the public road did not impede on the minimum required stopping sight distance. Enhanced documentation was completed.

4.1.4 Evaluation of Additional Burn Days

In addition to the PCLs described in section 4.1.1 and the possible impacts to ISPs, DEQ further evaluated the effectiveness of the CRB program by using the PM_{2.5} 4-hour average concentration preburn and postburn triggers of 22 µg/m³ and 32 µg/m³, respectively; the PM_{2.5} 24-hour average concentration preburn trigger of 16 µg/m³; and possible visibility hazards on public roadways. The 4-hour average concentrations can help to identify potential particulate sources that have a duration lasting longer than 1 hour but less than 24 hours, which is a typical time frame for a crop residue burn. DEQ used the same process as described in section 4.1.1 to determine whether smoke from crop residue burning was reasonably suspected of having caused an impact. The following days are discussed because approved crop residue burning was conducted and monitoring values were recorded at concentrations above the PM_{2.5} trigger levels.

April 12—4-hour average PM_{2.5} concentration in the Southeast Idaho SMA

April 12 was a burn day in the Southeast Idaho SMA, where 210 acres were approved to burn at two fields in Franklin County. The PM_{2.5} monitor in Franklin recorded a 4-hour average concentration of 37.0 µg/m³ for the 4-hour period ending at 2:00 p.m. A review of the data from the monitor found that there was a power failure at the monitor beginning with the hour ending at 10:00 a.m. and that the 2:00 p.m. data was the first data following the power failure. For these monitors, it is typical that the first few readings after a power failure are not accurate and do not reflect the actual particulate matter concentration. The readings following the 2:00 p.m. reading were all well within the acceptable range. This reading appears to have been an instrument error and not an accurate representation of the ambient air quality in Franklin at that time.

July 29—4-hour average PM_{2.5} concentration in the Southwest Idaho SMA

July 29 was a burn day in the Southwest Idaho SMA, where a total of 70 acres were approved to burn at one field in Owyhee County and one field in Ada County. The PM_{2.5} monitor in Meridian recorded a 4-hour average concentration of 27.7 µg/m³ for the 4-hour period ending at 8:00 a.m. Preburn enhanced documentation was conducted, and it was determined that the elevated concentrations were due to wildfire smoke; the concentrations were improving during the morning of the burn day and were expected to be within the acceptable range during the burn window; and the approved burns would not cause or contribute to any elevated concentrations. Furthermore, the burn in Owyhee County was closer to the monitor in Nampa, which was not showing any elevated concentrations. The field in Ada County, near the monitor in Meridian, was not burned this day, but the field in Owyhee County was successfully burned and neither of the monitors recorded any unacceptable concentrations during or after the burn.

October 7—4-hour average PM_{2.5} concentration in the Central SMA

October 7 was a burn day in the Central SMA, where 116 acres were burned in Nez Perce County. The PM_{2.5} monitor in Kendrick recorded 4-hour average concentration preburn triggers of 22.8 µg/m³ for the hour ending at 11:00 a.m., 25.2 µg/m³ at 12:00 p.m., and 25.7 µg/m³ at 1:00 p.m. Crop residue burning was approved because of a forecasted inversion lift that would return the PM_{2.5} to acceptable levels. Burning did not begin until after 1:00 p.m. Preburn

enhanced documentation was conducted. DEQ staff observed the burns and noted that surface winds were from the west.

October 16—4-hour average $PM_{2.5}$ concentration in the Central SMA

October 16 was a burn day in the Central SMA, where 206 acres were burned in Nez Perce County. The $PM_{2.5}$ monitor in Kendrick recorded 4-hour average concentration preburn triggers of $23.5 \mu\text{g}/\text{m}^3$ for the hour ending at 9:00 a.m., $31.6 \mu\text{g}/\text{m}^3$ at 10:00 a.m., and $36.3 \mu\text{g}/\text{m}^3$ at 11:00 a.m. Crop residue burning was approved because of a forecasted inversion lift that would return the $PM_{2.5}$ to acceptable levels. Burning did not begin until air quality improved. Preburn enhanced documentation was conducted. DEQ staff observed the burns and noted that surface winds were from the west.

October 25—4-hour and 24-hour average $PM_{2.5}$ concentration in the Central SMA

October 25 was a burn day in the Central SMA, where 120 acres were burned in Latah County. The $PM_{2.5}$ monitor in Kendrick recorded 4-hour average concentration preburn triggers of $23.6 \mu\text{g}/\text{m}^3$ for the hour ending at 8:00 a.m., $25.4 \mu\text{g}/\text{m}^3$ at 9:00 a.m., $26.1 \mu\text{g}/\text{m}^3$ at 10:00 a.m., $25.8 \mu\text{g}/\text{m}^3$ at 11:00 a.m., $23.8 \mu\text{g}/\text{m}^3$ at 12:00 p.m. and 24-hour average concentration preburn triggers of $16.1 \mu\text{g}/\text{m}^3$ for the hour ending at 8:00 a.m., $16.3 \mu\text{g}/\text{m}^3$ at 10:00 a.m., and $16.6 \mu\text{g}/\text{m}^3$ at 11:00 a.m. Crop residue burning was approved because of a forecasted inversion lift that would return the $PM_{2.5}$ to acceptable levels. Burning did not begin until air quality improved. Preburn enhanced documentation was conducted. DEQ staff observed the burns and noted that surface winds were from the west.

4.2 Complaints

Complaint response remains a critical part of DEQ's crop residue burning program. Like information from ambient monitoring or meteorological data, complaints provide smoke managers with information that can help them understand how the public perceives burning, air quality, and smoke behavior. DEQ focused on the location, content, and circumstances of the complaints and used the information to improve future burn decisions. Some of the complaints involved smoke from crop residue burning conducted within the CRB program. Other complaints involved crop residue burning conducted outside DEQ's CRB program, such as the burning of an unregistered field, burning on a no-burn day, or crop residue burning conducted on tribal land, as well as complaints regarding prescribed burning and wildfire smoke.

DEQ used a familiar toll-free hotline number for the public to submit questions, comments, and complaints. This number was previously used by the Idaho State Department of Agriculture when it operated the CRB program. DEQ, in cooperation with the Nez Perce and Coeur d'Alene Tribes, used a contractor to answer the calls. Information from each call was immediately e-mailed to CRB program staff. Complaints received through the hotline included complaints about burning conducted within and outside the CRB program. The following information was collected from the callers:

- Name
- Phone number
- Is a call back requested?
- City, state, and county of caller's location
- Is smoke visible from caller's location?

- Is smoke at ground level?
- Brief description of the problem

In addition to the complaint hotline, DEQ also directly received questions, comments, and complaints in the regional offices, and some complaints were received by other methods, such as by DEQ field coordinators. In all cases, crop residue burning complaints were entered into DEQ's Complaint Tracking System by regional office staff. Table 1 shows the total number of crop residue burning complaints received by SMA, including those that were related to DEQ's CRB program and those from non-DEQ crop residue burning and other smoke complaints.

Table 1. Summary of complaints responded to by the crop residue burn program during 2013.

Smoke management area ^a	Total crop residue burning related complaints	Complaints likely associated with DEQ-approved burning	Complaints associated with other smoke sources ^b
Central	6	0	6
Kootenai and Boundary Counties	18	15	3
Southwest Idaho	2	1	1
Northern Magic Valley	1	1	0

a. Smoke management areas with no related complaints during 2013 are not included.

b. Complaints from other sources include other open burning within DEQ jurisdiction, open burning outside DEQ jurisdiction, and wildfires,.

4.3 Compliance and Enforcement

DEQ's existing Air Quality Division Compliance and Enforcement Program is used for the CRB program. DEQ continued to focus on compliance assistance during 2013, with the goal of educating growers that are new to the program about their permits and requirements and helping them to understand how to comply with those requirements. In those instances where a violation was documented and an enforcement action was appropriate, DEQ continued to use both informal and formal enforcement tools.

During 2013 no violations of the CRB rule were forwarded to the enforcement coordinator in the Air Quality Division. Two enforcement actions that were initiated in 2012 were settled in 2013 and resulted in the collection of penalties totaling \$1,908. DEQ issued four notices to comply for minor violations of the CRB rule. These minor violations were escaped fires and burning without approval.

4.4 Crop Residue Burning Ambient Air Quality Monitoring Network

DEQ continued to operate the existing air quality monitors and seasonal CRB PM_{2.5} monitors (nephelometers) during 2013. Figures 2–4 show the locations of monitors in northern, central, and southern Idaho SMAs, respectively.

DEQ also uses real-time ambient ozone monitoring data from three National Park Service monitors (Craters of the Moon National Monument, Grand Teton National Park, and Yellowstone National Park). DEQ also used data from monitors operated by the Utah Department of Environmental Quality and Washington Department of Ecology.

This year the Lewiston Regional Office (LRO) relocated one of Central SMA's nephelometers from Genesee to Cottonwood, Idaho, due to limited burning in the Genesee area. Cottonwood provided a more representative location for gathering air monitoring data since a majority of the Central SMA agricultural burning is in Idaho County (over 10,000 acres) and the Nez Perce Tribe also burns tens of thousands of acres on the Camas Prairie where Cottonwood is located. A comparison of ISPs was conducted by LRO prior to relocating the monitor. The results of the comparison indicated that the populations in both communities were around 900 people; and Genesee has two ISPs, whereas Cottonwood has five ISPs along with an airport. In 2012 over three times the amount of acreage was burned in Cottonwood (451 acres) as opposed to Genesee (143 acres). In July the decision was made, with agreement from the CRB Advisory Committee, to relocate the nephelometer from Genesee to Cottonwood. The data gathered in 2013 provided a good representation of air quality impacts and monitored both CRB and prescribed burning activities. The total acreage burned near Cottonwood in 2013 was comparative to the amount burned in 2012.

