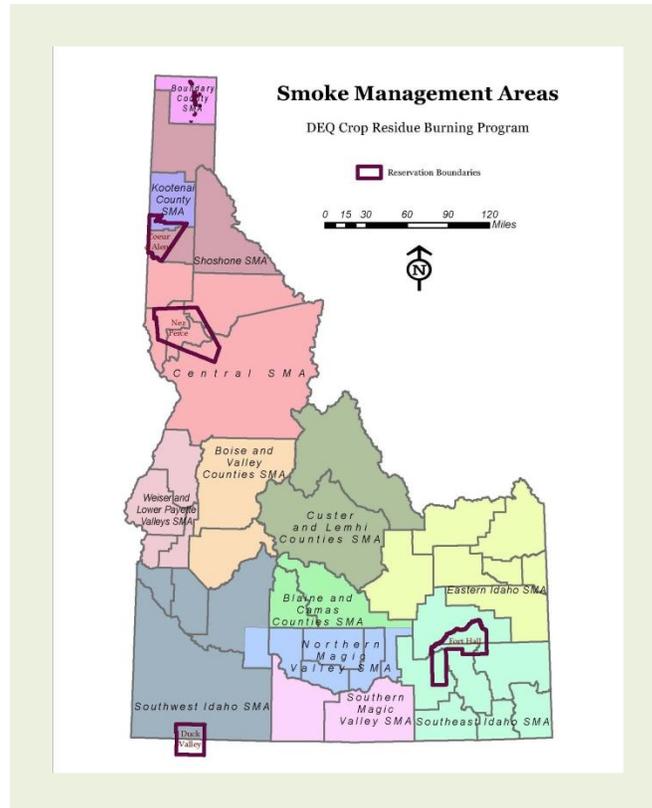


Crop Residue Burning Program 2012 Annual Report



**State of Idaho
Department of Environmental Quality**

June 2013

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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 2012 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 2012 burn season and an analysis of the 2012 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

Weather-related factors, such as a cool and wet spring or periodic wetting rains during September and October, are typically the major issue during the crop residue burning season. To some extent, that remained true for the 2012 burn season with a cool, wet spring in northern Idaho and occasional wetting rains in southern Idaho during the fall. However, the big complication this year was wildfire and associated smoke.

The spring and early summer months in southern and central Idaho were warm and relatively dry leading into July and August, which saw sustained above-normal temperatures and little to no precipitation. Lightning strikes, and in some cases human sources, sparked fires across southern and central Idaho during late July and early August. Wildfires also burned in nearby states, including Washington, Oregon, California, and Nevada, with the smoke from these fires often drifting into Idaho airsheds. Some wildfires grew very large and burned for weeks, generating large amounts of smoke and making it inappropriate to approve crop residue burning. Later in the summer, with the southern and central Idaho wildfires still burning strong, northern Idaho began to experience significant wildfire smoke also. The wildfire smoke significantly hindered crop residue burn approval across the state during August and September.

Additional complications this year, especially in southern Idaho, were fire safety burn bans 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 burn ban across southern and south-central Idaho. The IDL ban allowed for crop residue burning to proceed after each requested field had been reviewed by IDL and had been deemed to be exempt from the ban (all fields requested by DEQ were deemed to be exempt). The effect of the IDL ban was generally about a one week delay for burn approvals. DEQ abided by all fire safety burn bans by

approving no crop residue burning for locations under a fire safety burn ban, with the exception of the fields that were exempted by IDL.

Statewide, 67,416 acres were burned under the CRB program in 2012, which was a slight increase over the amount burned in 2011 (65,362 acres). For most of the SMAs across the state, the number of acres burned during 2012 was similar to, or lower than, the number of acres burned in 2011. The most notable difference for 2012 was a substantial increase in acres burned in the Boundary County, Southern Magic Valley, and Southeast Idaho SMAs, which saw increases in acres burned of 80%, 41%, and 47%, respectively.

DEQ believes that northern Idaho growers were initially more familiar with the CRB program from previous years of operation under the Idaho State Department of Agriculture, whereas southern Idaho growers were less familiar with operating under a regulated CRB program. As a result, the acres burned in the northern Idaho SMAs have remained fairly stable, while acres burned in the southern Idaho SMAs increased dramatically at the start of the program and may continue to slightly increase as a result of improved grower compliance with the CRB program requirements.

Evaluation of Air Quality

DEQ operates the CRB program under guidelines and procedures designed to protect public health, avoid causing adverse impacts to ISPs, 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 2012 burn season showed that approved crop residue burning did cause a measured air pollutant concentration above the 1-hour program-defined concentration limit and potentially did cause an adverse impact to an ISP. The evaluation also showed that approved crop residue burning did not create a hazard for travel on public roadways.

Recommended Improvements

Subsequent to the annual CRB program analysis, DEQ concluded that no improvements were needed at this time to help the program operate more effectively and efficiently without sacrificing the protection of human health. However, the CRB Advisory Committee made several recommendations to DEQ. The recommended improvements that were approved by the director are listed below:

- **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.
- **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.
- **Boundary County**—Execute a pilot project in Boundary County to conduct burning under high pressure events, when temperatures are in the range of 80 °–90 °F.
- **Compliance and enforcement**—In the next annual report, clarify the relationship between compliance assistance and enforcement.
- **Monitoring network**—Evaluate the existing 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

US Environmental Protection Agency to evaluate the usefulness of new portable PM_{2.5} (handheld) monitors.

- **Institutions with sensitive populations (ISPs)**—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 µg/m³) on marginal ventilation days.
- **Critical fields and/or areas**—On critical fields and/or areas, execute research to characterize optimum burn conditions from good burn experiences.

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1. Introduction

This report reviews and analyzes the Idaho Department of Environmental Quality's (DEQ's) crop residue burning (CRB) program for the 2012 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 2012, outreach efforts over the past year, a detailed analysis of the 2012 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 2012 burn season. For more in-depth information on the CRB program design, please refer to the 2008 annual report available at <http://www.deq.idaho.gov/air-quality/burning/crop-residue-burning.aspx>.

2. Program Updates

In the 2011 annual report, and at the CRB Advisory Committee meetings held in March and April 2012, DEQ recommended two updates to the CRB program: modify the restriction of burning on weekends and holidays and modify the ozone PCL. Following the Advisory Committee meetings, DEQ decided not to move forward with the two recommendations based on input from the Advisory Committee members and a lack of adequate support to proceed.

DEQ did incorporate a procedural clarification into the program. This clarification improves the evaluation of whether an adverse impact to an ISP occurred. For this evaluation, DEQ now looks at monitors at or near an ISP when DEQ-approved burning was conducted and the 1-hour average PM_{2.5} concentration reached a level of 26.25 µg/m³ or higher at the monitor. The days when this outcome occurred are discussed in this report in section 4.1.2. The CRB program operating guide will be revised to incorporate this clarification.

3. Outreach for the 2012 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 2012, 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 2012:

- ***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 phone, 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.

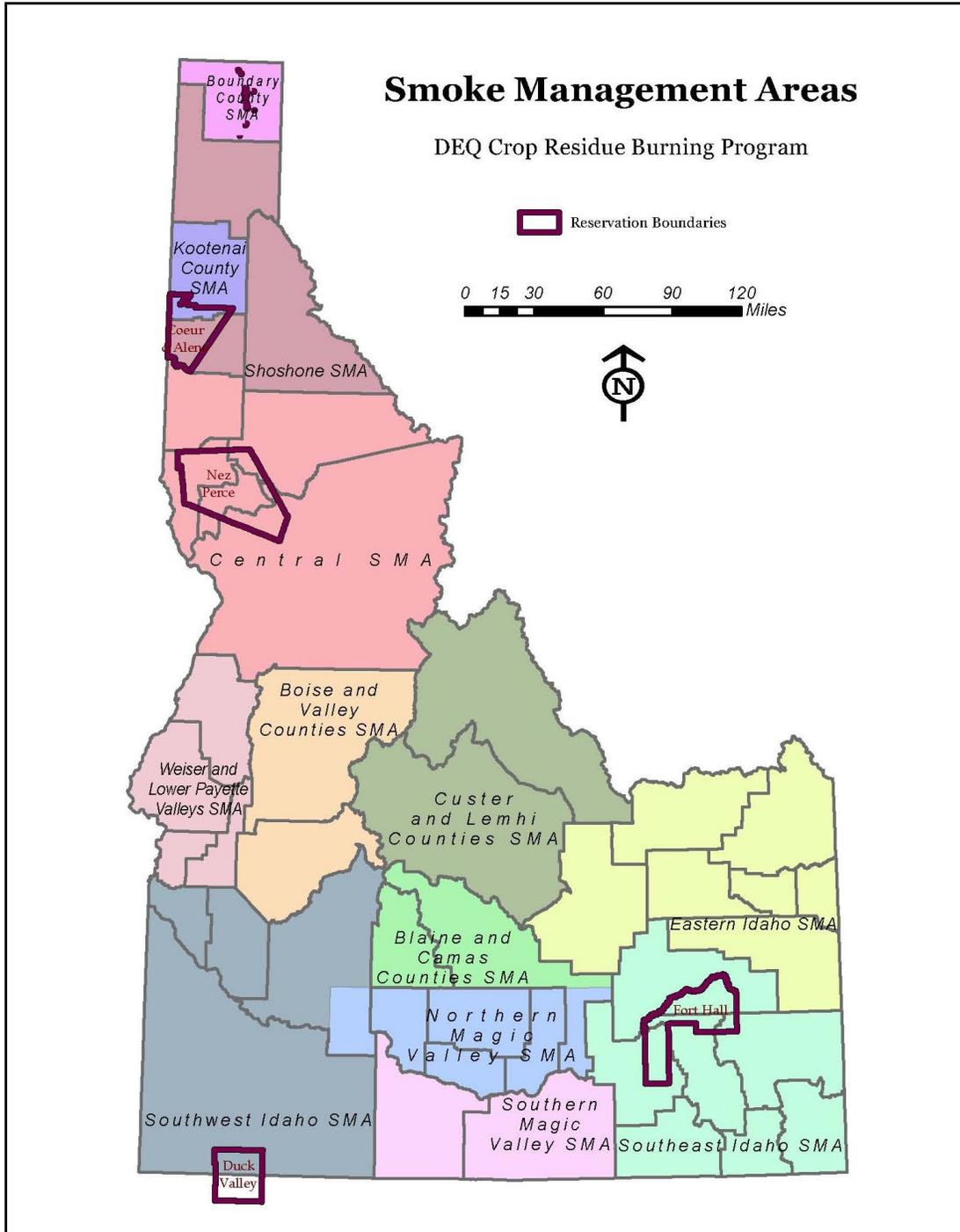


Figure 1. Idaho smoke management areas.

The SMA summaries include area geography descriptions, acres burned, and a summary of daily burn decisions and air quality conditions in 2012. Appendix A includes a daily summary of burn decisions from July through October, the peak burning period, for the northern SMAs (Tables A1–A4) and southern SMAs (Tables A5–A8). No crop residue burning was conducted in Lewis County in the Central SMA, the Shoshone SMA, or the Boise and Valley Counties SMA during 2012; 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 three 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 2012, 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) and ozone forecast models from the National Weather Service (NWS) and the University of Washington. This data provided sufficient coverage of southern 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.

The days discussed below are those when air quality monitors recorded concentrations above a PCL and crop residue burning was conducted within the same SMA. The Nez Perce Tribe, Kootenai Tribe of Idaho, Washington Department of Ecology, 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 since they are not owned or operated by DEQ. In addition, the DEQ monitor located near Porthill, Idaho, is actually across the United States border in Canada on a farm. No ISPs are located in Porthill; therefore monitoring data are not evaluated for impacts.

Ozone concentrations above the program concentration limit in southern Idaho

There were many days in southern Idaho SMAs when DEQ forecasted ozone concentrations 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 them are not even within Idaho), 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. Also, because of the large distance from the monitors to the burn locations, DEQ is unable to determine that the ozone concentration at a monitor is representative of the ozone concentration at a burn location.

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 or that DEQ approved any crop residue burning at any location that was above the PCL for ozone.

April 9—1-hour average PM_{2.5} concentrations in the Custer and Lemhi Counties SMA

April 9 was a burn day in the Custer and Lemhi Counties SMA, where 120 acres were burned at one field in southeastern Custer County. The PM_{2.5} monitor in Salmon recorded a 1-hour average concentration of 99 µg/m³ for the hour ending at 3:00 p.m. The monitor had been shut down for 2 days and the 3:00 p.m. reading was the first reading after being restarted. After 2 hours of operation, the monitor stabilized into normal readings with concentrations in the range of 10–20 µg/m³. The 3:00 p.m. reading did not meet the parameters to be invalidated but it may be an

effect of the monitor stabilizing after having been shut down, and the reading may not accurately represent the actual PM_{2.5} concentrations.