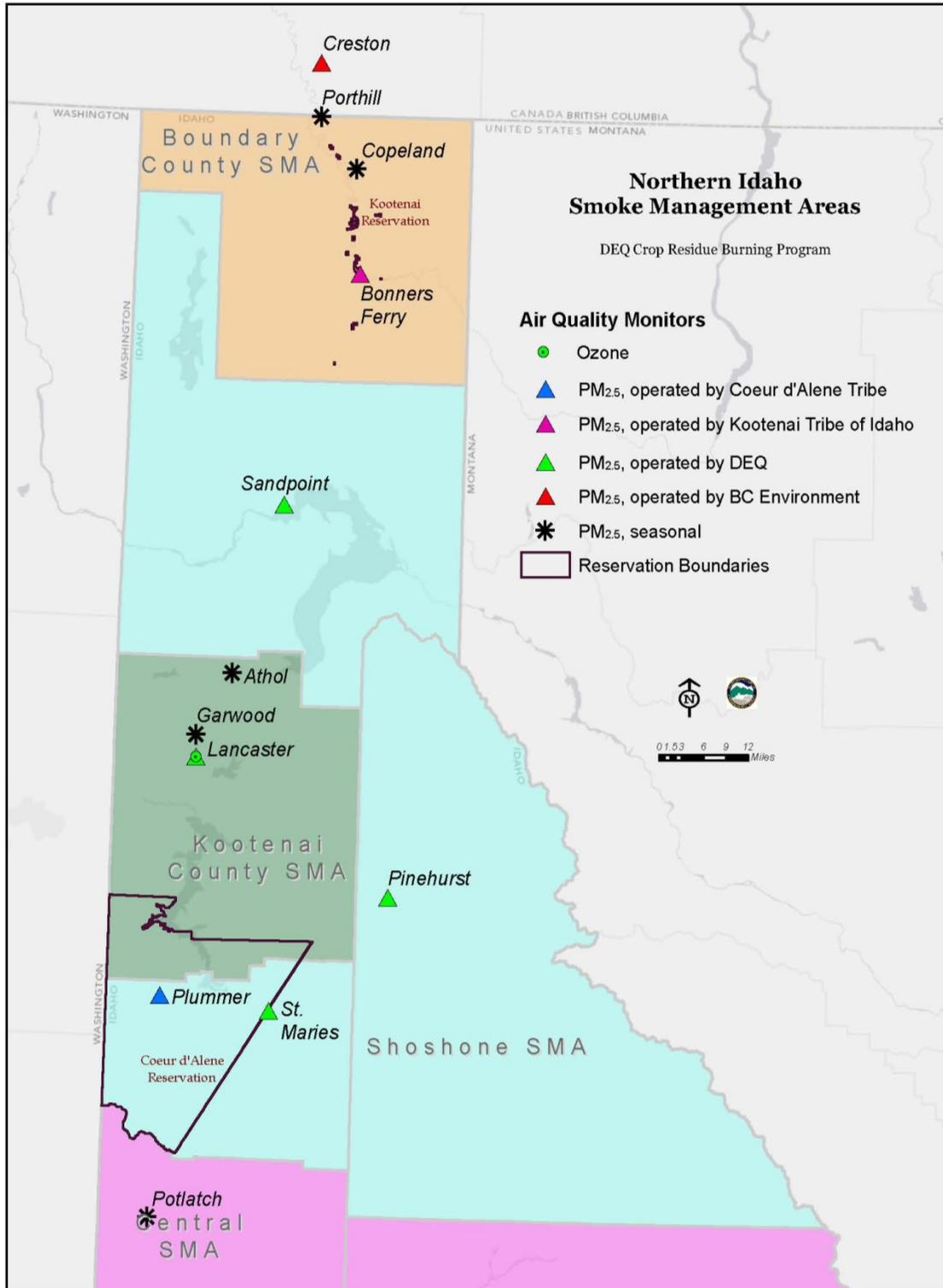


Figure 2. Air quality monitor locations for northern Idaho smoke management areas.

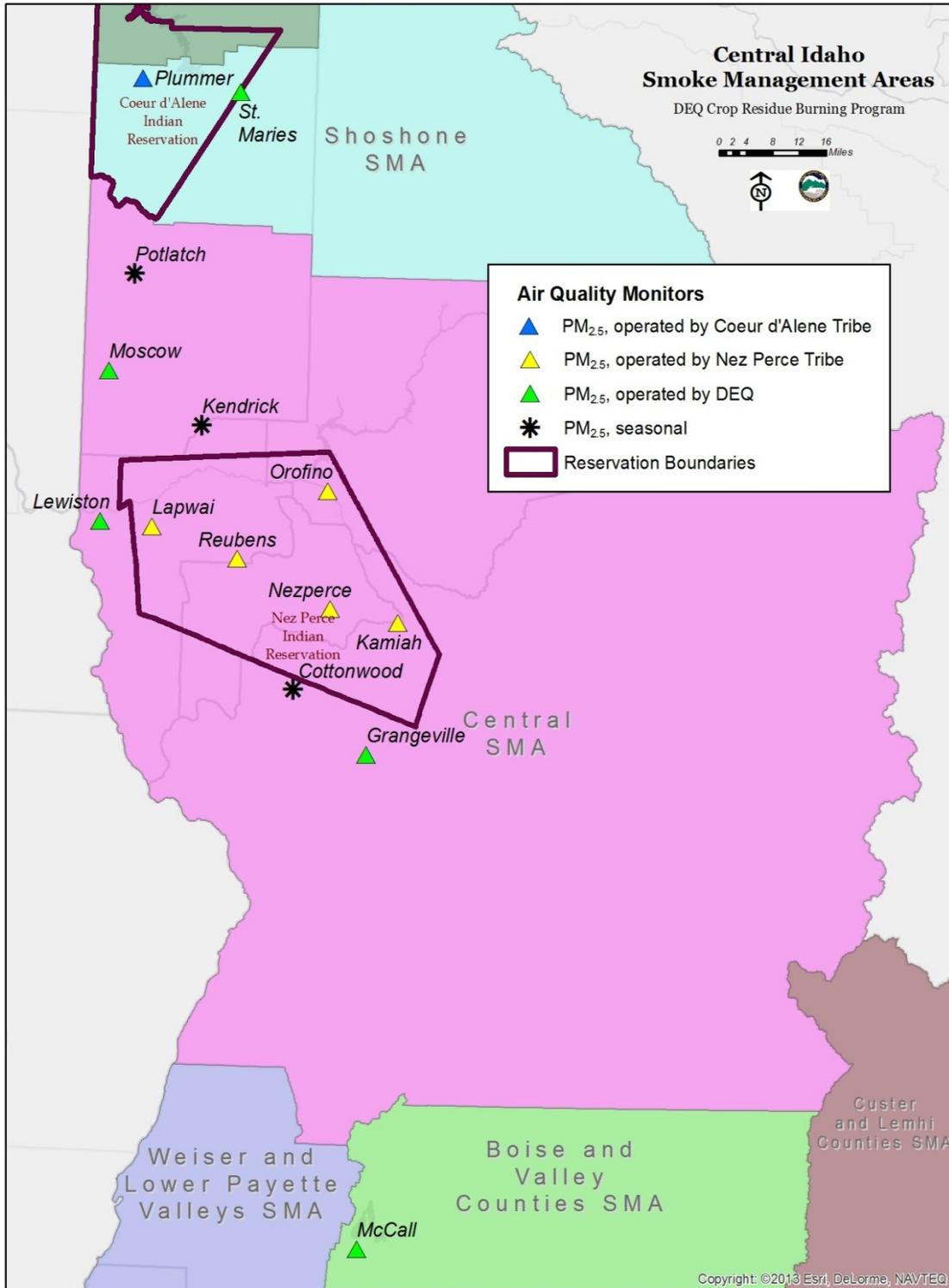


Figure 3. Air quality monitor locations for the central smoke management area.

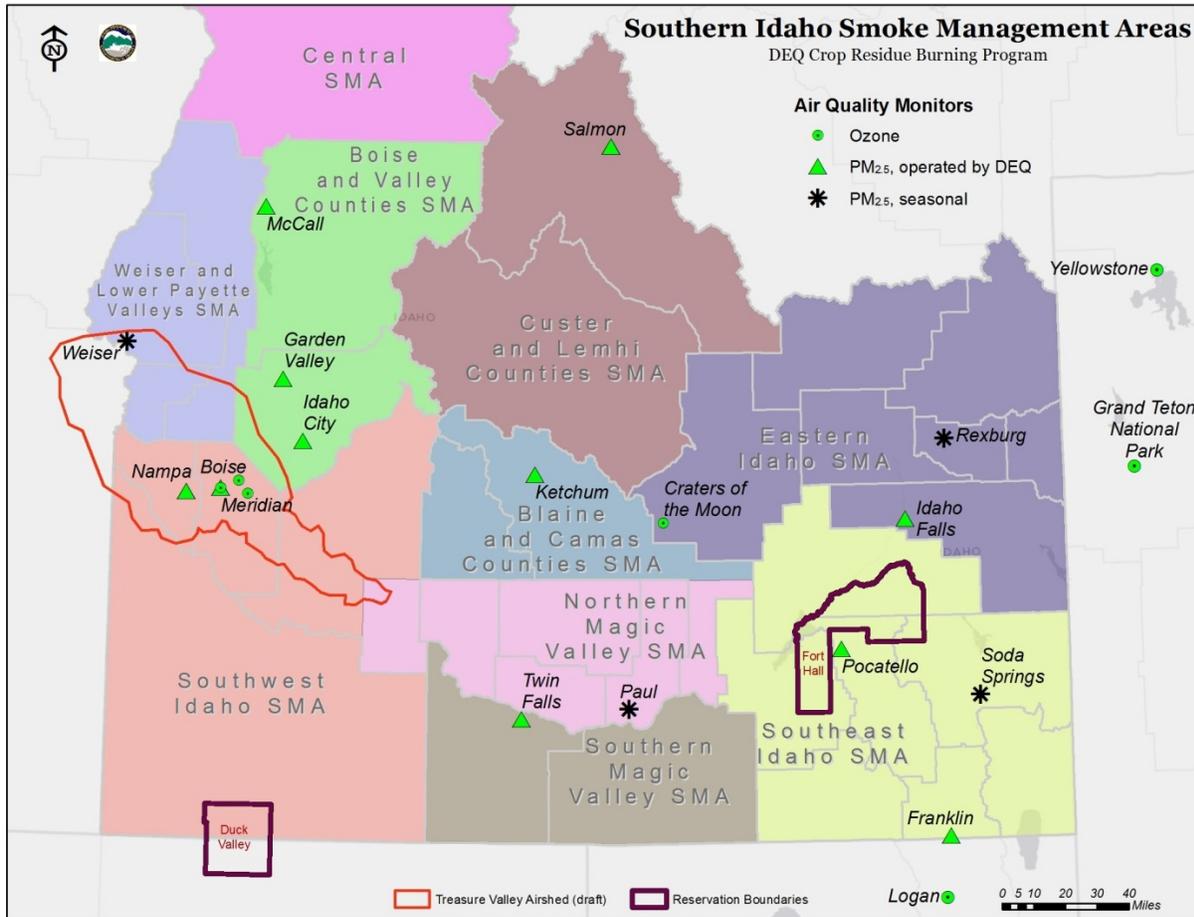


Figure 4. Air quality monitor locations for southern Idaho smoke management areas.

4.5 Meteorology

Meteorological conditions play an important part in DEQ’s burn decision process. DEQ contracted with Bennett Fire Weather Services to provide fire weather forecasting services during the fall burn season. Bennett Fire Weather Services, LLC, provided DEQ with region-specific meteorological forecasts each morning and afternoon, with an emphasis on parameters related to smoke dispersion and ventilation. At the end of September, DEQ transitioned to using an on-staff meteorologist for fire weather forecasting for the southern Idaho SMAs. Appendix D contains a detailed summary of the meteorological conditions throughout the state during the fall burn season.

DEQ analysts and coordinators use a variety of weather forecasting tools to study many parameters during the burn decision process, including wind speed and direction, atmospheric mixing height, transport wind speed and direction, temperature, relative humidity, and probability of precipitation. In addition to weather forecasting, DEQ field coordinators conduct *in-the-field* observations of meteorological conditions and launch and observe pilot balloons (pibals) to further understand the expected smoke dispersion.

4.6 Smoke Management Area Summaries

During 2013, 54,438 acres were burned statewide under the CRB program, somewhat less than the acres of previous years (67,416 and 65,362 acres in 2012 and 2011, respectively). As in prior years, a majority of the burning occurred during the fall burn season: for 2013, the fall burn season accounted for 85% of the acres burned.

Detailed summaries of each SMA follow. Acres burned under the CRB program are broken down by burn season and crop type. Crop types include Kentucky bluegrass, other grass species, cereal grain, other crops, and Conservation Reserve Program (CRP) lands. Each SMA summary includes the total number of burn days and the justification for no-burn days.

The burn decision methodologies are slightly different between northern Idaho and southern Idaho. In northern Idaho, multiple reasons are sometimes listed for a no-burn decision, while in southern Idaho, there is typically only one reason listed for a no-burn decision. In northern Idaho, the no-burn due to no requests decision justification only occurs when there are no burns appearing on the ready-to-burn list. In southern Idaho, this justification may be used if there are burns on the ready-to-burn list but the growers are not available or ready to burn.

Figure 5 shows the number of acres burned under the CRB program for the last 3 years in the northern Idaho SMAs. The data show that the acres burned in these SMAs have remained fairly stable since 2011.