April 10—1-hour average PM_{2.5} concentrations in the Eastern Idaho SMA

April 10 was a burn day in the Eastern Idaho SMA, where 135 acres were burned at two fields in Butte County. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 112 µg/m³ for the hour ending at 11:00 p.m. The two approved burns were approximately 60 miles to the west-northwest of Idaho Falls. The wind on April 10 was out of the south and southwest. The Idaho Falls monitor had several hours of readings that were deemed invalid this day, and the 11:00 p.m. reading was the first reading not invalidated following the hours of invalid readings. For these monitors, it is typical that the first few readings after invalid data are not accurate and do not reflect the actual PM_{2.5} concentration. It is unknown whether the 11:00 p.m. reading was accurate, and if so, what the source of the elevated concentration may have been, but it was not the approved crop residue burning.

October 3—1-hour average PM_{2.5} concentrations in the Eastern Idaho SMA

October 3 was a burn day in the Eastern Idaho SMA, where 34 acres were burned about 8 miles southwest of Rexburg, 20 acres were burned near Roberts (about 20 miles west of Rexburg), and 251 acres were burned near Rigby (about 15 miles southwest of Rexburg). The PM_{2.5} monitor at Madison Middle School in Rexburg recorded a 1-hour average concentration of 78.4 µg/m³ for the hour ending at 11:00 a.m. A DEQ field coordinator was at the burn near Roberts and observed that high wind speeds were preventing the smoke from lifting and that the smoke was drifting near ground level toward the south. Because of the poor smoke dispersion, the grower stopped the burn at 20 acres around 12:30 p.m.

Another DEQ employee went to Rexburg to investigate the elevated PM_{2.5} concentrations being recorded by the monitor at the school. He discovered that a large straw bale fire was burning just 0.5 mile to the north of the school. The DEQ employee observed that breezy winds from the north were carrying smoke from the straw bale fire along the ground directly toward the school. There was no approved crop residue burning upwind from the monitor and DEQ determined that the cause of the elevated concentrations was the straw bale fire. Enhanced documentation was completed.

October 12—1-hour average PM 2.5 concentration in the Kootenai County SMA

October 12 was a burn day in the Kootenai County SMA, where 170 acres were burned at two fields in Kootenai County. The Garwood monitor recorded a 1-hour average concentration of 93.0 µg/m³ for the hour ending at 2:00 p.m. DEQ staff observed the burns and noted that the plume collapsed three-quarters of the way through the burn. Surface winds were from the southwest. Based on these concentrations and staff observations, enhanced documentation was completed. The DEQ field staff contacted Garwood Elementary School and were informed that students were on recess at the time of the smoke impact. A teacher led the students inside and no health effects were reported. Field staff gave the school DEQ contact information and requested to be contacted if there were any complaints regarding smoke at the school. No additional smoke complications were reported by the school. Based on the timing and magnitude of the smoke impact, DEQ determined that an adverse impact to the ISP possibly occurred. For more information on the meteorological conditions in the Kootenai County SMA on this day, see Appendix C.

October 18—24-hour average $PM_{2.5}$ concentration in the Central SMA

October 18 was a burn day in the Central SMA, where 217 acres were burned at three fields in Latah County. The Moscow monitor recorded 24-hour average concentrations of $26.4 \mu\text{g}/\text{m}^3$ for the hour ending at 2:00 p.m., $27.1 \mu\text{g}/\text{m}^3$ for 3:00 p.m., $27.3 \mu\text{g}/\text{m}^3$ for 4:00 p.m., $27.7 \mu\text{g}/\text{m}^3$ for 5:00 p.m., $28.3 \mu\text{g}/\text{m}^3$ for 6:00 p.m., $29.8 \mu\text{g}/\text{m}^3$ for 7:00 p.m., $31.3 \mu\text{g}/\text{m}^3$ for 8:00 p.m., $32.5 \mu\text{g}/\text{m}^3$ for 9:00 p.m., and $33.4 \mu\text{g}/\text{m}^3$ for 10:00 p.m. Open burning conducted by another agency occurred in the area. The closest DEQ field burn to the Moscow monitor was 37 miles to the north. DEQ staff observed the burns and noted that surface winds were from the southeast. The wind that day would not have carried the smoke toward the Moscow monitor. The source of the elevated concentrations was prescribed burning by other agencies.

October 19—1-hour average $PM_{2.5}$ concentrations in the Southwest Idaho SMA

October 19 was a burn day in the Southwest Idaho SMA, where 200 acres were burned at one field in Elmore County. The $PM_{2.5}$ monitor in Nampa recorded a 1-hour average concentration of $116.2 \mu\text{g}/\text{m}^3$ for the hour ending at 10:00 a.m. The approved burn was located approximately 65 miles southeast of Nampa and the burn was started at 2:00 p.m. The source of the elevated concentration at the Nampa monitor is unknown, but it was not the approved crop residue burning, which was not conducted until several hours after the elevated concentration was recorded. Preburn enhanced documentation should have been completed but the elevated concentration had not shown up during the burn decision process and all DEQ CRB staff were in the field during the burn window.

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, see section 2). 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 $20 \mu\text{g}/\text{m}^3$ (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 $26.25 \mu\text{g}/\text{m}^3$:
 - 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

During the 2012 burn season, enhanced documentation, discussed below, was completed to evaluate whether an adverse impact to an ISP occurred. Also 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 4—Pocatello Monitor in the Southeast Idaho SMA

April 4 was a burn day in the Southeast Idaho SMA, where 275 acres were burned at three fields in Oneida, Caribou, and Bannock Counties. The PM_{2.5} monitor in Pocatello recorded a 1-hour average concentration of 42.3 µg/m³ for the hour ending at 11:00 a.m. The three approved burns ranged from 25 to 50 miles distance from Pocatello and were located to the east and south of Pocatello. The burns were all approved to start at 11:00 a.m. The wind on April 4 was from the north; thus, smoke from the approved burns would not have drifted toward Pocatello. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning.

April 11—Bonners Ferry Monitor in Boundary County SMA

April 11 was a burn day in the Boundary County SMA, where 234 acres were burned at two fields in Boundary County. The Bonners Ferry monitor recorded 1-hour average concentrations of 27.7 µg/m³ at 3:00 p.m. and 23.1 µg/m³ at 4:00 p.m. Surface and transport winds were forecasted from the north. DEQ staff observed the burns and noted a northerly component to transport winds. Enhanced documentation was not completed. DEQ staff contacted the Kootenai Tribe of Idaho Health Clinic, which did not report adverse health effects. DEQ could not isolate the source of the elevated concentrations in the airshed.

April 11—Pocatello Monitor in the Southeast Idaho SMA

April 11 was a burn day in the Southeast Idaho SMA, where 90 acres were burned at one field in Power County and 3 acres were burned at two fields in Bannock County. The PM_{2.5} monitor in Pocatello recorded a 1-hour average concentration of 30.4 µg/m³ for the hour ending at 12:00 p.m. The approved burn in Power County was approximately 25 miles southwest of Pocatello and the two Bannock County burns were approximately 25 miles south of Pocatello. The burns were all approved to start at 10:30 a.m. The wind was gusty and from the south, becoming southwest late in the day; thus, smoke from the 3 acres approved in Bannock County may have drifted toward Pocatello. However, the small amount of smoke generated from burning 3 acres would have been fully dispersed well before reaching Pocatello. The source of the elevated PM_{2.5} concentrations is unknown, but it was not the approved crop residue burning.

April 23—Bonners Ferry and Copeland Monitors in Boundary County SMA

April 23 was a burn day in the Boundary County SMA, where 1,039 acres were burned at eight fields in Boundary County. The Bonners Ferry monitor recorded 1-hour average concentrations of 41.8 µg/m³ for the hour ending at 1:00 p.m., 26.3 µg/m³ at 2:00 p.m., 41.4 µg/m³ at 3:00 p.m., and 39.0 µg/m³ at 4:00 p.m. The Copeland monitor recorded 1-hour average concentrations of 26.6 µg/m³ for the hour ending at 1:00 p.m., 51.7 µg/m³ at 2:00 p.m., and 22.0 µg/m³ at 4:00 p.m. Surface winds were forecasted with an easterly component and transport winds with a southwest component. DEQ staff observed the burns and noted good smoke dispersion. After field burning was completed smoke began falling back to the ground. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. DEQ staff contacted the following ISPs: Kootenai Tribe of Idaho Health Clinic, Mt. Hall School, and Boundary County Hospital. The ISPs did not report any adverse health effects.

May 21—Pocatello Monitor in the Southeast Idaho SMA

May 21 was a burn day in the Southeast Idaho SMA, where 457 acres were burned at three fields in Oneida County. The PM_{2.5} monitor in Pocatello recorded a 1-hour average concentration of 42.2 µg/m³ for the hour ending at 1:00 p.m. The three approved burns were each approximately 40 miles south of Pocatello. Two of the burns were approved to start at 11:00 a.m., while the third burn was approved to start at 12:00 p.m. The wind was from the south; thus, smoke from the approved burns may have drifted toward Pocatello. However, it would have taken a minimum of 5 hours for any smoke to reach Pocatello, and the measured concentration occurred sooner than that. Additionally, after having drifted 40 miles, the smoke would have been completely dispersed. The source of the elevated PM_{2.5} concentration is unknown, but it was not the approved crop residue burning.

August 22—Twin Falls Monitor in the Southern Magic Valley SMA

August 22 was a burn day in the Southern Magic Valley SMA, where 2 acres were burned at one field in western Twin Falls County. It was also a burn day in the Northern Magic Valley SMA, where 125 acres were burned at one field in Jerome County. The PM_{2.5} monitor in Twin Falls recorded a 1-hour average concentration of 32.8 µg/m³ for the hour ending at 7:00 p.m. The approved burn in Twin Falls County was approximately 20 miles west of the Twin Falls monitor, and the approved burn in Jerome County was approximately 10 miles north of the Twin Falls monitor. Winds were from the west through southwest; thus, smoke from the Jerome County burn would not have drifted toward Twin Falls. The small amount of smoke from

the 2-acre burn in western Twin Falls County would not have had an effect on the monitor. Portions of southern Idaho were being affected by wildfire smoke, which was the likely source of the elevated PM_{2.5} concentration.

August 22—Grangeville Monitor in the Central SMA

August 22 was a burn day in the Central SMA, where 69 acres were burned at two fields in Idaho County. The Grangeville monitor (about 2.7 miles east of the field) recorded 1-hour average concentrations of 22.1 µg/m³ for the hour ending at 2:00 p.m., 27.6 µg/m³ at 3:00 p.m., and 35.5 µg/m³ at 4:00 p.m. Open burning by another agency occurred to the north and northeast of the ISPs and monitor on this day. DEQ staff observed the burns and noted that DEQ-authorized burns were completely out at 2:05 p.m., while other agency burning continued. Surface winds were from the northwest, north, and northeast. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Grangeville Elementary/Middle School, Grangeville High School, Meadowlark Homes, Grangeville Health and Rehabilitation Center, and Syringa General Hospital. During the evaluation, DEQ determined that both schools were out of session and no one was impacted at the ISPs. DEQ concluded that the elevated concentrations were not caused by DEQ-approved crop residue burning but were likely caused by the other burning in the airshed.

August 28—Athol Elementary School and Garwood Elementary School in the Kootenai County SMA

August 28 was a burn day in the Kootenai County SMA, where 220 acres were burned at one field in Kootenai County. The Garwood monitor recorded a 1-hour average concentration of 39.1 µg/m³ for the hour ending at 2:00 p.m. The Athol monitor recorded 1-hour average concentrations of 30.2 µg/m³ at 2:00 p.m., 53.2 µg/m³ at 3:00 p.m., and 21.6 µg/m³ at 4:00 p.m. DEQ staff observed the burns and noted heavy smoke production from the field. Very heavy ground smoke drifted across the roadway, and smoke that initially lifted dropped back to ground level. Surface winds were from the southwest. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Athol Elementary School, Garwood Elementary School, and Betty Kiefer Elementary School. School was out of session, so no students were impacted. Employees at Garwood Elementary could smell the smoke, but no one reported adverse health effects.

August 29—Grangeville Monitor in the Central SMA

August 29 was a burn day in the Central SMA, where 327 acres were burned at four fields in Idaho County. The Grangeville monitor recorded 1-hour average concentrations of 22.1 µg/m³ for the hour ending at 3:00 p.m. and 44.2 µg/m³ at 4:00 p.m. DEQ staff observed the burns and noted at 2:51 p.m. that smoke from other agency burning and wildfires was entering the area. Winds that day were from the north through north-northeast. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Grangeville Elementary/Middle School, Grangeville High School, Meadowlark Homes, Grangeville Health and Rehabilitation Center, and Syringa General Hospital. During the evaluation, DEQ determined that both schools were out of session and no one was impacted at the ISPs. DEQ could not isolate the source of the elevated concentrations in the airshed.

September 4—Homedale Middle School in the Southwest Idaho SMA

September 4 was a burn day in the Southwest Idaho SMA, where 13 acres were burned at one field near Homedale. A DEQ field coordinator was onsite and observed winds from the northeast prior to the start of the burn and during the beginning of the burn. While the burn was underway, the wind briefly shifted and was blowing from the northwest causing smoke to drift toward Homedale Middle School (located 0.8 miles south of the field) for approximately 3 minutes. The field coordinator went to the school and observed no visible smoke but did detect a faint smoke odor in the air. The wind direction had returned to coming from the northeast and the burn was completed with no further issues. The field coordinator interviewed the school authorities and found that there were no complaints or illnesses associated with the event. Enhanced documentation was completed. DEQ concluded that an adverse impact did not occur.