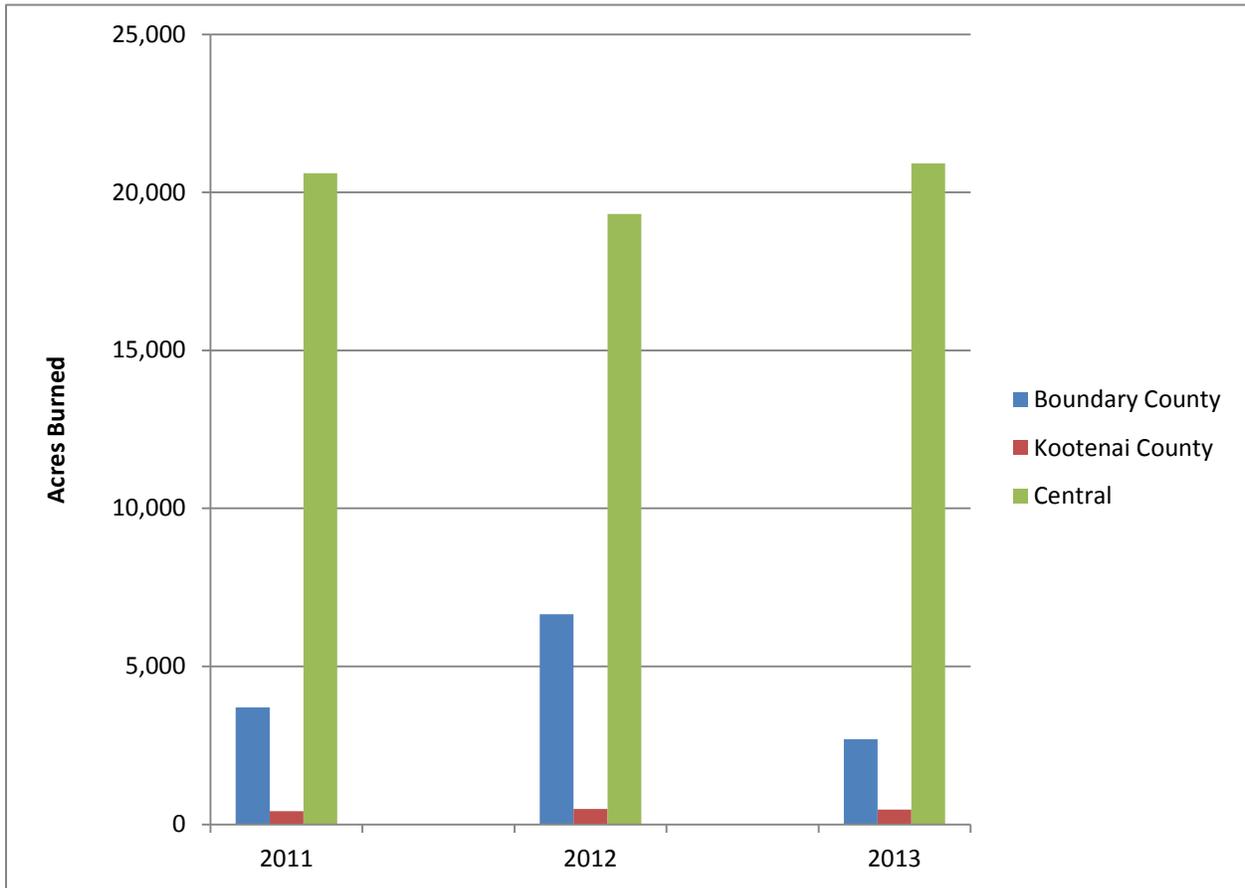


Figure 5. Acres burned in northern Idaho smoke management areas.

Figure 6 shows the number of acres burned under the CRB program in the southern Idaho SMAs for the last 3 years. The data generally show that with the exception of the Northern Magic Valley SMA, which had a large increase in acres burned, most of the SMAs had decreased numbers of acres burned compared to the prior year.

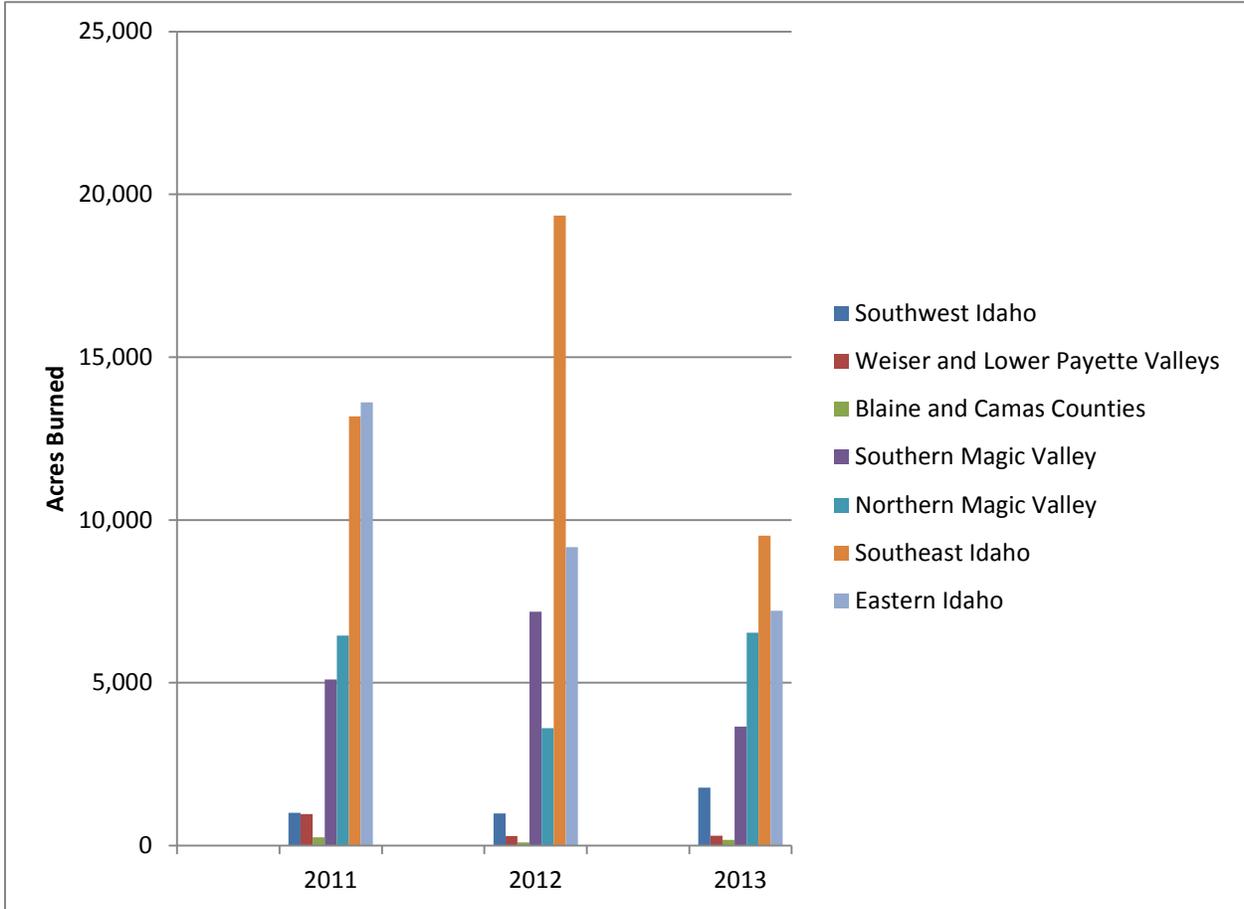


Figure 6. Acres burned in the southern Idaho smoke management areas.

4.6.1 Boundary County Smoke Management Area

The Boundary County SMA covers 1,278 square miles and encompasses all of Boundary County (Figure 1). The majority of the crop residue burning in Boundary County occurs in the Kootenai River valley along the river and adjacent benches.

The only crop residue burned in the Boundary County SMA in 2013 was cereal grain; however, residue from other crops, such as Kentucky bluegrass, legumes, and hops, has historically been burned as well. Peak burn months for this SMA are April–June and August–October. High relative humidity and high fuel moisture often limit burning in the early spring and late fall.

Seasonal monitors are located in Porthill and Copeland. Year-round monitors in Creston, British Columbia, operated by BC Environment, and in Bonners Ferry, operated by the Kootenai Tribe of Idaho, provide additional data for program decisions and evaluations. Also, the Boundary County SMA used meteorological data from pibals and theodolites that were released and tracked (respectively) by the Kootenai National Wildlife Refuge.

4.6.1.1 Acres Burned

Table 2 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. A total of 3,288 acres were burned in the Boundary County SMA during 2013. The number of acres burned in the Boundary County SMA in 2013 was less than the two previous years.

Figure 7 shows the locations of the fields burned during 2013: 33 fields totaling 3,288 acres were burned in the SMA, and 3 fields (9%) amounting to 360 acres (11%) were located within 3 miles of an ISP. In 2013, 8 growers burned fields within the CRB program in the SMA.

Table 2. Summary of acres burned in the Boundary County Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
Cereal grain	575	3,348	1,071
Kentucky bluegrass	0	0	0
Other crops	0	0	0
Subtotal	575	3,348	1,071
Fall^b			
Cereal grain	3,131	3,159	2,217
Kentucky bluegrass	0	150	0
Other crops	0	0	0
Subtotal	3,131	3,309	2,217
Total	3,706	6,657	3,288

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

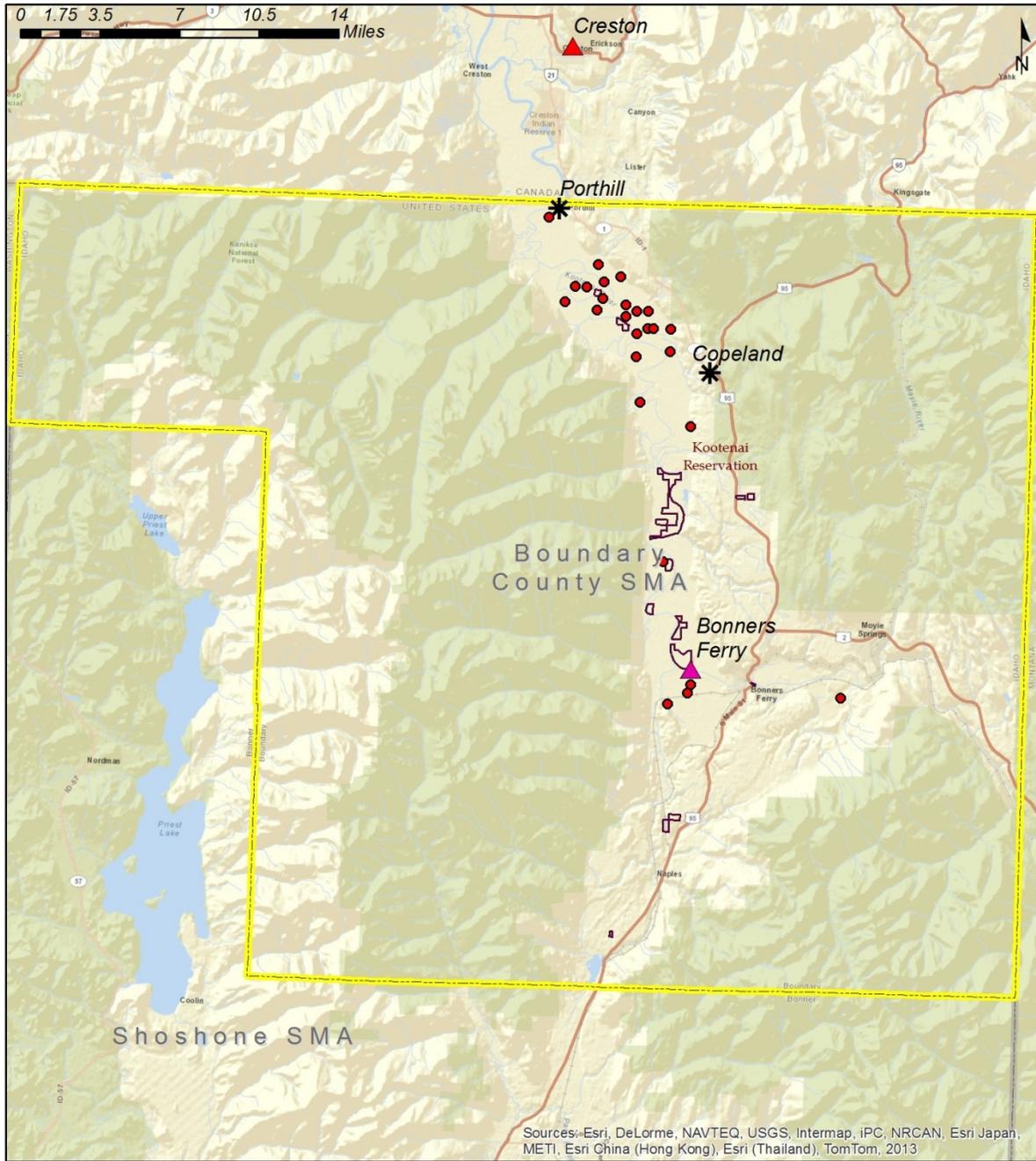


Figure 7. Location of 2013 burns in the Boundary County Smoke Management Area.