September 5—Madison Middle School in the Eastern Idaho SMA

September 5 was a burn day in the Eastern Idaho SMA, where 593 acres were burned at nine fields in Jefferson County. The PM_{2.5} monitor at Madison Middle School in Rexburg recorded 1-hour average concentrations of 40.0 µg/m³ and 34.7 µg/m³ for the hours ending at 1:00 p.m. and 2:00 p.m., respectively. Upon noticing the elevated concentrations, a DEQ field coordinator was sent to the school to investigate. The coordinator arrived at the school at 2:40 p.m. and observed noticeable smoke drifting into the Rexburg area from the southwest. Several approved crop residue burns were located about 7–9 miles southwest of the school. The coordinator went to the burn locations but the burning had finished and the coordinator was unable to determine whether any of these burns was the source of the smoke at the school. Another possible source of smoke was the ongoing wildfires. The PM_{2.5} concentrations measured by the monitor quickly returned to normal levels, with a reading of 5.4 µg/m³ for the hour ending at 4:00 p.m. The coordinator contacted the school principal and was told there were no complaints or illnesses at the school. Enhanced documentation was completed. DEQ concluded that an adverse impact did not occur.

September 6—Grangeville Monitor in the Central SMA

September 6 was a burn day in the Central SMA, where 756 acres were burned at eight fields in Idaho County. The Grangeville monitor recorded 1-hour average concentrations of 33.5 µg/m³ for the hour ending at 3:00 p.m. and 28.4 µg/m³ at 4:00 p.m. Open burning by another agency occurred to the north and northeast of Grangeville. DEQ staff observed the DEQ burns and noted that crop residue burning was complete at 2:05 p.m., while other agency burning continued. Surface winds were from the north and northeast. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Grangeville Elementary/Middle School, Grangeville High School, Meadowlark Homes, Grangeville Health and Rehabilitation Center, and Syringa General Hospital. During the evaluation, DEQ determined that no one was impacted at the ISPs, although Syringa General Hospital admitted one patient from White Bird, Idaho (17 miles southwest of Grangeville) complaining of problems due to smoke, dust, and dryness. DEQ concluded that the elevated concentrations were not caused by DEQ-approved crop residue burning, but were likely caused by another agency burning and/or wildfire smoke in the airshed.

September 11—Grangeville Monitor in the Central SMA

September 11 was a burn day in the Central SMA, where 1,008 acres were burned at eleven fields in Idaho County. The Grangeville monitor recorded a 1-hour average concentration of $28.2 \mu\text{g}/\text{m}^3$ for the hour ending at 1:00 p.m. DEQ staff observed the burns and ceased burning north of Grangeville at 1:12 p.m. Surface winds were from the north and northeast. Open burning conducted by another agency occurred in the area and wildfires were ongoing in the surrounding region. Based on the measured $\text{PM}_{2.5}$ concentration and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Grangeville Elementary/Middle School, Grangeville High School, Meadowlark Homes, Grangeville Health and Rehabilitation Center, and Syringa General Hospital. During the evaluation, DEQ determined that no one was impacted at the ISPs. DEQ could not isolate the source of the elevated concentrations in the airshed.

September 12—Twin Falls Monitor in the Southern Magic Valley SMA

September 12 was not a burn day in the Southern Magic Valley SMA, but it was a burn day in the Northern Magic Valley SMA, where 12 acres were burned at one field in Jerome County. The $\text{PM}_{2.5}$ monitor in Twin Falls recorded a 1-hour average concentration of $28.8 \mu\text{g}/\text{m}^3$ for the hour ending at 8:00 p.m. The approved burn was approximately 10 miles north of Twin Falls. Winds were from the west through southwest; thus, smoke from the approved burn would not have drifted toward Twin Falls. Portions of southern Idaho were being affected by wildfire smoke, and this was the likely source of the elevated $\text{PM}_{2.5}$ concentration.

September 12—Meridian Monitor in the Southwest Idaho SMA

September 12 was a burn day in the Southwest Idaho SMA, where 13 acres were burned at one field near Caldwell, about 20 miles west of Meridian, and 15 acres were burned at one field near Parma, about 30 miles west-northwest of Meridian. The $\text{PM}_{2.5}$ monitor in Meridian recorded a 1-hour average concentration of $62.5 \mu\text{g}/\text{m}^3$ for the hour ending at 2:00 p.m. A DEQ field coordinator was at the field near Parma and noted that visibility was good and there was no noticeable smoke in the air other than the smoke from the approved crop residue burn. Winds at the field during the burn were from the west. The coordinator noted that the field burned well and the smoke plume lifted to a height of about 5,000 feet and dispersed quickly. Smoke from wildfires to the north and northeast of the Treasure Valley had drifted into the Boise and Meridian area during the day. The wildfire smoke, which remained densest around the Boise and Meridian areas, is believed to be the source of the elevated concentrations at the Meridian monitor. The Nampa monitor, which is closer to the fields that were burned, registered only a slight increase in $\text{PM}_{2.5}$ levels as the wildfire smoke did not extend that far to the southwest. Enhanced documentation was completed.

September 12—Idaho Falls Monitor in the Eastern Idaho SMA

September 12 was a burn day in the Eastern Idaho SMA, where 188 acres were burned at five fields in Jefferson County. The $\text{PM}_{2.5}$ monitor in Idaho Falls recorded a 1-hour average concentration of $36.6 \mu\text{g}/\text{m}^3$ for the hour ending at 8:00 p.m. The approved burns ranged from approximately 10 to 20 miles north-northeast of the Idaho Falls monitor. Winds were from the southwest; thus, smoke from the burns would not have drifted toward the Idaho Falls monitor. Portions of southern Idaho were being affected by wildfire smoke, and this may have been the source of the elevated $\text{PM}_{2.5}$ concentration.

September 13—Twin Falls Monitor in the Southern Magic Valley SMA

September 13 was not a burn day in the Southern Magic Valley SMA, but it was a burn day in the Northern Magic Valley SMA, where 70 acres were burned at one field in Minidoka County. The PM_{2.5} monitor in Twin Falls recorded a 1-hour average concentration of 34.8 µg/m³ for the hour ending at 8:00 p.m. The approved burn was approximately 35 miles east of Twin Falls. Winds were from the east through northeast; thus, DEQ cannot rule out that smoke from the approved burn did not reach the Twin Falls monitor. However, portions of southern Idaho were being affected by wildfire smoke, and this was the likely source of the elevated PM_{2.5} concentration.

September 26—Idaho Falls Monitor in the Eastern Idaho SMA

September 26 was a burn day in the Eastern Idaho SMA, where 165 acres were burned at six fields in Jefferson and Bonneville Counties. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 28.7 µg/m³ for the hour ending at 8:00 p.m. The approved burns ranged from approximately 5 to 20 miles north of the Idaho Falls monitor. Winds were light and variable but generally from the southwest; thus, smoke from the burns would not have drifted toward the Idaho Falls monitor. The Idaho Falls monitor had several hours of readings that were deemed invalid this day. The 8:00 p.m. reading did not meet the parameters to be invalidated but it does appear that the monitor may have been malfunctioning and the readings may not be reliable.

September 27—Idaho Falls Monitor in the Eastern Idaho SMA

September 27 was a burn day in the Eastern Idaho SMA, where 381 acres were burned at nine fields in Jefferson and Bonneville Counties. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 31.4 µg/m³ for the hour ending at 8:00 p.m. The approved burns ranged from approximately 10 to 20 miles north-northeast of the Idaho Falls monitor. Winds were generally from the south through southwest; thus, smoke from the burns would not have drifted toward the Idaho Falls monitor. The Idaho Falls monitor had several hours of readings that were deemed invalid this day, and maintenance was performed on the monitor during the 2:00 p.m. hour. The 8:00 p.m. reading did not meet the parameters to be invalidated but it does appear that it may be an effect of the monitor stabilizing following the maintenance or a continuation of a possible malfunction.

September 28—Idaho Falls Monitor in the Eastern Idaho SMA

September 28 was a burn day in the Eastern Idaho SMA, where 233 acres were burned at six fields in Jefferson and Bonneville Counties. The PM_{2.5} monitor in Idaho Falls recorded a 1-hour average concentration of 38.4 µg/m³ for the hour ending at 10:00 p.m. The approved burns ranged from approximately 10 to 15 miles north of the Idaho Falls monitor. Winds were generally from the south through southwest; thus, smoke from the burns would not have drifted toward the Idaho Falls monitor. The source of the elevated reading is unknown, but it was not the approved crop residue burning.

October 3—Grangeville Monitor in the Central SMA

October 3 was a burn day in the Central SMA, where 706 acres were burned at nine fields in Idaho County. The Grangeville monitor recorded 1-hour average concentrations of 24.0 µg/m³ for the hour ending at 3:00 p.m. and 35.1 µg/m³ at 4:00 p.m. Open burning by another agency

occurred in the area. DEQ-approved crop residue burning was concluded by 1:30 p.m. DEQ staff observed the burns and noted at 1:30 p.m. that wildfire smoke was entering the area. Winds that day were from the east-southeast through north-northeast. Based on PM_{2.5} concentrations and staff observations, enhanced documentation was completed. The DEQ coordinator contacted Grangeville Elementary/Middle School, Grangeville High School, Meadowlark Homes, Grangeville Health and Rehabilitation Center, and Syringa General Hospital. During the evaluation, DEQ determined that no one was impacted at the ISPs. DEQ concluded that the elevated concentrations were not caused by DEQ-approved crop residue burning but were likely caused by wildfire smoke in the airshed. For more information about the meteorological conditions in the Central SMA on this day, see Appendix D.

October 3—Genesee Monitor in the Central SMA

October 3 was a burn day in the Central SMA, where 406 acres were burned at seven fields in Latah County. The Genesee monitor recorded a 1-hour average concentration of 32.5 µg/m³ for the hour ending at 2:00 p.m. Open burning by another agency occurred in the area. The closest field burn to the Genesee monitor was 12 miles to the northeast. DEQ staff observed the burns and noted that surface winds were from the east. The wind that day would not have carried the smoke toward the Genesee monitor. The source of the elevated concentrations is unknown, but it was not DEQ-approved crop residue burning. For more information about the meteorological conditions in the Central SMA on this day, see Appendix D.

October 12—1-hour average PM_{2.5} concentration in the Kootenai County SMA

The Garwood monitor recorded a 1-hour average concentration of 93.0 µg/m³ for the hour ending at 2:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on October 12 in the Kootenai County SMA and see Appendix C for more information about the meteorological conditions in the Kootenai County SMA on this day.

October 18—Genesee Monitor in the Central SMA

October 18 was a burn day in the Central SMA, where 217 acres were burned at three fields in Latah County. The Genesee monitor recorded 1-hour average concentrations of 38.5 µg/m³ for the hour ending at 3:00 p.m., 21.8 µg/m³ for 4:00 p.m., 36.0 µg/m³ for 5:00 p.m., and 37.6 µg/m³ for 6:00 p.m. Data for hours before 2:00 p.m. were invalidated. Prescribed burning by other agencies occurred in the area. The closest DEQ field burn to the Genesee monitor was 60 miles to the north. DEQ staff observed the burns and noted that surface winds were from the southeast. The wind that day would not have carried the smoke toward the Genesee monitor. The source of the elevated concentrations was other agency prescribed burning.

October 18—Kendrick Monitor in the Central SMA

October 18 was a burn day in the Central SMA, where 0.1 acres was burned at one field in Nez Perce County. The Kendrick monitor recorded 1-hour average concentrations of 32.3 µg/m³ for the hour ending at 12:00 p.m. and 35.0 µg/m³ for 1:00 p.m. Prescribed burning by other agencies occurred in the area. The closest DEQ field burn to the Kendrick monitor was 5 miles to the east-southeast. DEQ staff observed the burns and noted that surface winds were from the

east. The wind that day would not have carried the smoke toward the Kendrick monitor. The source of the elevated concentrations was other agencies' prescribed burning.

October 22—Moscow Monitor in the Central SMA

October 22 was a burn day in the Central SMA, where 406 acres were burned at seven fields in Latah County. The Moscow monitor recorded 1-hour average concentrations of 24.9 $\mu\text{g}/\text{m}^3$ for the hour ending at 2:00 p.m., 35.9 $\mu\text{g}/\text{m}^3$ for 3:00 p.m., and 32.3 $\mu\text{g}/\text{m}^3$ for 4:00 p.m. Open burning by other agencies occurred in the area. The closest field burn to the Moscow monitor was 20 miles to the north. DEQ staff observed the field burns postburn and noted the airshed was clear. The source of the elevated concentrations is unknown, but it was not DEQ-approved crop residue burning.

4.1.3 Evaluation of Possible Public Roadway Safety Impacts

August 28—Public Roadway Safety in the Kootenai County SMA

August 28 was a burn day in the Kootenai County SMA, where 220 acres were burned at one field in Kootenai County. DEQ staff observed the burns and noted very heavy ground smoke that drifted across the roadway and smoke that initially lifted dropped back to ground level. Surface winds were from the southwest. Based on staff observations, enhanced documentation was completed. DEQ determined that the burn impacted visibility on a public roadway (Lancaster Road) for short durations. The permittee confirmed that a verbal traffic control plan was in effect with the local road district. The permittee provided certified flaggers and signage to limit traffic speeds and access. DEQ field observers noted that in areas experiencing smoke impacts along Lancaster Road, no flaggers were present. The permittee deployed additional roadway support.

September 11—Public Roadway Safety in the Southwest Idaho SMA

September 11 was a burn day in the Southwest Idaho SMA, where a 21-acre field was burned in western Canyon County. A DEQ field coordinator was onsite to observe the burn. Near the completion of the burn, the wind direction shifted so that smoke from the smoldering phase of the burn drifted across Upper Pleasant Ridge Road. The coordinator was positioned approximately 2,000 feet east of the field and was able to see through the smoke and distinguish trees on the other side of the plume. The posted speed limit on the road is 45 mph; thus, from the CRB operating guide, the minimum stopping sight distance is 360 feet. The coordinator determined that the faint 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 $\text{PM}_{2.5}$ 4-hour average concentration preburn and postburn triggers of 22 $\mu\text{g}/\text{m}^3$ and 32 $\mu\text{g}/\text{m}^3$, respectively; the $\text{PM}_{2.5}$ 24-hour average concentration preburn trigger of 16 $\mu\text{g}/\text{m}^3$; 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 9—4-hour average PM_{2.5} concentration in the Custer and Lemhi Counties SMA

The PM_{2.5} monitor at Salmon recorded a 4-hour average concentration of 99.0 µg/m³ for the 4 hours ending at 3:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on April 9 in the Custer and Lemhi Counties SMA.

April 10—4-hour average PM_{2.5} concentration in the Eastern Idaho SMA

The PM_{2.5} monitor at Idaho Falls recorded a 4-hour average concentration of 55.8 µg/m³ for the 4 hours ending at 11:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on April 10 in the Eastern Idaho SMA.

April 23—Bonners Ferry Monitor in Boundary County SMA

The PM_{2.5} monitor at Bonners Ferry in Boundary County recorded 4-hour average concentrations of 37.0 µg/m³ for the hour ending at 4:00 p.m. and 34.4 µg/m³ at 5:00 p.m.

Please refer to section 4.1.2, “Institutions with Sensitive Populations,” for a summary of burning on April 23 in the Boundary County SMA.

June 29—24-hour average PM_{2.5} concentration in the Southeast Idaho SMA

June 29 was a burn day in the Southeast Idaho SMA, where 180 acres were approved to burn at one field in Caribou County. The PM_{2.5} monitor in Pocatello recorded rolling 24-hour averages slightly above the preburn enhanced documentation trigger level during the morning hours on June 29 (the highest 24-hour rolling average concentration was 16.3 µg/m³). Burning was approved after it was determined that the source of the elevated concentrations was a wildfire burning in Pocatello, that the monitor did not represent conditions at the location of the approved burn in Caribou County, and that smoke from the approved burn would not drift toward Pocatello. Preburn enhanced documentation should have been conducted but was not.

August 2—4-hour average PM_{2.5} concentrations in the Southwest Idaho SMA

August 2 was a burn day in the Southwest Idaho SMA, where 65 acres were burned at one field near Bruneau, about 60 miles southeast of Nampa. The PM_{2.5} monitor in Nampa recorded a 4-hour average concentration of 27.8 µg/m³ for the 4-hour period ending at 11:00 a.m. A review of the monitoring data shows that the monitor experienced a power failure during the 9:00 a.m. hour and that the 1-hour average concentration for the hour following the power failure was 58.2 µg/m³. This single elevated 1-hour average concentration boosted the 4-hour average concentration. All of the 1-hour average concentrations measured before and after the power failure, with the exception of the 58.2 µg/m³ for the hour ending at 10:00 a.m., were well within the acceptable range. This reading may have been an instrument error and not an accurate representation of the ambient air quality in Nampa at that time.

August 22—24-hour average $PM_{2.5}$ concentration in the Southeast Idaho SMA

August 22 was a burn day in the Southeast Idaho SMA, where 430 acres were approved to burn at one field in Bingham County. The $PM_{2.5}$ monitor in Pocatello recorded rolling 24-hour averages above the preburn enhanced documentation trigger level during the morning hours on August 22. Preburn enhanced documentation was completed and the burning was approved after it was determined that the source of the elevated concentrations was local emissions near the Pocatello monitor that did not represent conditions at the location of the approved burn in Bingham County. The $PM_{2.5}$ monitor in Idaho Falls was determined to be more representative of the burn location and the readings at this monitor remained below the preburn enhanced documentation trigger levels.

August 22—24-hour average $PM_{2.5}$ concentration in the Southern Magic Valley SMA

August 22 was a burn day in the Southern Magic Valley SMA, where 182 acres were approved to burn at three fields in Twin Falls County. The $PM_{2.5}$ monitor in Twin Falls recorded rolling 24-hour averages above the preburn enhanced documentation trigger level during the morning hours on August 22. Preburn enhanced documentation was completed and the burning was approved after it was determined that the source of the elevated concentrations was smoke from wildfires during the previous morning. The 1-hour average concentrations at the monitor after 12:00 p.m. on August 21 had all been less than $14 \mu\text{g}/\text{m}^3$. The 24-hour rolling preburn trigger level had been reached only because of elevated concentrations the previous morning, and current 1-hour average concentrations were suitable for burn approval.

August 29—4-hour average $PM_{2.5}$ concentration in the Central SMA

The $PM_{2.5}$ monitor at Grangeville in Idaho County recorded 4-hour average concentrations of $22.1 \mu\text{g}/\text{m}^3$ for the hour ending at 3:00 p.m. and $44.2 \mu\text{g}/\text{m}^3$ at 4:00 p.m.

Please refer to section 4.1.2, “Institutions with Sensitive Populations,” for a summary of burning on August 29 in the Central SMA.

August 30—24-hour average and 4-hour average $PM_{2.5}$ concentration in the Southeast Idaho SMA

August 30 was a burn day in the Southeast Idaho SMA, where 723 acres were approved to burn at eight fields in Caribou County. The $PM_{2.5}$ monitor in Pocatello recorded rolling 24-hour averages and rolling 4-hour averages above the preburn enhanced documentation trigger level during the morning hours on August 30. Burning was approved after it was determined that the source of the elevated concentrations was wildfire smoke that was just reaching Pocatello but did not extend any further to the south or east and therefore did not represent conditions at the locations of the approved burns in Caribou County. The elevated concentrations continued at the Pocatello monitor until the middle of the afternoon, with a highest 4-hour average concentration of $46 \mu\text{g}/\text{m}^3$ recorded for the 4-hour period ending at 2:00 p.m. Preburn enhanced documentation should have been completed but was not.

September 12—4-hour average $PM_{2.5}$ concentrations in the Southwest Idaho SMA

The $PM_{2.5}$ monitor in Meridian recorded a 4-hour average concentration of $42.0 \mu\text{g}/\text{m}^3$ for the 4 hours ending at 2:00 p.m.

Please refer to section 4.1.2, “Institutions with Sensitive Populations,” for a summary of burning on September 12 in the Southwest Idaho SMA.

September 13—4-hour average $PM_{2.5}$ concentration in the Southern Magic Valley SMA

The $PM_{2.5}$ monitor at Twin Falls recorded a 4-hour average concentration of $32.1 \mu\text{g}/\text{m}^3$ for the 4 hours ending at 10:00 p.m.

Please refer to section 4.1.2, “Institutions with Sensitive Populations,” for a summary of burning on September 13 in the Southern Magic Valley SMA.

September 13—4-hour average $PM_{2.5}$ concentration in the Southeast Idaho SMA

September 13 was a burn day in the Southeast Idaho SMA, where 20 acres were approved to burn at one field in Caribou County. The $PM_{2.5}$ monitor at Pocatello recorded 4-hour rolling average concentrations above the preburn enhanced documentation trigger level during the morning of September 13. These concentrations were the result of wildfire smoke that drifted into the region the previous evening and affected the Pocatello monitor. Burning was approved for Caribou County after DEQ determined that the Pocatello monitor did not represent conditions at the burn location. Preburn enhanced documentation should have been completed but was not.

September 14—24-hour average $PM_{2.5}$ concentrations in the Eastern Idaho SMA

September 14 was a burn day in the Eastern Idaho SMA, where 124 acres were approved to burn at four fields located between Idaho Falls and Rexburg. The $PM_{2.5}$ monitors at Idaho Falls and Rexburg each recorded 24-hour rolling average concentrations above the preburn enhanced documentation trigger level. The 24-hour rolling concentrations were around $18\text{--}20 \mu\text{g}/\text{m}^3$ at Idaho Falls and $17 \mu\text{g}/\text{m}^3$ at Rexburg. These concentrations were the result of wildfire smoke that drifted into the region the previous evening and affected the monitors. During the morning of September 14, the smoke had cleared and the 1-hour average concentrations at each of these monitors were at acceptable levels. Winds were expected to be from the southwest, which would help to clear any remaining wildfire smoke from the area. Preburn enhanced documentation was completed.

September 14—4-hour and 24-hour average $PM_{2.5}$ concentrations in the Northern Magic Valley SMA

September 14 was a burn day in the Northern Magic Valley SMA, where 195 acres were approved to burn at two fields about 10 miles northwest of Paul. The $PM_{2.5}$ monitor at Paul recorded 4-hour rolling averages just above the preburn enhanced documentation trigger level from midnight to 3:00 a.m. and 24-hour rolling averages above the preburn enhanced documentation trigger level from midnight to 10:00 a.m. when the burn decision was made. The 1-hour average $PM_{2.5}$ concentrations had been steadily declining from the maximum reading of $24.5 \mu\text{g}/\text{m}^3$, which was recorded at 4:00 p.m. on September 13. Enhanced documentation was completed and the source of the elevated concentrations was determined to be smoke from wildfires. Winds were forecasted to be out of the southeast, which would clear the wildfire smoke from the area. Also, based on the locations of the two fields relative to the Paul monitor, it was determined that smoke from the crop residue burning would not add to the concentrations being recorded at the monitor.

October 2—24-hour average $PM_{2.5}$ concentration in the Central SMA

October 2 was a burn day in the Central SMA, where 162 acres were burned at five fields in Latah County. The $PM_{2.5}$ monitor at Potlatch Jr. Sr. High School recorded 24-hour average concentrations of $16.2 \mu\text{g}/\text{m}^3$ for the hour ending at 7:00 a.m., $16.4 \mu\text{g}/\text{m}^3$ at 8:00 a.m., $16.3 \mu\text{g}/\text{m}^3$ at 9:00 a.m., and $16.2 \mu\text{g}/\text{m}^3$ at 10:00 a.m. Surface winds were forecasted from the west and northwest.

Additionally, 184 acres were burned at four fields in Nez Perce County. The $PM_{2.5}$ monitor in Kendrick recorded 24-hour average concentrations of $17.8 \mu\text{g}/\text{m}^3$ for the hour ending at 5:00 a.m., $18.4 \mu\text{g}/\text{m}^3$ at 6:00 a.m., $19.1 \mu\text{g}/\text{m}^3$ at 7:00 a.m., $19.7 \mu\text{g}/\text{m}^3$ at 8:00 a.m., $20.1 \mu\text{g}/\text{m}^3$ at 9:00 a.m., and $20.3 \mu\text{g}/\text{m}^3$ at 10:00 a.m. West winds were forecasted for the day. DEQ staff observed the burns.

The cause of the elevated concentrations at the Kendrick and Potlatch monitors was wildfire smoke. Crop residue burning was approved because of forecasted prefrontal winds from an impending storm that would clear out the airshed and return the $PM_{2.5}$ to acceptable levels. Preburn enhanced documentation was conducted.

October 3—4-hour average $PM_{2.5}$ concentration in the Central SMA

The $PM_{2.5}$ monitor at Grangeville recorded 4-hour average concentrations of $37.2 \mu\text{g}/\text{m}^3$ for the hour ending at 6:00 p.m., $39.7 \mu\text{g}/\text{m}^3$ at 7:00 p.m., and $37.3 \mu\text{g}/\text{m}^3$ at 8:00 p.m.

Please refer to section 4.1.2, “Institutions with Sensitive Populations,” for a summary of burning on October 3 in the Central SMA.

October 3—4-hour average $PM_{2.5}$ concentration in the Eastern Idaho SMA

The $PM_{2.5}$ monitor at Idaho Falls recorded a 4-hour average concentration of $53.5 \mu\text{g}/\text{m}^3$ for the 4 hours ending at 1:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on October 3 in the Eastern Idaho SMA.