4.6.1.2 Daily Burn Decisions and Air Quality

DEQ field coordinators were on site in this SMA on many burn days or conditional burn days during August, September, and October to evaluate the suitability of the field and weather conditions for potential burning. DEQ issued a total of 25 burn days. On many of these days, conditions were marginal and only limited burning could be approved.

Table 3 shows the summary of burn decisions for the Boundary County SMA for 2013. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture was also a frequent reason for no-burn days in this SMA during 2013.

Table 3. Summary of burn decisions for the Boundary County Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Boundary	25	124	7	53	11	9	14

a. This summary includes all burn decisions issued for 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix E contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Boundary County SMA. Only those weeks when burning occurred are included in Appendix E.

4.6.2 Kootenai County Smoke Management Area

The Kootenai County SMA covers 1,316 square miles, encompasses all of Kootenai County, and includes the Rathdrum Prairie and Rose Lake areas (Figure 1). The Rathdrum Prairie is a mix of irrigated and nonirrigated agricultural fields and other rural land. The Rose Lake area is on the eastern edge of Kootenai County and includes the Chain Lakes area that follows the Coeur d'Alene River as it flows into Coeur d'Alene Lake.

The primary crop burned in the Kootenai County SMA is Kentucky bluegrass. The peak burn months are August–October.

Seasonal ambient air quality monitors are located at Athol and Garwood. A year-round monitor is located in Hayden (Lancaster monitor). A Washington Department of Ecology ozone monitor in Spokane and DEQ monitors in Sandpoint and Pinehurst also provide additional data, although they are located outside the SMA. The ozone monitor operated by the Washington Department of Ecology is used to forecast ozone in Kootenai County.

Crop residue burning in the Kootenai County SMA has been greatly limited by urban development. The Rathdrum Prairie is bordered to the north by the city of Rathdrum, to the east by the city of Hayden, and to the south by the cities of Post Falls and Coeur d'Alene. The Kentucky bluegrass fields located on the prairie are nearly surrounded by urbanized cities and growing rural residential communities. Proximity to ISPs and urban centers has led to increasingly restrictive field requirements by severely limiting an acceptable wind direction for approval in Kootenai County.

4.6.2.1 Acres Burned

Table 4 shows the acres burned during the fall burn season for each crop type during the 2011–2013 burn seasons. A total of 470 acres were burned in the SMA during the 2013 burn season. The number of burned acres has remained relatively stable between 2011 and 2013.

Figure 8 shows the locations of the fields burned during 2013: 4 fields totaling 470 acres were burned in this SMA, and 2 fields (50%) amounting to 370 acres (79%) were located within 3 miles of an ISP. In 2013, 3 growers burned fields within the CRB program in the SMA.

Table 4. Summary of acres burned in the Kootenai County Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Fall^a			
Kentucky bluegrass	420	470	370
Cereal grain	0	20	0
Other grass species	0	0	100
Total	420	490	470

a. Fall season is July 1–December 31.

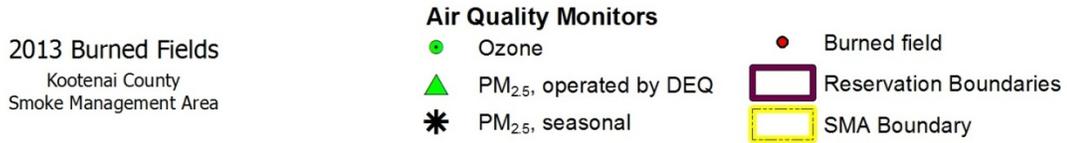
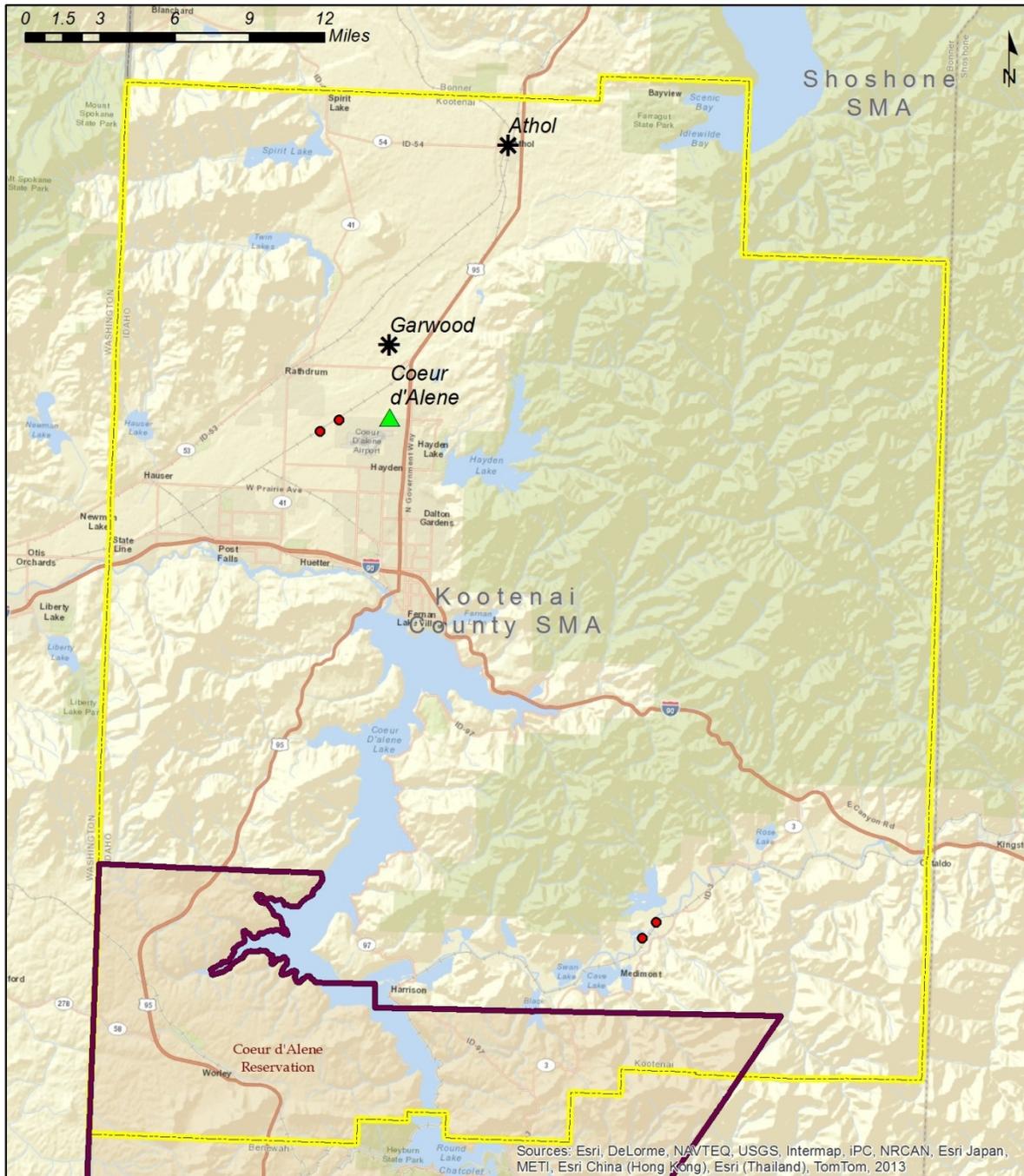


Figure 8. Location of 2013 burns in the Kootenai County Smoke Management Area.

4.6.2.2 Daily Burn Decisions and Air Quality

Table 5 shows the summary of burn decisions for the Kootenai County SMA for 2013. The most common reason for a no-burn decision was that no requests to burn were received. All burning in this SMA was conducted on 4 burn days. Crop residue burning was limited by poor air quality due to wildfire smoke in the region, stagnant air conditions due to high pressure systems, and unfavorable wind directions.

Table 5. Summary of burn decisions for the Kootenai County Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Kootenai	4	211	6	6	0	1	4

a. This summary includes all burn decisions issued for 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix F contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and the 8-hour average ozone concentrations recorded and collected by DEQ monitors for the Kootenai County SMA. Only those weeks when burning occurred are included in Appendix F.

4.6.3 Central Smoke Management Area

The Central SMA covers 13,403 square miles and includes Latah, Nez Perce, Lewis, Idaho, and Clearwater Counties. Additionally, the Nez Perce Indian Reservation, which contains portions of each of these counties, is located entirely within this SMA (Figure 1). All burning within the reservation boundary is managed by the Nez Perce Tribe.

The primary crop burned in the Central SMA is cereal grain stubble followed by Kentucky bluegrass. Peak burn months for this SMA are July through early November.

The Central SMA is topographically diverse with many subairsheds. High mountains characterize Latah, Clearwater, and Idaho Counties; valleys and steep canyons or drainages dominate Nez Perce County; and a centrally located highland agricultural area intersects all counties except Latah. Sophisticated smoke management is required to address the challenges created by localized weather conditions; the proximity of burning in relation to ISPs and small towns; and the necessary coordination with the Nez Perce Tribe, Washington Department of Ecology, Coeur d'Alene Tribe, and regional prescribed burners.

Year-round ambient air quality monitors that measure PM_{2.5} are located in Moscow, Lewiston, and Grangeville; seasonal monitors are deployed at Potlatch, Cottonwood, and Kendrick. DEQ also uses data from air quality monitors in Kamiah, Orofino, Nezperce, and Lapwai that are operated by the Nez Perce Tribe.

4.6.3.1 Acres Burned

Table 6 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. A total of 21,225 acres were burned in the SMA during 2013, with the majority occurring during the fall burn season.

The lack of multiple consecutive days of dry weather in October and November prohibited Kentucky bluegrass burning but not cereal grain (in certain areas, cereal grain can burn after a single day of no rain).