October 4—24-hour average $PM_{2.5}$ concentration in the Eastern Idaho SMA

October 4 was a burn day in the Eastern Idaho SMA, where 506 acres were approved to burn at seven fields in Jefferson and Bonneville Counties. The $PM_{2.5}$ monitor in Rexburg recorded rolling 24-hour averages above the preburn enhanced documentation trigger level during the early morning hours on October 4. Preburn enhanced documentation was completed and the burning was approved after it was determined that the source of the elevated concentrations was the straw bale fire that had occurred on October 3. The straw bale fire had resulted in several hours of elevated $PM_{2.5}$ readings at the monitor on October 3, but the readings on October 4 were all less than $15 \mu\text{g}/\text{m}^3$. Furthermore, no burning was approved for the vicinity of the monitor or the straw bale fire.

October 12—4-hour average $PM_{2.5}$ concentration in the Kootenai County SMA

The $PM_{2.5}$ monitor at Garwood in Kootenai County recorded 4-hour average concentrations of $46.3 \mu\text{g}/\text{m}^3$ for the hour ending at 2:00 p.m., $44.1 \mu\text{g}/\text{m}^3$ at 3:00 p.m., and $40.7 \mu\text{g}/\text{m}^3$ at 4:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on October 12 in the Kootenai County SMA.

October 18—4-hour average $PM_{2.5}$ concentration in the Central SMA

October 18 was a burn day in the Central SMA, where 217 acres were burned at three fields in Latah County. The $PM_{2.5}$ monitor at Potlatch Jr. Sr. High School in Potlatch recorded 4-hour average concentrations above the preburn enhanced documentation trigger level with concentrations of $23.4 \mu\text{g}/\text{m}^3$ for the hour ending at 7:00 a.m., $24.6 \mu\text{g}/\text{m}^3$ at 8:00 a.m., and $24.0 \mu\text{g}/\text{m}^3$ at 9:00 a.m. The cause of the elevated concentrations at the Potlatch monitor was determined to be smoke from prescribed burners trapped at ground level under an inversion from the previous night. Crop residue burning was approved because of a forecasted inversion lift that would result in $PM_{2.5}$ concentrations returning to acceptable levels. Preburn enhanced documentation was conducted.

Later in the day on October 18, the $PM_{2.5}$ monitor at Potlatch Jr. Sr. High School recorded a 4-hour average concentration of $34.8 \mu\text{g}/\text{m}^3$ for the 4-hour period ending at 10:00 p.m. Winds were forecasted from the east, east-southeast, and south-southeast. Prescribed burning occurred in the area on this day (169 prescribed burns were authorized between October 17 and 19). DEQ-approved crop residue burning was concluded by 3:00 p.m. DEQ staff observed the burns, noting no impacts to ISPs or roads. Enhanced documentation was completed. The DEQ coordinator did not contact the ISPs because DEQ determined that the elevated concentrations were not caused by DEQ-approved crop residue burning but were likely caused by prescribed burners.

Also on October 18, 33 acres were burned at one field in Nez Perce County. The Lewiston monitor recorded 4-hour average concentrations of $33.9 \mu\text{g}/\text{m}^3$ for the hour ending at 11:00 a.m. and $32.5 \mu\text{g}/\text{m}^3$ for 12:00 p.m. Opening burning by other agencies occurred in the area. The closest DEQ field burn to the Lewiston monitor was 25 miles to the east-northeast. DEQ staff observed the burns and noted that surface winds were from the east. The wind that day would not have carried the smoke toward the Lewiston monitor. The source of the elevated concentrations was determined to be other agency prescribed burning.

October 18—24-hour average $PM_{2.5}$ concentration in the Central SMA

October 18 was a burn day in the Central SMA, where 0.1 acres was burned in Nez Perce County. The $PM_{2.5}$ monitor in Kendrick recorded 24-hour average concentration preburn triggers of $16.6 \mu\text{g}/\text{m}^3$ for the hour ending at 5:00 a.m., $20.0 \mu\text{g}/\text{m}^3$ at 6:00 a.m., $23.8 \mu\text{g}/\text{m}^3$ at 7:00 a.m., $27.7 \mu\text{g}/\text{m}^3$ at 8:00 a.m., $30.8 \mu\text{g}/\text{m}^3$ at 9:00 a.m., and $32.9 \mu\text{g}/\text{m}^3$ at 10:00 a.m. DEQ staff observed the burns. Surface winds were forecasted from the east. The cause of the elevated concentrations at the Kendrick monitor was prescribed burners’ smoke trapped under an inversion from the previous night. Crop residue burning was approved because of forecasted inversion lift that would return the $PM_{2.5}$ to acceptable levels. Preburn enhanced documentation was conducted.

October 19—4-hour average $PM_{2.5}$ concentration in the Southwest Idaho SMA

The $PM_{2.5}$ monitor at Nampa recorded a 4-hour average concentration of $59.0 \mu\text{g}/\text{m}^3$ for the 4 hours ending at 12:00 p.m.

Please refer to section 4.1.1, “Compliance with Program Concentration Limits,” for a summary of burning on October 19 in the Southwest Idaho SMA.

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 2012.

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	43	16	27
Kootenai and Boundary Counties	60	33	23
Southwest Idaho	3	0	3
Eastern Idaho	3	1	2

a. Smoke management areas with no related complaints during 2012 are not included.

b. Complaints from other sources include crop residue burning on reservations, illegal crop residue burning off reservation, wildfires, and prescribed fires.

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 2012, with the goal of educating growers about their permits and requirements and helping them comply with those requirements. In those instances where an enforcement action was appropriate, DEQ continued to use both informal and formal enforcement tools. This process is considered a proactive approach to help avoid future issues that could result from poor smoke management. DEQ believes this approach will preempt future emissions and is not solely an after-the-fact enforcement stance.

The CRB program forwarded two potential violations of the CRB rule to the enforcement coordinator in the Air Quality Division. Both of these cases remain under development. To date, DEQ has not collected any monetary penalties for CRB violations in 2012. In addition to the two violations, DEQ issued three notices to comply for minor violations of the CRB rule.

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 2012. 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 Reserve, Grand Teton National Park, and Yellowstone National Park). DEQ also used data from monitors operated by the Utah Department of Environmental Quality.

During the fall burn season, Boundary County SMA experienced an issue with the Mt. Hall PM_{2.5} monitor used in the burn decision process. The monitor would not calibrate. After multiple attempts to rectify the issue, the monitor was replaced with a beta attenuation monitor (BAM). The existing meteorological instruments were kept in operation.

In the Central SMA, monitors experienced various issues throughout the burn season. The backscatter (Bscat) value for the PM_{2.5} monitors in Genesse and Kendrick were set between 10.6 and 10.7, which inhibited the monitors from reading PM_{2.5} values above 164 µg/m³. During August, September, and October, these locations likely experienced wildfire smoke impacts that were

above $164 \mu\text{g}/\text{m}^3$, but the monitors were unable to accurately measure the effects. Also, the Moscow monitor was plagued with equipment malfunctions in July as a result of a faulty mass transducer. Data were impacted sporadically prior to being invalidated on July 18. The mass transducer was replaced on July 27 and the equipment returned to normal operation. Lastly, the Grangeville monitor wind vector data was invalidated from June 18 to July 5 due to a wind vector error.

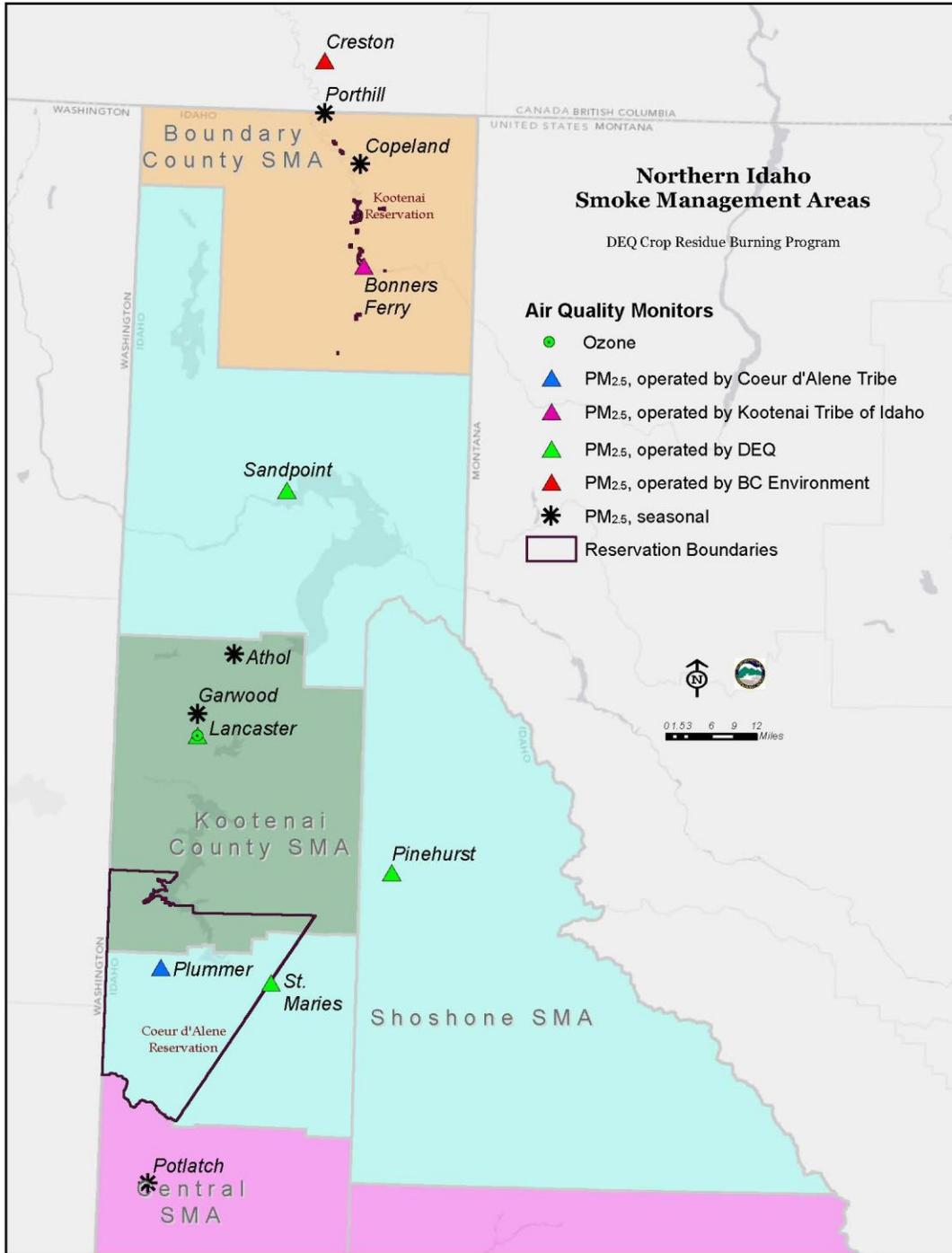


Figure 2. Air quality monitor locations for northern Idaho smoke management areas.

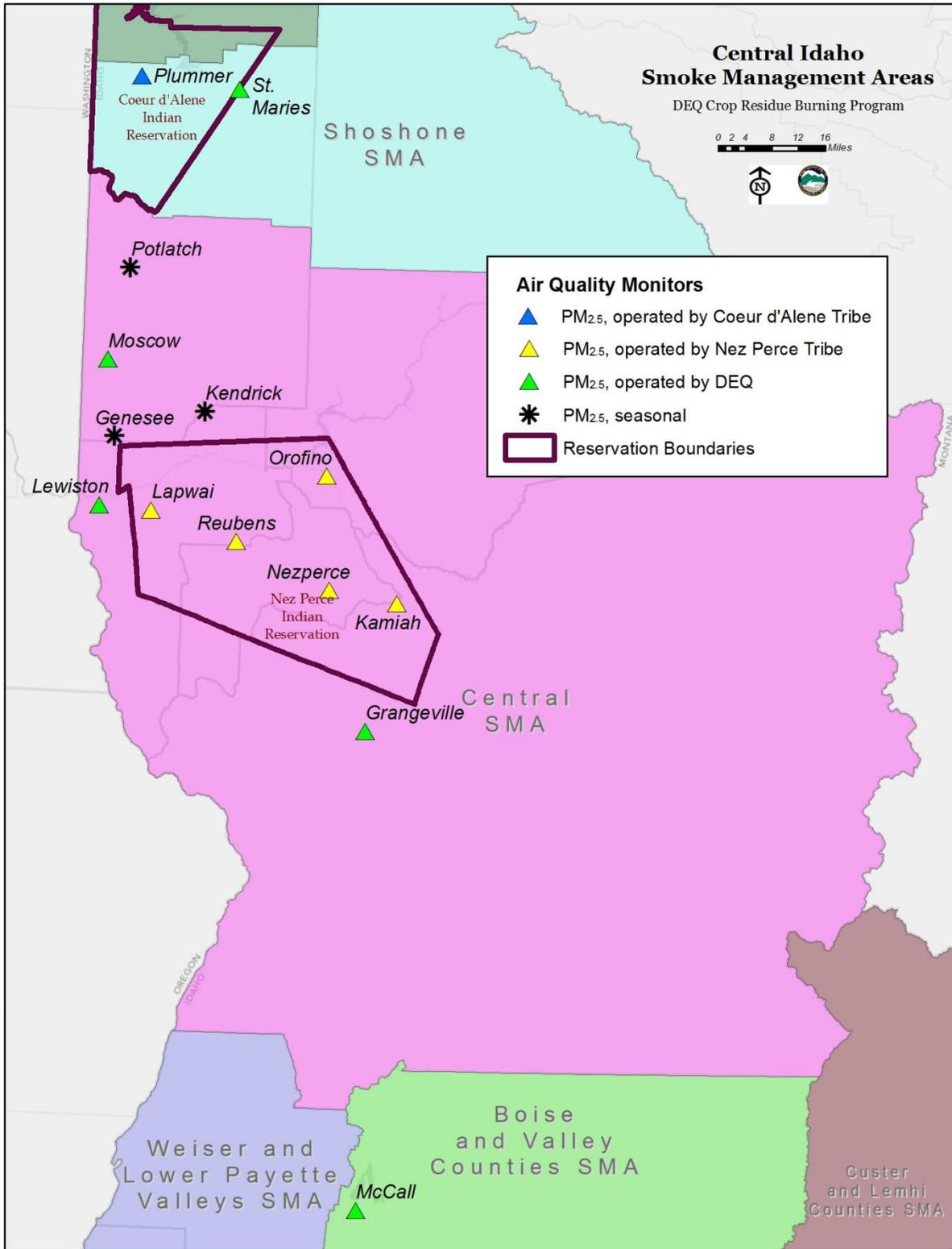


Figure 3. Air quality monitor locations for the Central Smoke Management Area.

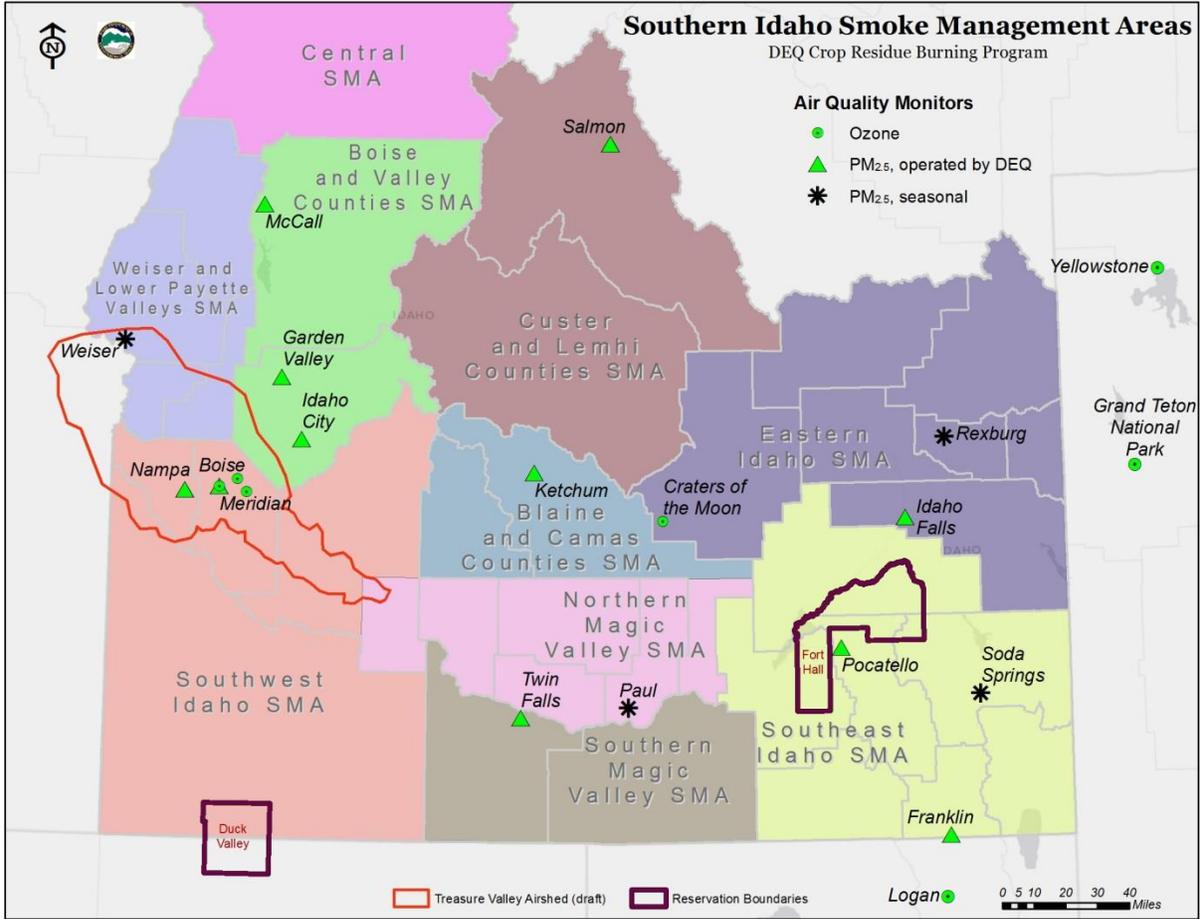


Figure 4. Air quality monitor locations for southern Idaho smoke management areas.

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. Appendix B 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 2012, 67,416 acres were burned statewide under the CRB program, slightly more than the acres of previous years (64,165 and 65,362 acres in 2010 and 2011, respectively). As in prior

years, a majority of the burning occurred during the fall burn season: for 2012, the fall burn season accounted for 71% 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 turf grass, 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 2009.

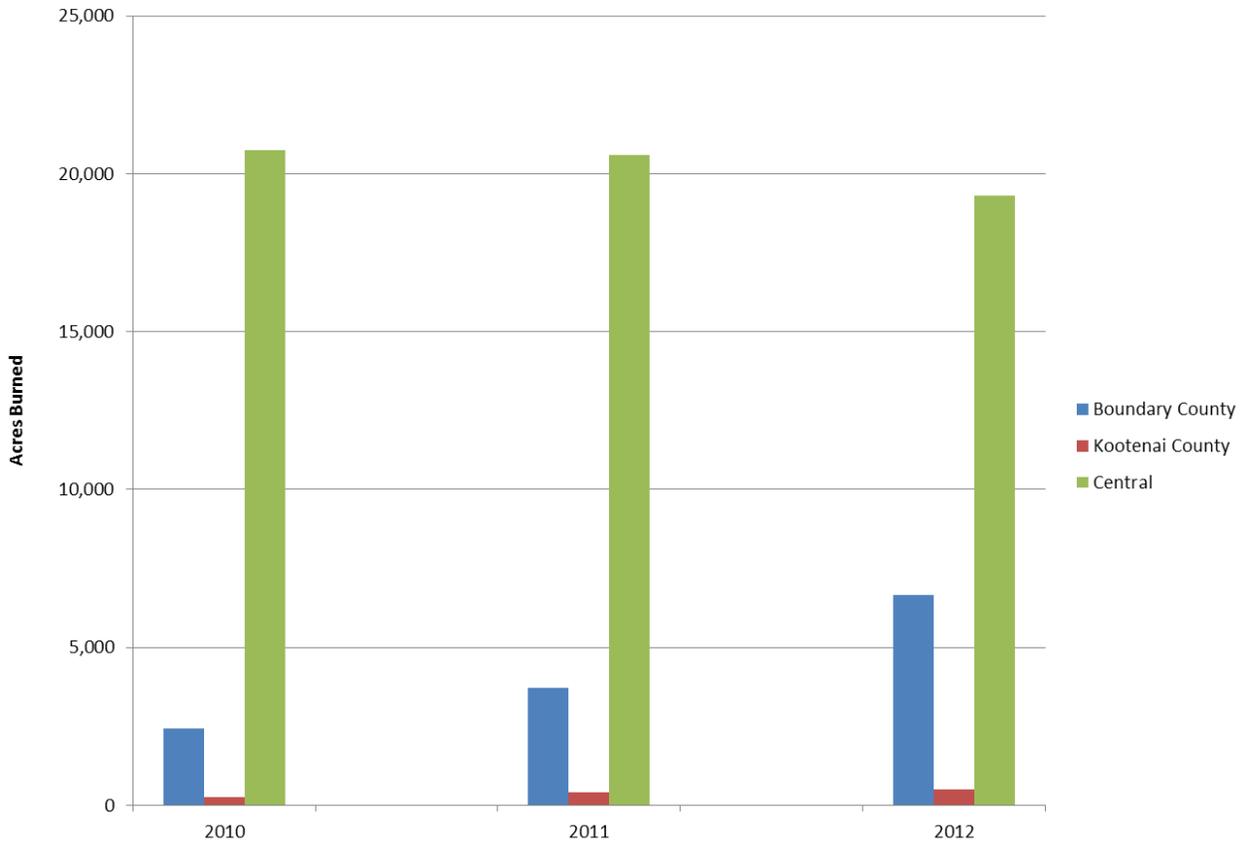


Figure 5. Acres burned in northern Idaho smoke management areas.

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 in most of these SMAs the acres burned has been similar from year to year. However, the data do show substantial increases in acres burned in the Northern Magic Valley and Southern Magic Valley SMAs, especially from 2010 to 2011.

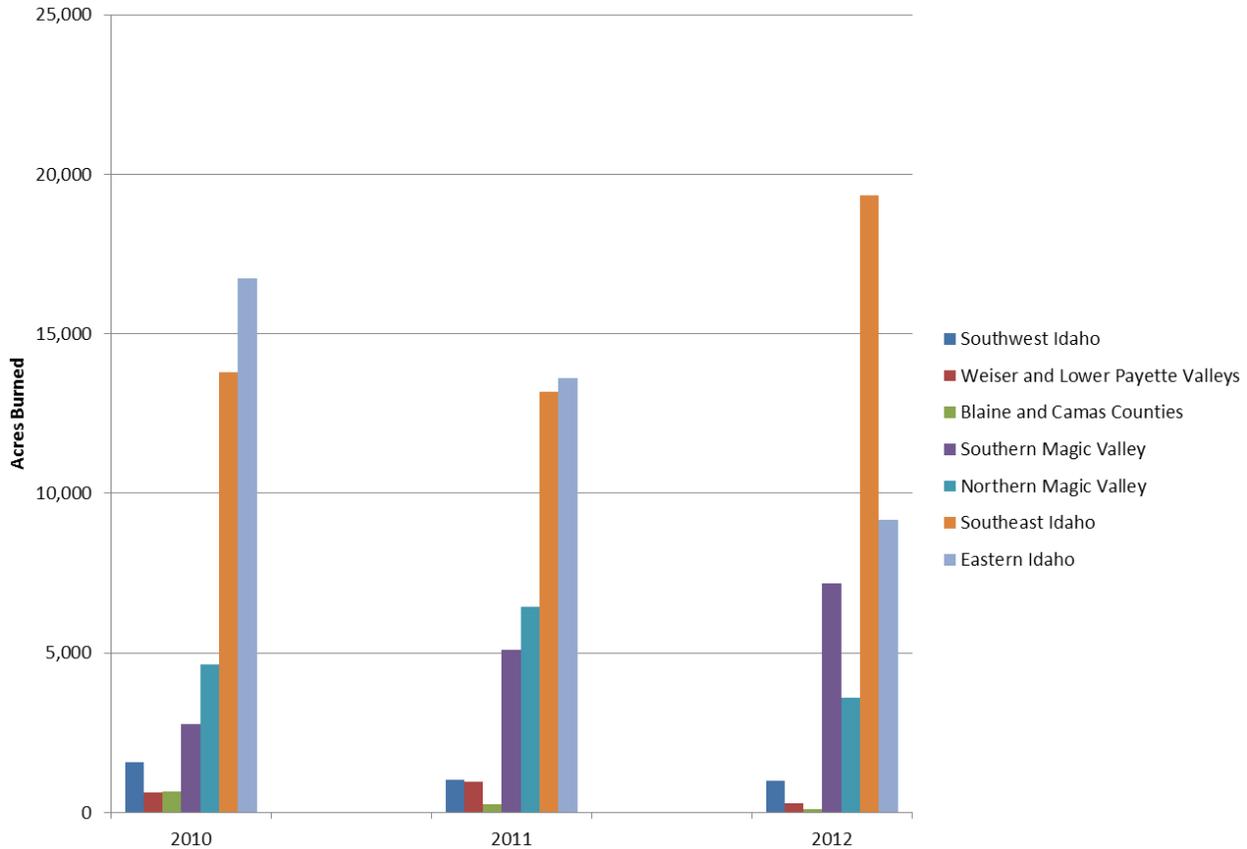


Figure 6. Acres burned in the southern Idaho smoke management areas.

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 residues burned in the Boundary County SMA in 2012 were cereal grain stubble and turf grass; however, residue from other crops, such as 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. The monitor in Copeland experienced calibration problems and was replaced with a BAM monitor. 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. More man-hours are needed to analyze the abundance of data gathered from the theodolites.

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 2010–2012 burn seasons. A total of 6,657 acres were burned in the Boundary County SMA during 2012, with nearly equal number of acres burned during the spring and fall seasons. The number of acres burned in the Boundary County SMA in 2012 was greater than the two previous years; and the total acreage burned in 2012 was nearly double the acreage that burned in 2011.