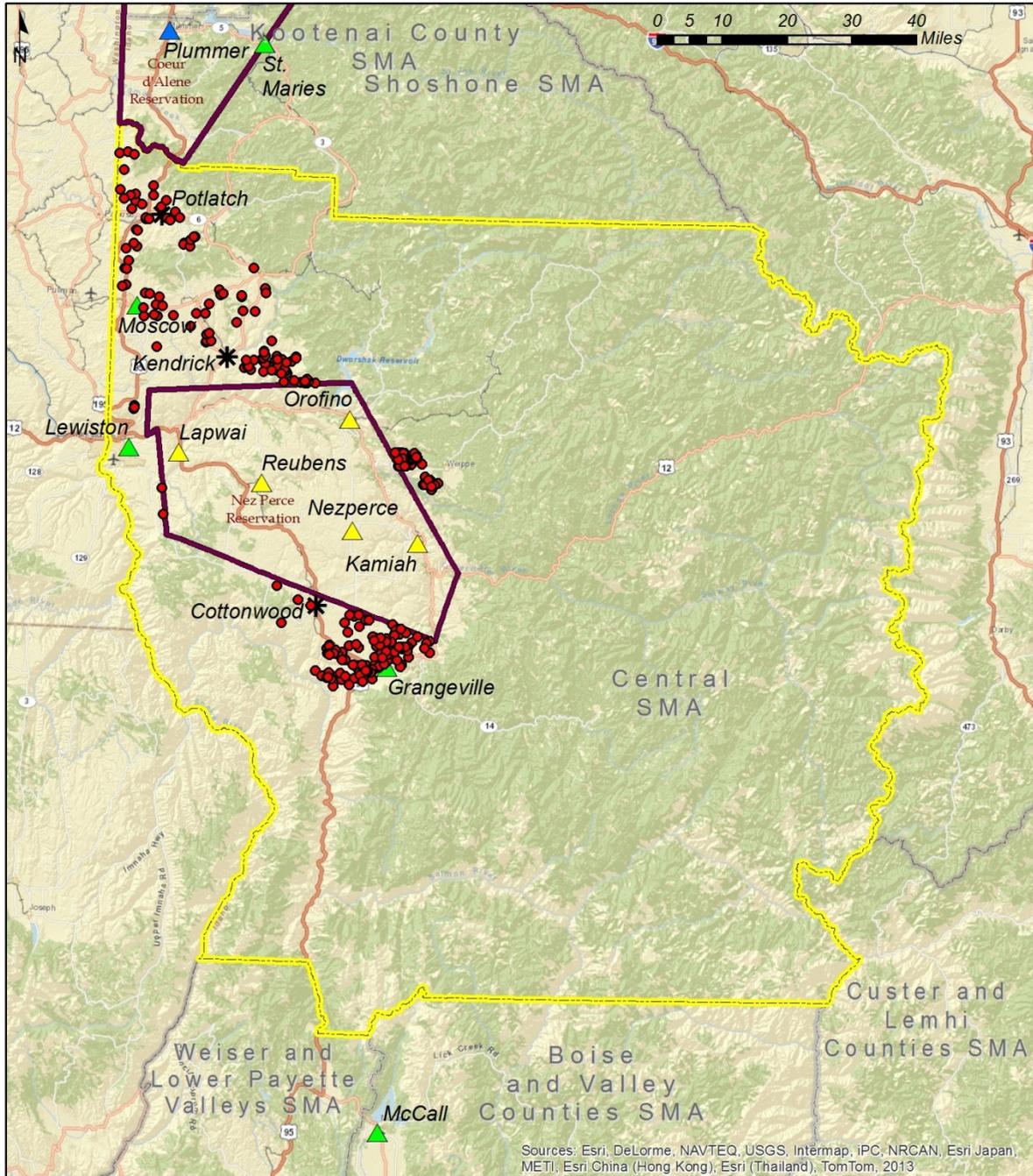
Figure 9 shows the locations of fields burned during 2013: 321 fields totaling 21,225 acres were burned in this SMA, and 50 fields (16%) amounting to 2,982 acres (14%) were located within 3 miles of an ISP. In 2013, 92 growers burned fields within the CRB program in the SMA.

Table 6. Summary of acres burned in the Central Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
CRP	99	1,285	549
Cereal grain	1,854	822	1,470
Kentucky bluegrass	0	162	27
Other crops	31	110	100
Subtotal	1,984	2,379	2,144
Fall^b			
CRP	1,762	877	1,788
Cereal grain	12,026	12,560	14,111
Kentucky bluegrass	4,164	3,085	2,202
Other grass species	NA	NA	926
Other crops	564	421	54
Subtotal	18,516	16,943	19,081
Total	19,301	20,761	21,225

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013



Figure 9. Location of 2013 burns in the Central Smoke Management Area.

4.6.3.2 Daily Burn Decisions and Air Quality

Table 7 shows the summary of burn decisions for each county in the Central SMA for 2013. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture was a frequent reason for a no-burn decision. DEQ issued 44 burn days in at least one county in the Central SMA during 2013.

Table 7. Summary of burn decisions for the Central Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Latah	39	125	6	44	6	3	15
Clearwater	17	168	5	36	2	2	5
Nez Perce	20	176	6	17	1	4	9
Idaho	44	109	5	61	4	3	8

a. This summary includes all burn decisions issued for 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendices G, H, and I contain a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the three subsections of the Central SMA. Only those weeks when burning occurred are included in the appendices.

4.6.4 Southwest Idaho Smoke Management Area

The Southwest Idaho SMA includes Canyon, Ada, Owyhee, and Elmore Counties (with the exception of the southeast portion of Elmore County, which is included in the Northern Magic Valley SMA (Figure 1). Most of the crop residue burning activity occurred in western Canyon County, northwest Owyhee County, and southeastern Owyhee County. The primary crops burned included cereal grain stubble, pasture, and alfalfa residue. Burning may occur year-round, but the peak burn periods in this SMA are March–April and July–October. Two ambient air quality monitors that measure PM_{2.5} are located in Nampa and Boise, and two ambient air quality monitors that measure ozone are located in Boise and Meridian.

The Southwest Idaho SMA covers 12,462 square miles and includes complex terrain in the northern foothills of Ada County and the uplands of southwestern Owyhee County. Most of the crop residue burning in the SMA is in the Snake River valley. The cooling effect of water in the Snake River and in several reservoirs has the potential to influence smoke dispersion and transport.

4.6.4.1 Acres Burned

Table 8 shows the acres burned during the spring and fall burn seasons for general crop types during the 2011–2013 burn seasons. Figure 10 shows the locations of fields burned during 2013: 57 fields totaling 1,778 acres were burned in this SMA, and 6 fields (11%) amounting to 82 acres (4%) were located within 3 miles of an ISP. In 2013, 22 growers burned fields within the CRB program in the SMA.

Table 8. Summary of acres burned in the Southwest Idaho Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
Cereal grain	72	20	16
Other crops	76	85	59
Subtotal	148	105	75
Fall^b			
Cereal grain	614	460	1,508
Other crops	247	426	195
Subtotal	861	886	1,703
Total	1,009	990	1,778

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

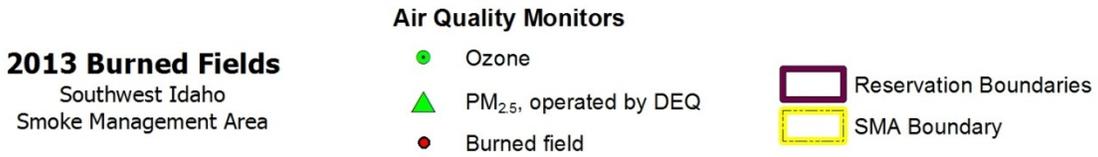
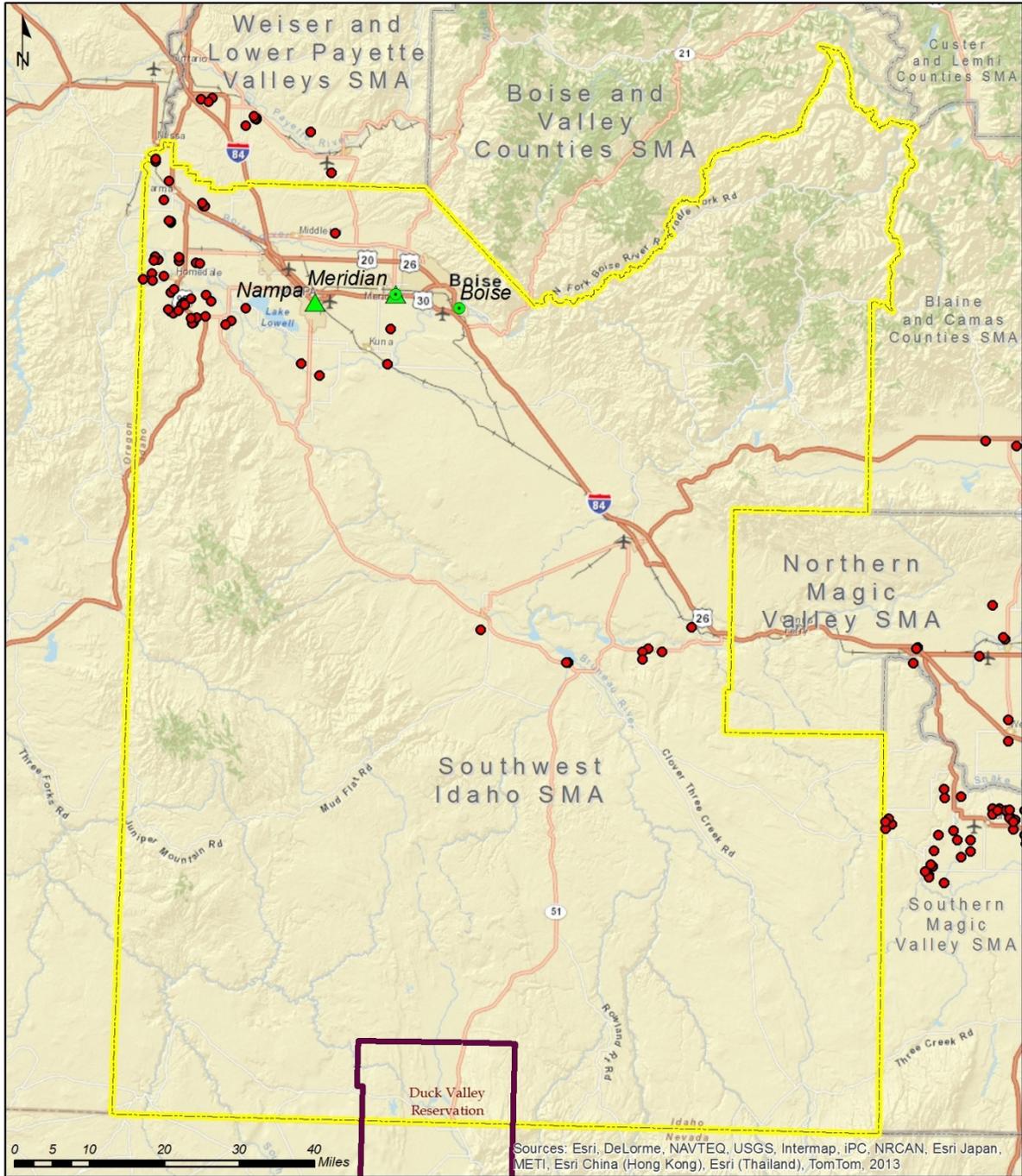


Figure 10. Location of 2013 burns in the Southwest Idaho Smoke Management Area.

4.6.4.2 Daily Burn Decisions and Air Quality

Table 9 shows the summary of burn decisions for each county in the Southwest Idaho SMA for 2012. The most common reason for a no-burn decision was that no requests to burn were received. Poor air quality, fuel moisture, and unsuitable meteorological conditions were occasional reasons for a no-burn decision. During August, NWS-issued red-flag warnings and wildfire smoke resulted in no-burn conditions on several days. During September, periodic precipitation caused elevated fuel and soil moisture levels, resulting in several no-burn days.