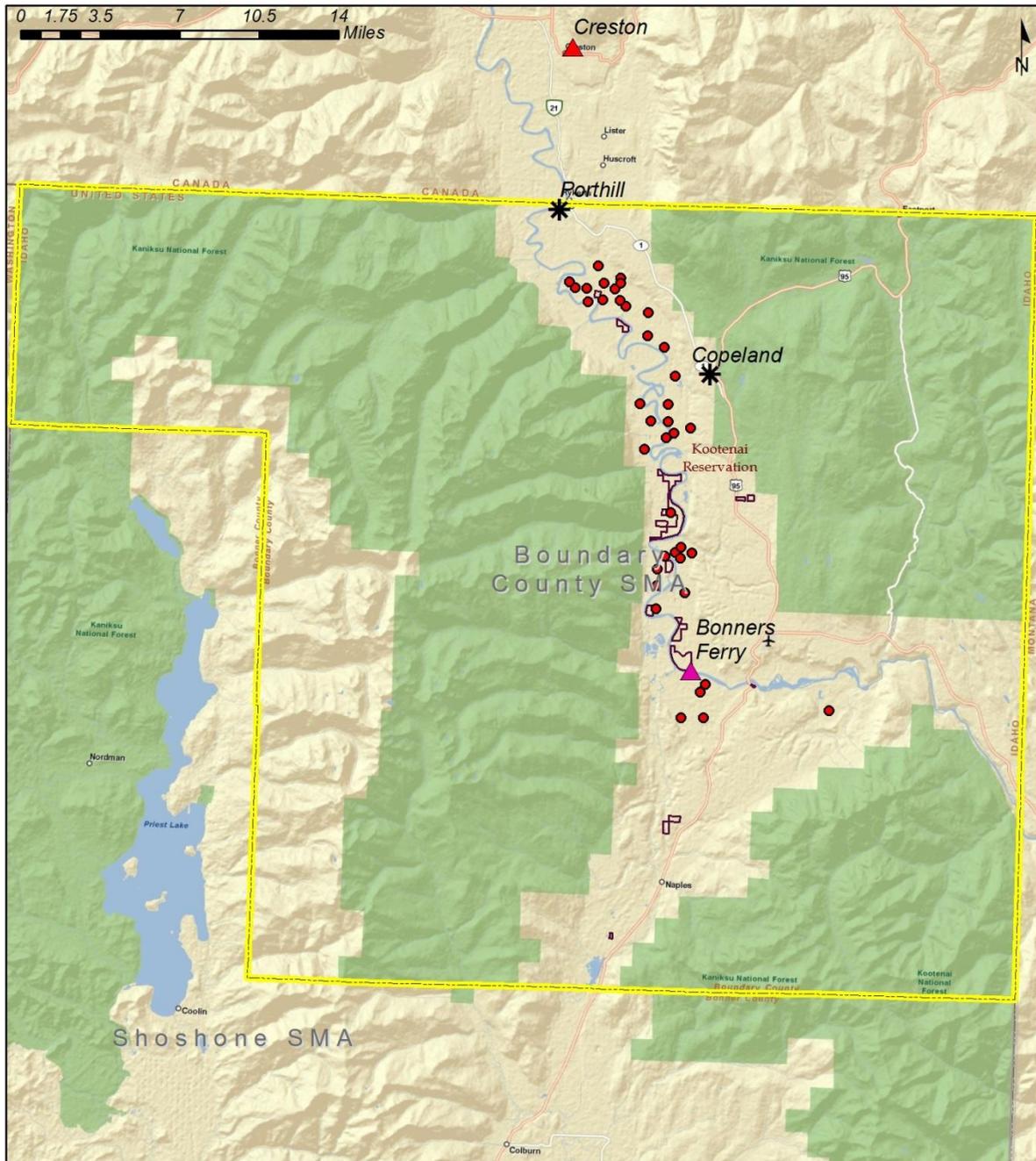
Figure 7 shows the locations of the fields burned during 2012: 43 fields totaling 6,657 acres were burned in the SMA, and 13 fields (31%) amounting to 1,866 acres (29%) were located within 3 miles of an ISP. In 2012, 13 growers burned fields within the CRB program in the SMA.

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

Burn season and crop type	Acres burned		
	2010	2011	2012
Spring^a			
Cereal grain	396	575	3,348
Turf grass	0	0	0
Other crops	0	0	0
Subtotal	396	575	3,348
Fall^b			
Cereal grain	1,999	3,131	3,159
Turf grass	0	0	150
Other crops	44	0	0
Subtotal	2,043	3,131	3,309
Total	2,439	3,706	6,657

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.



- | | | |
|---|--|--|
| <p>2012 Burned Fields
Boundary County
Smoke Management Area</p> | <p>Air Quality Monitors</p> <ul style="list-style-type: none"> ▲ PM_{2.5}, operated by Kootenai Tribe of Idaho ▲ PM_{2.5}, operated by BC Environment * PM_{2.5}, seasonal | <ul style="list-style-type: none"> ● Burned field ▭ Reservation Boundaries ▭ SMA Boundary |
|---|--|--|

Figure 7. Location of 2012 burns in the Boundary County Smoke Management Area.

4.6.1.2 Daily Burn Decisions and Air Quality

Boundary County SMA experienced a nearly six-fold increase in spring burn acreage from the previous year. However, rain events and stagnant conditions inhibited burning this year. Severe flooding resulted in some fields never drying sufficiently to be successfully burned, while approximately 8,000–10,000 acres of farmland were declared a complete loss. During the fall burn season, poor air quality due to wildfires in the Pacific Northwest resulted in several no-burn decisions. The air quality and weather constraints led growers to consider other management options (rotating crops, removing fields from production, etc.) to meet their crop residue disposal goals for the season.

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 authorized a total of 29 burn days. On many of these days, conditions were marginal and only limited burning could be approved. A detailed description of burn days in the Boundary County SMA is included in Appendix E.

Table 3 shows the summary of burn decisions for the Boundary County SMA for 2012. 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 2012.

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	29	133	7	36	7	16	23

a. This summary includes all burn decisions issued for 2012. The majority of the no-burn decisions due to requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix C 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 C.

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 turf grass; however, one grower registered a cereal grain stubble field this year. The peak burn months are August–October.

Seasonal ambient air quality monitors that measure PM_{2.5} and are used to make burn decisions in this SMA are located at Athol and Garwood. A year-round monitor is located in Hayden (Lancaster monitor). A Washington Department of Ecology monitor in Spokane and DEQ monitors in Sandpoint and Pinehurst also provide additional data, although they are located outside the SMA.

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 turf grass 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 2010–2012 burn seasons. A total of 490 acres were burned in the SMA during the 2012 burn season. The number of burned acres has remained relatively stable between 2010 and 2012.

Figure 8 shows the locations of the fields burned during 2012: 5 fields totaling 490 acres were burned in this SMA, and 3 fields (60%) amounting to 390 acres (80%) were located within 3 miles of an ISP. In 2012, 4 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		
	2010	2011	2012
Fall^a			
Turf grass	180	420	470
Other	0	0	20
Total	180	420	490

a. Fall season is July 1–December 31.

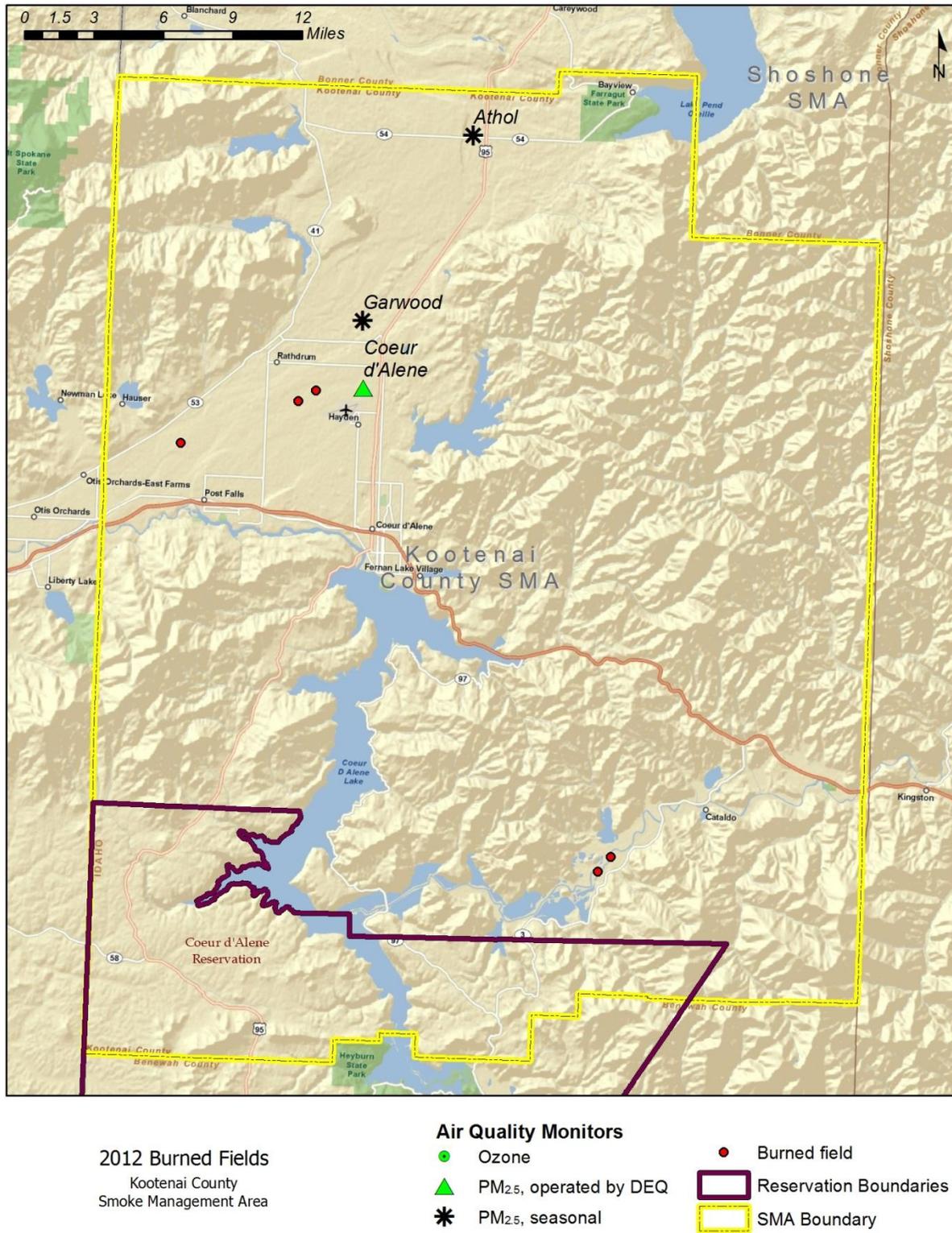


Figure 8. Location of 2012 burns in the Kootenai County Smoke Management Area.

4.6.2.2 Daily Burn Decisions and Air Quality

Table 5 shows the summary of burn decisions for the Kootenai County SMA for 2012. 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 6 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	6	187	11	6	10	15	15

a. This summary includes all burn decisions issued for 2012. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix D 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 D.

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 turf grass. 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, Genesee, 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 2010–2012 burn seasons. A total of 19,322 acres were burned in the SMA during 2012, with the majority occurring during the fall burn season.

More CRP was burned in the spring of 2012 than the fall, which is the opposite of previous years. The increase in CRP acres burned during this spring is likely due to acres that were still under mid-management contract that were not burned during fall 2011.