Elmore County was under a fire safety burn ban from July 2 to October 20. Many growers seemed to be aware of the burn ban as DEQ received no requests to burn in this county while the ban was in effect.

A relatively dry spring and light snowpack caused irrigation operators to curtail water deliveries to many areas around the end of August this year, at the same time that DEQ issued frequent no-burn decisions due to high fire danger (e.g., NWS red flag warning) or poor air quality from wildfire smoke or ozone. Some growers chose to implement other means of crop residue disposal in lieu of burning rather than wait for a suitable burn day so that they could work their fields while they still had irrigation water. While conditions improved in October and there were several days that would have been suitable for burning, DEQ received no burn requests during the month. By November, conditions were quickly becoming inappropriate for burning, and DEQ received no requests to burn.

Table 9. Summary of burn decisions for the Southwest Idaho Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Ada	4	197	7	7	4	0	2
Canyon	8	203	5	7	1	0	2
Elmore	2	222	0	0	0	0	2
Owyhee	18	189	4	7	0	0	6

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix J contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and 8-hour ozone concentrations recorded and collected by DEQ monitors for the Southwest Idaho SMA. Only those weeks when burning occurred are included in Appendix J.

4.6.5 Weiser and Lower Payette Valleys Smoke Management Area

The Weiser and Lower Payette Valleys SMA includes Adams, Washington, Payette, and Gem Counties (Figure 1). While a minimal amount of burning has been conducted in Adams, Payette, and Gem counties, Washington County accounts for the majority of acres burned. The primary crops burned in the SMA were cereal grain stubble and pasture. Burning may occur year-round, but the peak burn periods are March–April and July–October. An ambient air quality monitor that measures PM_{2.5} is located in Weiser. The closest ambient ozone monitor is located in Meridian in the Southwest Idaho SMA.

The Weiser and Lower Payette Valleys SMA covers 3,820 square miles and includes a mixture of complex mountainous terrain and lowlands of the Snake River valley. The cooling effect of water in the Snake River has the potential to influence smoke dispersion and transport.

4.6.5.1 Acres Burned

Table 10 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 11 shows the locations of fields burned during 2013: 15 fields totaling 310 acres were burned in this SMA, and 3 fields (20%) amounting to 59 acres (19%) were located within 3 miles of an ISP. In 2013, 8 growers burned fields within the CRB program in the SMA.

Table 10. Summary of acres burned in the Weiser and Lower Payette Valleys Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
Cereal grain	143	3	165
Other crops	102	223	92
Subtotal	245	226	257
Fall^b			
Cereal grain	568	0	53
Other crops	160	72	0
Subtotal	728	72	53
Total	973	298	310

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.



2013 Burned Fields
Weiser and Lower Payette Valleys
Smoke Management Area

Air Quality Monitors

- ▲ PM_{2.5}, operated by DEQ
- * PM_{2.5}, seasonal

- Burned field
- SMA Boundary

Figure 11. Location of 2013 burns in the Weiser and Lower Payette Valleys Smoke Management Area.

4.6.5.2 Daily Burn Decisions and Air Quality

Table 11 shows the summary of burn decisions for each county in the Weiser and Lower Payette Valleys SMA for 2012. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and wind were occasional reasons for a no-burn decision. Poor air quality was not cited as a reason for a no-burn decision as wildfire smoke had a minimal effect on this region, and there were few requests to burn during what tends to be the time of year when ozone concentrations are at their highest.

During the fall burn season, DEQ received one request to burn in this SMA, and this request was fulfilled on August 2.

Table 11. Summary of burn decisions for the Weiser and Lower Payette Valleys Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Adams	0	225	0	0	0	0	0
Gem	2	220	0	3	2	0	0
Payette	9	212	0	2	2	0	0
Washington	3	221	0	0	0	0	1

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix K contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and 8-hour ozone concentrations recorded and collected by DEQ monitors for the Weiser and Lower Payette Valleys SMA (ozone monitoring data is from DEQ monitors in the Treasure Valley). Only those weeks when burning occurred are included in Appendix K.

4.6.6 Blaine and Camas Counties Smoke Management Area

The Blaine and Camas Counties SMA consists of Blaine and Camas Counties with the exception of the southern panhandle of Blaine County, which is included in the Northern Magic Valley SMA (Figure 1). During 2013, crop residue burning was conducted at just two fields in the SMA. Burning may occur year-round, but the typical burn season is fall. One PM_{2.5} air quality monitor is located in Ketchum, and an ozone monitor operated by the National Park Service is located at Craters of the Moon National Monument.

The Blaine and Camas Counties SMA covers 3,740 square miles. The SMA includes high-elevation prairie, foothills, and mountains. The climate of this area tends to be cooler and moister than some of the surrounding areas, creating the potential for more frequent unsuitable burning conditions. Several lakes and reservoirs have the potential to affect smoke dispersion due to the cooling effect of the water.

4.6.6.1 Acres Burned

Table 12 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 12 shows the location of the field burned during 2013: one grower burned two fields totaling 180 acres in this SMA. These fields were not within 3 miles of an ISP.

Table 12. Summary of acres burned in the Blaine and Camas Counties Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
Cereal grain	0	0	0
Other crops	0	0	0
Subtotal	0	0	0
Fall^b			
Cereal grain	257	100	180
Other crops	0	0	0
Subtotal	257	100	180
Total	257	100	180

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

Appendix L contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors and 8-hour ozone concentrations recorded and collected by the National Park Service for the Blaine and Camas Counties SMA. Only those weeks when burning occurred are included in Appendix L.

4.6.7 Southern Magic Valley Smoke Management Area

The Southern Magic Valley SMA consists of Twin Falls and Cassia Counties (Figure 1). Burning occurred throughout both counties. The primary crop burned has generally been cereal grain stubble. Burning may occur year-round, but the peak burn periods are March–May and July–October. The Southern Magic Valley SMA has one PM_{2.5} air quality monitor located in Twin Falls. Additionally, a PM_{2.5} monitor located in Paul (in the Northern Magic Valley SMA) and an ozone monitor operated by the National Park Service at Craters of the Moon National Monument are within the relevant vicinity of portions of this SMA and are used in the burn decision process.

The Southern Magic Valley SMA covers 4,508 square miles and includes mountains and valleys in the south and the Snake River valley in the north. The area is somewhat arid and often experiences windy conditions. The cooling effect of water in the Snake River and several water storage reservoirs has the potential to influence smoke dispersion and transport.

4.6.7.1 Acres Burned

Table 14 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 13 shows the locations of fields burned during 2013: 107 fields totaling 3,761 acres were burned in this SMA, and 47 fields (44%) amounting to 636 acres (17%) were located within 3 miles of an ISP. In 2013, 60 growers burned fields within the CRB program in the SMA.

Table 14. Summary of acres burned in the Southern Magic Valley Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
CRP	61	1,001	84
Cereal grain	381	1,762	872
Other crops	0	418	16
Subtotal	442	3,181	972
Fall^b			
CRP	120	2,350	79
Cereal grain	4,495	1,602	2,710
Other crops	45	52	<1
Subtotal	4,660	4,004	2,789
Total	5,102	7,185	3,761

a. Spring season is January–June 30.

b. Fall season is July 1–December 31.

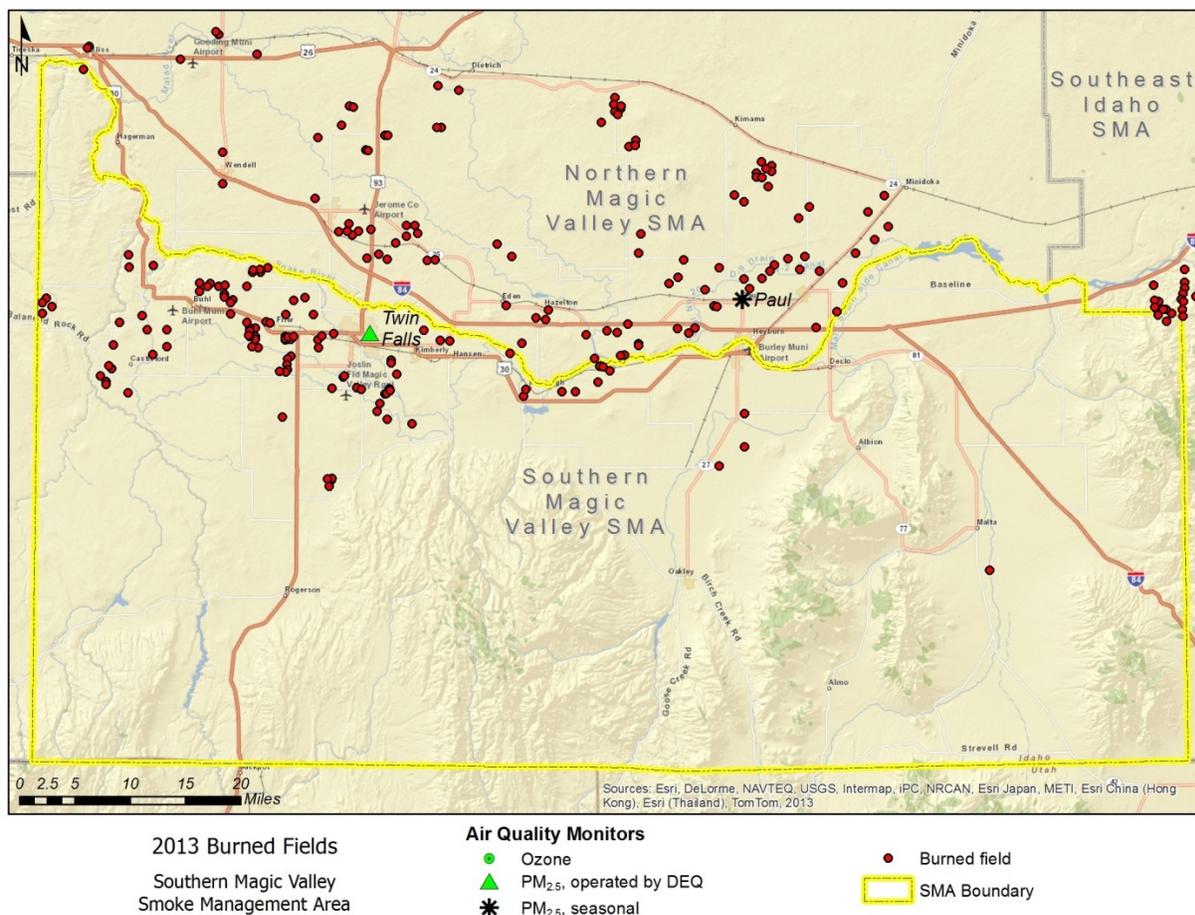


Figure 13. Location of 2013 burns in the Southern Magic Valley Smoke Management Area.

4.6.7.2 Daily Burn Decisions and Air Quality

Table 15 shows the summary of 2013 burn decisions for the two counties in the Southern Magic Valley SMA. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for no-burn decisions. Forecasted ozone concentrations above the PCL and wildfire smoke were also reasons for no-burn decisions.

A relatively dry spring and light snowpack caused irrigation operators to curtail water deliveries to many areas around the end of August this year, at the same time that we were forced to issue frequent no-burn decisions due to high fire danger or poor air quality from wildfire smoke or ozone. Some growers chose to implement other means of crop residue disposal in lieu of burning rather than wait for a suitable burn day so that they could work their fields while they still had irrigation water. Conditions improved in October, and to an extent in November, and DEQ issued several burn days that allowed some growers to burn.

By the time the wildfire smoke had cleared and the burn bans had been rescinded, many growers had already turned to alternative methods of crop residue disposal. Nonetheless, a relatively dry and mild fall provided an extended burn season for growers to continue to burn through October.

Table 15. Summary of burn decisions for the Southern Magic Valley Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Cassia	7	201	3	6	2	0	8
Twin Falls	57	110	8	28	19	0	12

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix M contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors and 8-hour ozone concentrations recorded and collected by the National Park Service for the Southern Magic Valley SMA. Only those weeks when burning occurred are included in Appendix M.

4.6.8 Northern Magic Valley Smoke Management Area

The Northern Magic Valley SMA includes southeast Elmore County; all of Gooding, Lincoln, Jerome, and Minidoka Counties; and the Blaine County panhandle (Figure 1). The primary crop burned was cereal grain stubble. Burning may occur year-round, but the peak burn periods are March–April and July–October. The Northern Magic Valley SMA has one PM_{2.5} air quality monitor located in the town of Paul. Additionally, a PM_{2.5} monitor located in Twin Falls (in the Southern Magic Valley SMA) and an ozone monitor operated by the National Park Service at Craters of the Moon National Monument are in the relevant vicinity of portions of this SMA and are used in the burn decision process.

The Northern Magic Valley SMA covers 2,542 square miles. The topography of the area is dominated by the Snake River valley in the south, foothills in the north, and lava beds in the northeast. The cooling effect of water in the Snake River and several reservoirs has the potential to affect smoke dispersion and transport.

4.6.8.1 Acres Burned

Table 16 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 14 shows the locations of fields burned during 2013: 102 fields totaling 6,538 acres were burned in this SMA, and 8 fields (8%) and 313 acres (5%) were located within 3 miles of an ISP. In 2013, 50 growers burned fields within the CRB program in the SMA.

Table 16. Summary of acres burned in the Northern Magic Valley Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
CRP	062	0	0
Cereal grain	428	193	148
Other crops	0	83	0
Subtotal	490	276	148
Fall^b			
CRP	193	150	0
Cereal grain	5,537	3,067	6,334
Other crops	231	112	56
Subtotal	5,961	3,329	6,390
Total	6,451	3,605	6,538

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

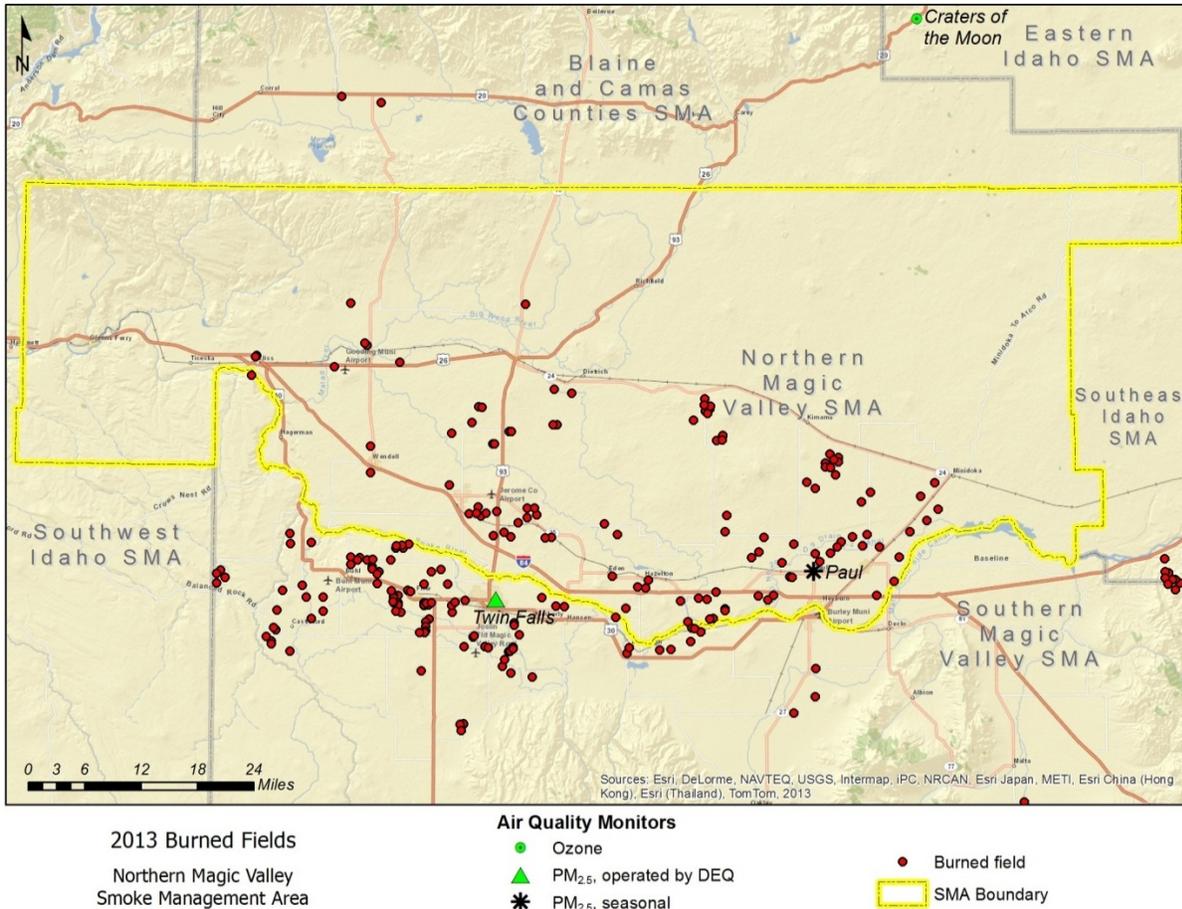


Figure 14. Location of 2013 burns in the Northern Magic Valley Smoke Management Area.

4.6.8.2 Daily Burn Decisions and Air Quality

Table 17 shows the summary of 2013 burn decisions for each county in the Northern Magic Valley SMA. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for no-burn decisions. Forecasted ozone concentrations above the PCL and wildfire smoke were also reasons for no-burn decisions.

There were many requests to burn in this SMA in August and the first two weeks of September, and despite some days with unsuitable conditions, DEQ found several good burn days that growers took advantage of. By the middle of September, all of the growers who had requested burn days had either accomplished their burning or used other means of crop residue disposal. No requests were received from the middle of September to early November when another grower requested a burn day. Despite this large gap in burn requests, the number of acres burned in this SMA during 2013 increased significantly from 2012 and was similar to the number of acres burned in 2011.

Table 17. Summary of burn decisions for the Northern Magic Valley Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Gooding	10	204	2	5	5	0	3
Jerome	16	186	4	9	2	0	9
Lincoln	10	193	2	11	8	0	6
Minidoka	12	201	3	3	0	0	6

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix N contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors and 8-hour ozone concentrations recorded and collected by the National Park Service for the Northern Magic Valley SMA. Only those weeks when burning occurred are included in Appendix N.

4.6.9 Southeast Idaho Smoke Management Area

The Southeast Idaho SMA includes Bingham, Power, Bannock, Caribou, Oneida, Franklin, and Bear Lake Counties (Figure 1). The primary crops burned in the SMA were cereal grain stubble and CRP. Burning may occur year-round, but the peak burn periods in the SMA are April–May and July–October. Ambient air quality monitors that measure PM_{2.5} are located in Pocatello and Soda Springs. Additionally, an ozone monitor operated by the National Park Service at Craters of the Moon National Monument and an ozone monitor operated by the Utah Department of Environmental Quality at Logan are in the relevant vicinity of portions of this SMA and are used in the burn decision process.

The Southeast Idaho SMA covers 9,428 square miles. The area is topographically complex with the exception of the relatively flat lowlands of the Snake River plain. The mountainous terrain, with its ridges and valleys, can strongly influence wind flow patterns and affect smoke dispersion. Two large water supply reservoirs in the region and the Snake River can also influence smoke dispersion and transport due to the cooling effect of the water.

4.6.9.1 Acres Burned

Table 18 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 15 shows the locations of fields burned during 2013: 106 fields totaling 9,441 acres were burned in this SMA, and 9 fields (8%) totaling 315 acres (3%) were located within 3 miles of an ISP. In 2013, 53 growers burned fields within the CRB program in the SMA.

Table 18. Summary of acres burned in the Southeast Idaho Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
CRP	2,216	3,716	1,786
Cereal grain	424	514	332
Other crops	0	199	244
Subtotal	2,640	4,430	2,362
Fall^b			
CRP	4,395	10,647	1,868
Cereal grain	6,152	4,142	5,011
Other crops	0	125	200
Subtotal	10,547	14,914	7,079
Total	13,187	19,344	9,441

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

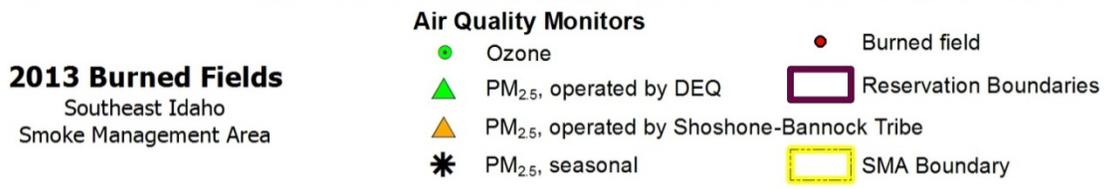
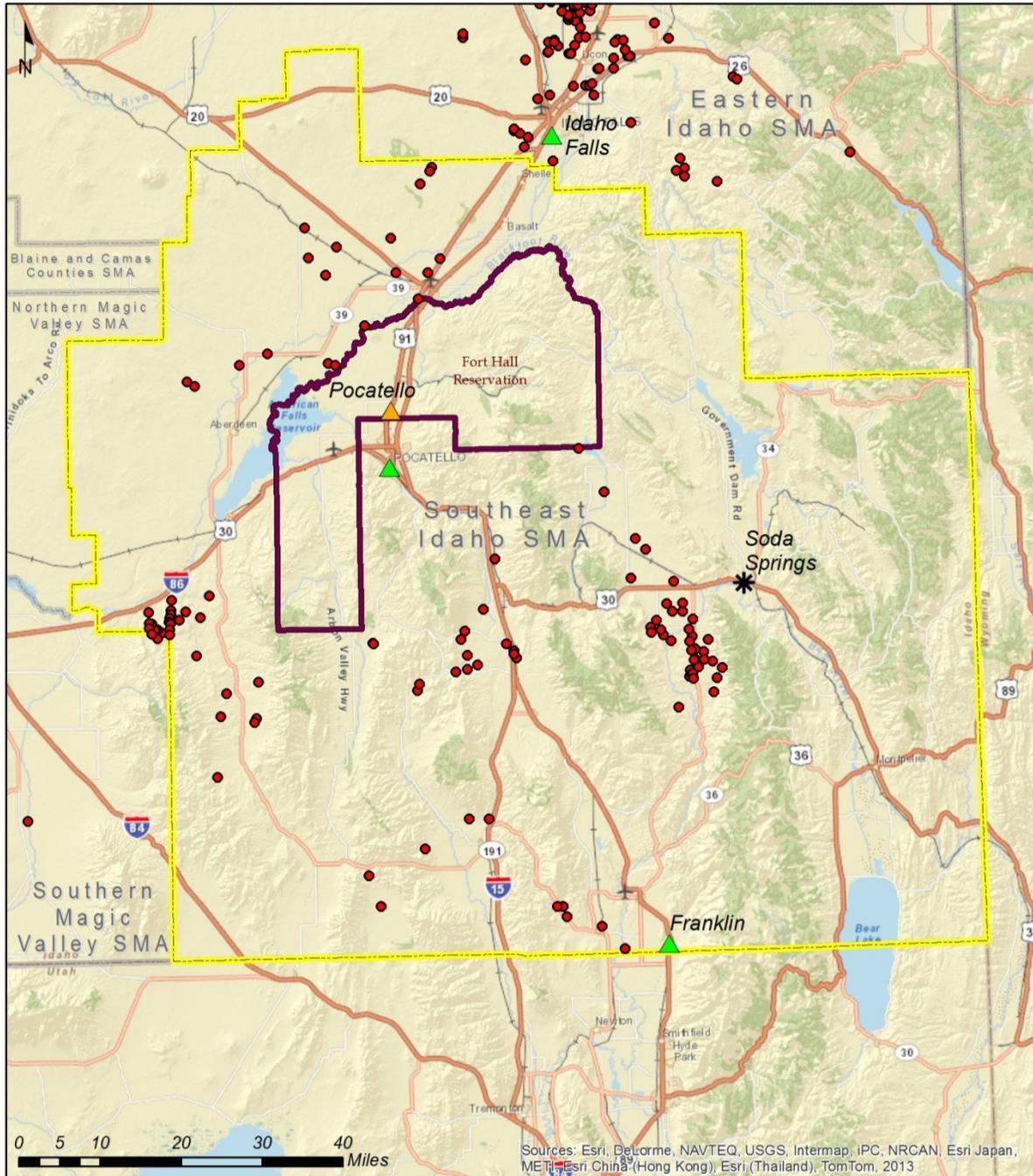


Figure 15. Location of 2013 burns in the Southeast Idaho Smoke Management Area.

4.6.9.2 Daily Burn Decisions and Air Quality

Table 19 shows the summary of 2013 burn decisions for each county in the Southeast Idaho SMA. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for a no-burn decision. Forecasted ozone concentrations above the PCL and wildfire smoke were also reasons for no-burn decisions. Other reasons for no-burn decisions were fire safety burn bans in Bannock and Caribou Counties and NWS-issued red-flag warnings.

Growers in this SMA struggled with high winds and wildfire smoke in August, periodic rains in September, and a combination of elevated fuel and soil moisture and diminished ventilation in October.

Table 19. Summary of burn decisions for the Southeast Idaho Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Bannock	16	194	1	8	9	0	3
Bear Lake	0	225	0	0	0	0	0
Bingham	14	192	2	12	6	0	3
Caribou	24	175	1	20	3	0	4
Franklin	4	212	0	7	7	0	2
Oneida	9	188	3	15	2	0	6
Power	17	174	2	21	9	0	7

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix O contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors and 8-hour ozone concentrations recorded and collected by the National Park Service and Utah DEQ for the Southeast Idaho SMA. Only those weeks when burning occurred are included in Appendix O.

4.6.10 Eastern Idaho Smoke Management Area

The Eastern Idaho SMA includes Clark, Fremont, Butte, Jefferson, Madison, Teton, and Bonneville Counties (Figure 1). Burning was mainly conducted in Jefferson and Bonneville Counties. The primary crop burned was cereal grain stubble. Burning may occur year-round, but the peak burn periods are April–May and August–October. Two ambient PM_{2.5} monitors are located in the Eastern Idaho SMA, one in Rexburg and one in Idaho Falls. Additionally, ozone monitors operated by the National Park Service at Craters of the Moon National Monument, Grand Teton National Park, and Yellowstone National Park are within the relevant vicinity of portions of this SMA and are used in the burn decision process.

The Eastern Idaho SMA covers 9,826 square miles. The topography of the area consists of mountains and valleys to the west, north, and east. The large central area of the SMA consists of the Snake River valley and is relatively flat. The cooling effect of water in the Snake River, as

well as several smaller waterways and reservoirs, has the potential to influence smoke dispersion and transport.

4.6.10.1 Acres Burned

Table 20 shows the acres burned during the spring and fall burn seasons for each crop type during the 2011–2013 burn seasons. Figure 16 shows the locations of fields burned during 2013: 124 fields totaling 7,365 acres were burned in the SMA, and 41 fields (33%) totaling 1,739 acres (24%) were located within 3 miles of an ISP. In 2013, 64 growers burned fields within the CRB program in the SMA.

Table 20. Summary of acres burned in the Eastern Idaho Smoke Management Area.

Burn season and crop type	Acres burned		
	2011	2012	2013
Spring^a			
CRP	0	339	1,205
Cereal grain	1,908	599	467
Other crops	0	0	53
Subtotal	1,908	938	1,725
Fall^b			
CRP	0	60	0
Cereal grain	11,709	8,076	5,640
Other crops	0	89	0
Subtotal	11,709	8,225	5,640
Total	13,617	9,163	7,365

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

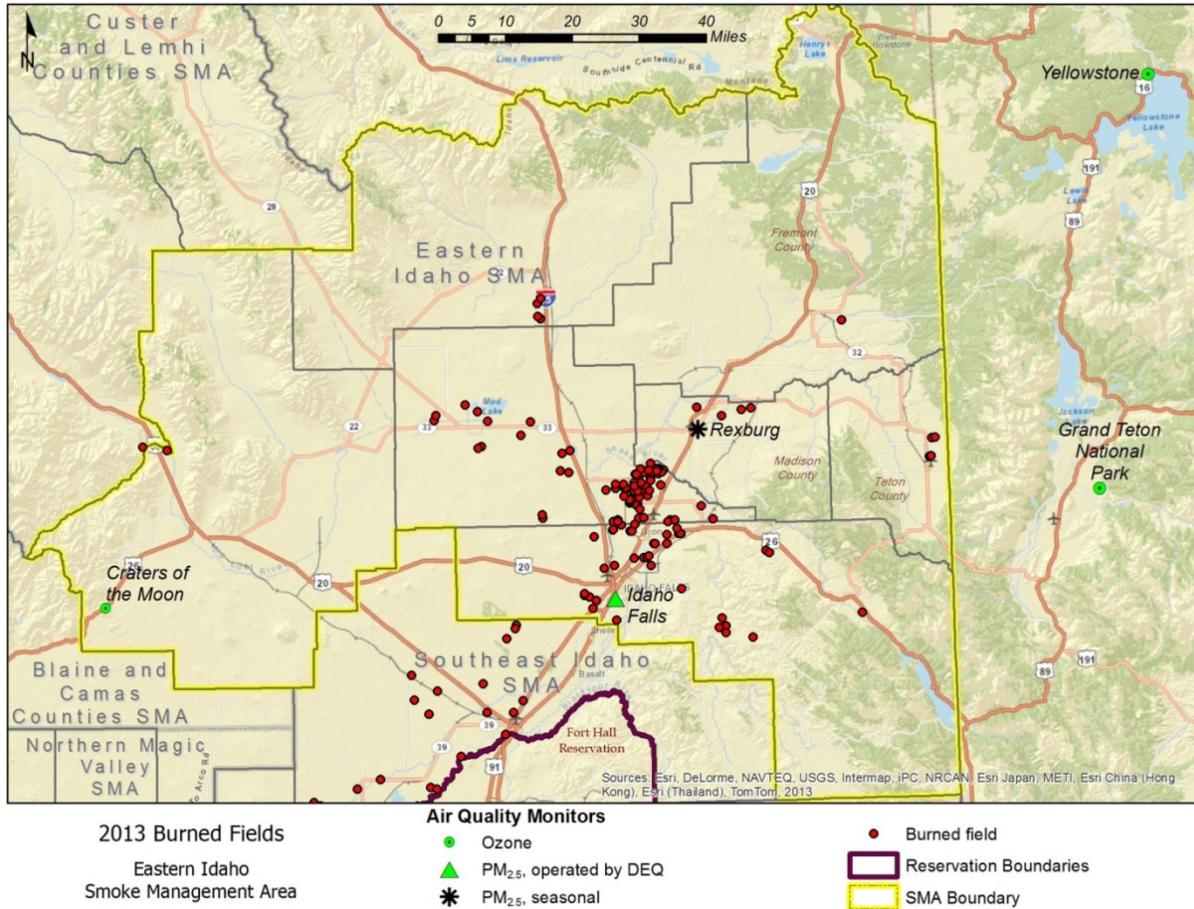


Figure 16. Location of 2013 burns in the Eastern Idaho Smoke Management Area.

4.6.10.2 Daily Burn Decisions and Air Quality

Table 21 shows the summary of 2013 burn decisions for each county in the Eastern Idaho SMA. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for a no-burn decision. Forecasted ozone concentrations above the PCL and wildfire smoke were also reasons for no-burn decisions. Other reasons for no-burn decisions were NWS-issued red-flag warnings.

The primary crop residue burning season of August and September was significantly hampered first by many days with unsuitably strong winds and then by periodic precipitation that resulted in elevated fuel and soil moisture levels. By the time conditions had improved, many growers had already turned to alternative methods of crop residue disposal. Nonetheless, a relatively dry and mild fall provided an extended burn season for growers to continue to burn through October.

Table 21. Summary of burn decisions for the Eastern Idaho Smoke Management Area.

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Butte	4	220	1	0	0	0	0
Clark	4	217	1	0	0	0	3
Fremont	1	224	0	0	0	0	0
Jefferson	27	173	2	17	7	0	3
Madison	6	190	2	19	7	0	3
Bonneville	27	166	0	21	14	0	3
Teton	3	221	0	1	0	0	0

a. This summary includes all burn decisions issued through November 30, 2013. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include NWS-issued red-flag warnings.

Appendix P contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors and 8-hour ozone concentrations recorded and collected by the National Park Service for the Eastern Idaho SMA. Only those weeks when burning occurred are included in Appendix P.

5. Recommendations to the CRB Advisory Committee and the Department's Decision

Subsequent to the annual CRB program analysis, DEQ concluded that no improvements were needed at this time to protect public health or improve the effectiveness and efficiency of the program. However, the CRB Advisory Committee made several recommendations to DEQ. The following recommended improvements were approved by the DEQ director and will be implemented in 2014:

- Ozone in the Coeur d'Alene Area—Evaluate ozone and weather parameters used for the burn decisions in the Coeur d'Alene area on all days in summer and fall to evaluate the potential impact the ozone program concentration limit may have on burning on the Rathdrum Prairie.
- DEQ Public Website—Develop an alternative method to issue burn approvals and notify the public if the DEQ public website is down. The alternative method must be in accordance with Idaho statute, rules, and the State Implementation Plan.
- CRB Advisory Committee Members—Develop an introductory packet for new CRB Advisory Committee members.

DEQ determined that the following recommendations from the CRB Advisory Committee are part of implementing the CRB program and, therefore, will not be tracked as recommendations.

- Include the new process for evaluating when an ISP is repeatedly impacted (i.e., when enhanced documentation is triggered) in the summary of adverse impacts to ISPs in the annual report.

- Keep moving forward with pilot project in Boundary County and improving burn decisions.
- Continue to improve communication between smoke coordinator, grower, and office staff (e.g., when burning is shut down, increasing acres on a given burn day based on field staff observation, increase flexibility on timing of final burn approval).
- Continue to use burn day analysis on good burn days.
- Continue to evaluate monitoring network and look for opportunities to increase the number of PM_{2.5} and ozone monitors in Idaho for use in CRB program.
- Continue to evaluate staffing needs of CRB program.

The committee requested DEQ coordinate a conference call to summarize the information that has been presented about ozone and the CRB program. The committee also requested DEQ coordinate a second CRB Advisory Committee meeting after the conference call to discuss a path forward on the ozone issue. A summary of this second meeting will be provided on the DEQ website, which will include any additional recommendations that may result from the meeting.

6. Conclusions

Overall, DEQ considered the 2013 CRB season a success. Although DEQ air quality monitors recorded values above the CRB PCLs for 8-hour ozone and 1-hour and 24-hour average PM_{2.5}, none of these occurrences was likely a direct result of DEQ-approved crop residue burning. DEQ determined that there were no instances where DEQ approved crop residue burning caused adverse impacts to ISPs.