Fewer acres of cereal grain and turf grass were burned in 2012 than 2011. The Central SMA experienced a wet spring, which inhibited cereal grain crop residue burning. Poor air quality, fire safety restrictions, and the onset of winter and rain severely limited the fall burn season. Since turf grass is primarily burned from August through October, it was impacted more so than other crops by the loss of burn days due to regional wildfire smoke and prescribed burning, IDL not issuing permits for fire safety concerns, and high fuel moisture at the end of the year. During the fall burn season, air quality did not improve until precipitation arrived in October. The lack of multiple consecutive days of dry weather in October and November prohibited turf grass 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 2012: 270 fields totaling 19,322 acres were burned in this SMA, and 58 fields (22%) amounting to 3,763 acres (20%) were located within 3 miles of an ISP. In 2012, 80 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		
	2010	2011	2012
Spring^a			
CRP	171	99	1,285
Cereal grain	1,224	1,854	822
Turf grass	25	0	162
Other crops	48	31	110
Subtotal	1,468	1,984	2,379
Fall^b			
CRP	372	1,762	877
Cereal grain	14,632	12,026	12,560
Turf grass	3,776	4,164	3,085
Other crops	166	564	421
Subtotal	18,946	18,516	16,943
Total	19,301	20,761	19,322

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

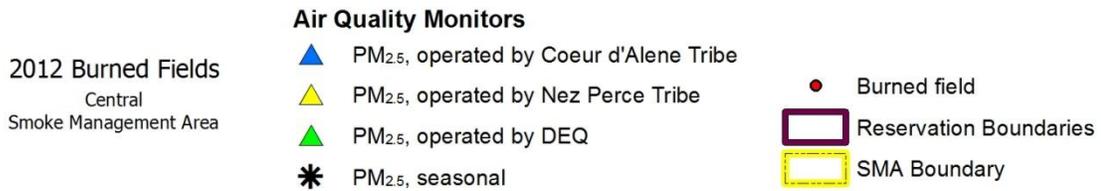
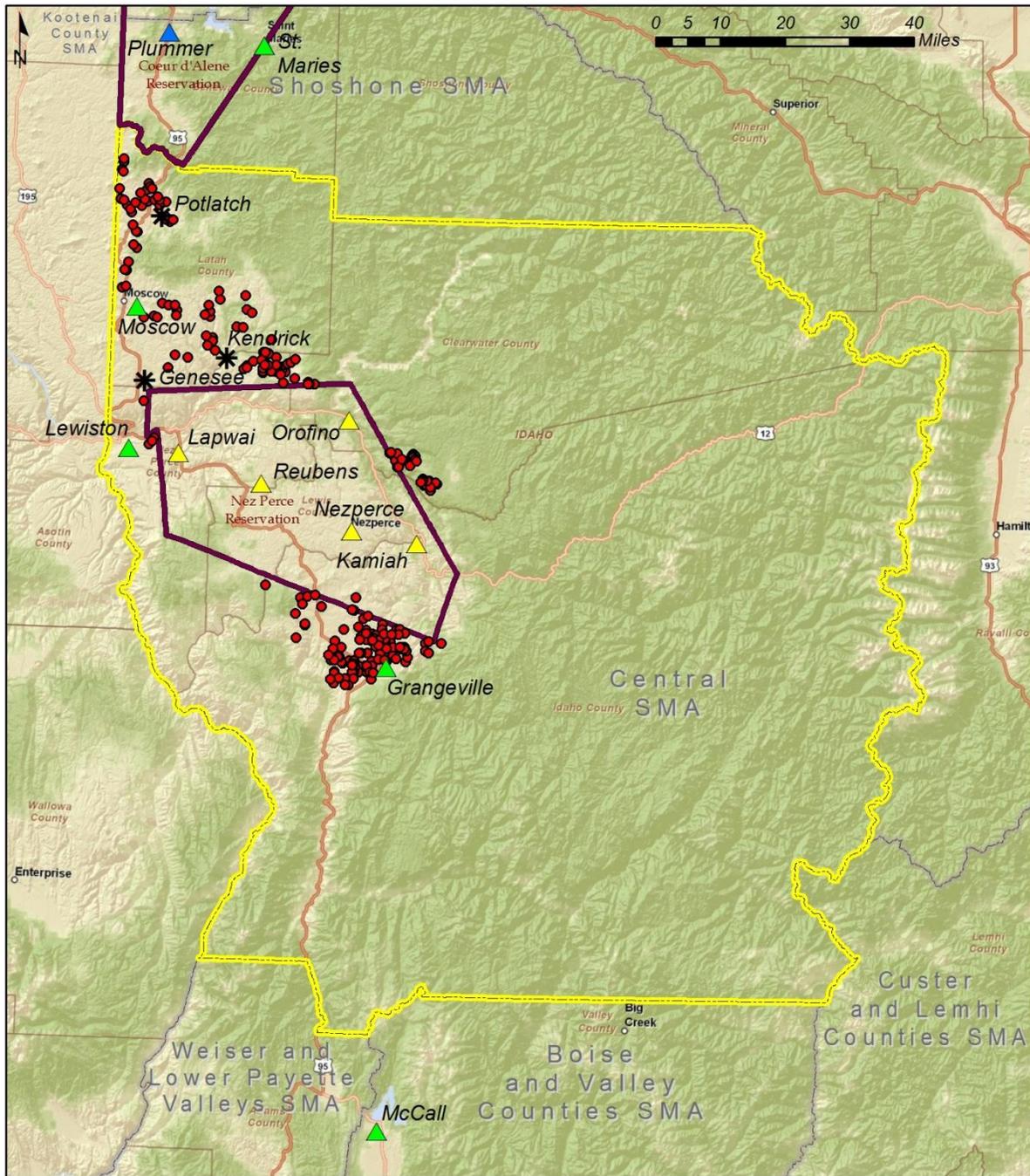


Figure 9. Location of 2012 burns in the Central Smoke Management Area.

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 2012. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture and poor air quality were frequent reasons for a no-burn decision.

DEQ issued 42 burn days in at least one county in the Central SMA during 2012. DEQ issued a no-burn or limited-burn decision for 23 days because of poor air quality as a result of regional wildfire smoke, 3 days due to IDL fire restrictions, and 2 days from prescribed burners overloading the airshed. Approximately 2,472 acres (766 acres of turf grass and 1,706 of cereal grain) were not burned or were taken out of production due to the lack of burn days.

Between September 12 and October 19, DEQ could have approved burning on 12 days, but instead exercised caution for the public's wellbeing and issued a no-burn decision because PM_{2.5} preburn trigger levels were exceeded. During September and October, if weekends and holidays were allowable burn days, the Central SMA would have potentially had an extra 14 days to accomplish crop residue disposal.

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	36	107	18	31	9	15	36
Clearwater	12	167	17	19	2	14	19
Lewis	0	229	2	1	0	0	10
Nez Perce	21	162	15	17	2	12	14
Idaho	42	100	23	54	6	13	18

a. This summary includes all burn decisions issued for 2012. The majority of the no-burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendices E, F, and G 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 period 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 three 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 2010–2012 burn seasons. Figure 10 shows the locations of fields burned during 2012: 38 fields totaling 990 acres were burned in this SMA, and 18 fields (47%) amounting to 303 acres (31%) were located within 3 miles of an ISP. In 2012, 21 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		
	2010	2011	2012
Spring^a			
Cereal grain	22	72	20
Other crops	69	76	85
Subtotal	91	148	105
Fall^b			
Cereal grain	889	614	460
Other crops	611	247	426
Subtotal	1,500	861	886
Total	1,591	1,009	990

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

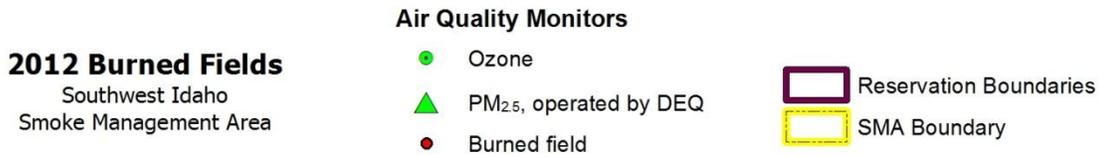
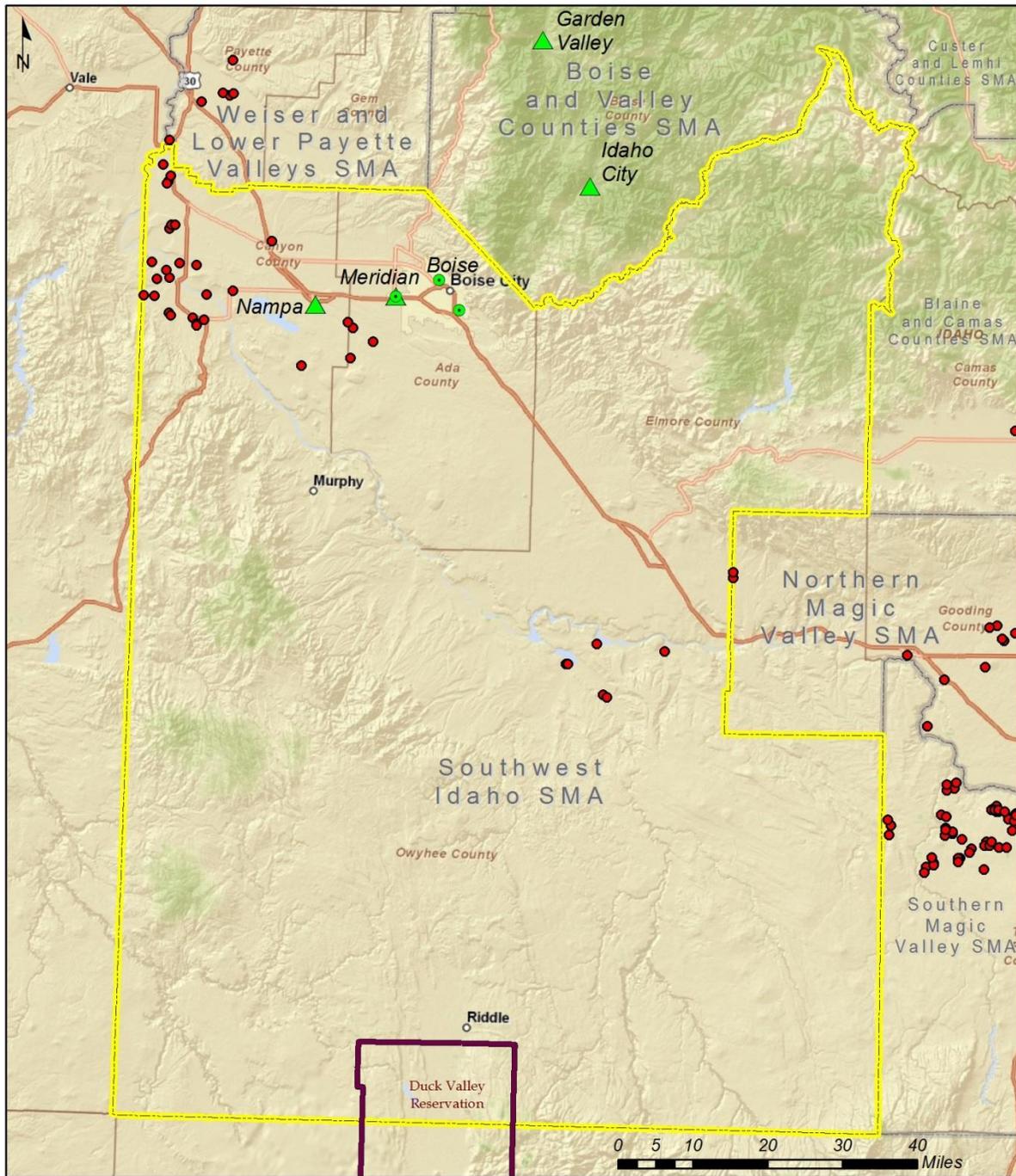


Figure 10. Location of 2012 burns in the Southwest Idaho Smoke Management Area.

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 and September, National Weather Service-issued Red-Flag Warnings and wildfire smoke resulted in no-burn conditions on several days.

Elmore County was under a fire safety burn ban from June 28 to September 10, and the Nampa Fire Protection District issued a burn ban from June 22 to September 11. Many growers seemed to be aware of the burn ban as DEQ received no requests to burn in these areas while the bans were in effect.

The IDL issued a Stage 1 burn ban from July 13 to October 5 that covered all of this SMA. DEQ was required to submit to IDL for review each field that a grower requested to burn. IDL's review found that none of the requested fields were subject to the IDL burn ban; however, the process did generally require about 1 week to complete, from submitting the fields for review and obtaining the IDL determination.

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 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	192	18	17	0	1	1
Canyon	8	190	15	16	1	0	2
Elmore	2	227	1	3	1	0	0
Owyhee	11	186	25	2	0	0	6

a. This summary includes all burn decisions issued for 2012. 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 H 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 H.

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 2010–2012 burn seasons. Figure 11 shows the locations of fields burned during 2012: 14 fields totaling 298 acres were burned in this SMA, and 5 fields (36%) amounting to 83 acres (28%) were located within 3 miles of an ISP. In 2012, 7 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		
	2010	2011	2012
Spring^a			
Cereal grain	93	143	3
Other crops	30	102	223
Subtotal	123	245	226
Fall^b			
Cereal grain	357	568	0
Other crops	124	160	72
Subtotal	481	728	72
Total	604	973	298

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

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. Poor air quality, fuel moisture, and wind were occasional reasons for a no-burn decision.

Gem County was under a fire safety burn ban from July 5 to October 15. 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.

The IDL issued a Stage 1 burn ban from July 13 to October 5 that covered all of this SMA. DEQ was required to submit each field burn request to IDL for review. IDL's review found that none of the requested fields were subject to the IDL burn ban; however, the process required about one week to complete, from submitting the fields for review to obtaining the IDL determination.

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 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
				Fuel moisture	Wind	Ventilation	
Adams	0	233	0	0	0	0	0
Gem	0	231	1	0	0	0	0
Payette	8	209	10	4	2	0	2
Washington	5	207	8	7	2	0	2

a. This summary includes all burn decisions issued for 2012. 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 I 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 I.

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 2012, crop residue burning was conducted at just one field 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 2010–2012 burn seasons. Figure 12 shows the location of the field burned during 2012: one field totaling 100 acres was burned in this SMA. This field was 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		
	2010	2011	2012
Spring^a			
Cereal grain	0	0	0
Other crops	1	0	0
Subtotal	1	0	0
Fall^b			
Cereal grain	643	257	100
Other crops	0	0	0
Subtotal	643	257	100
Total	644	257	100

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

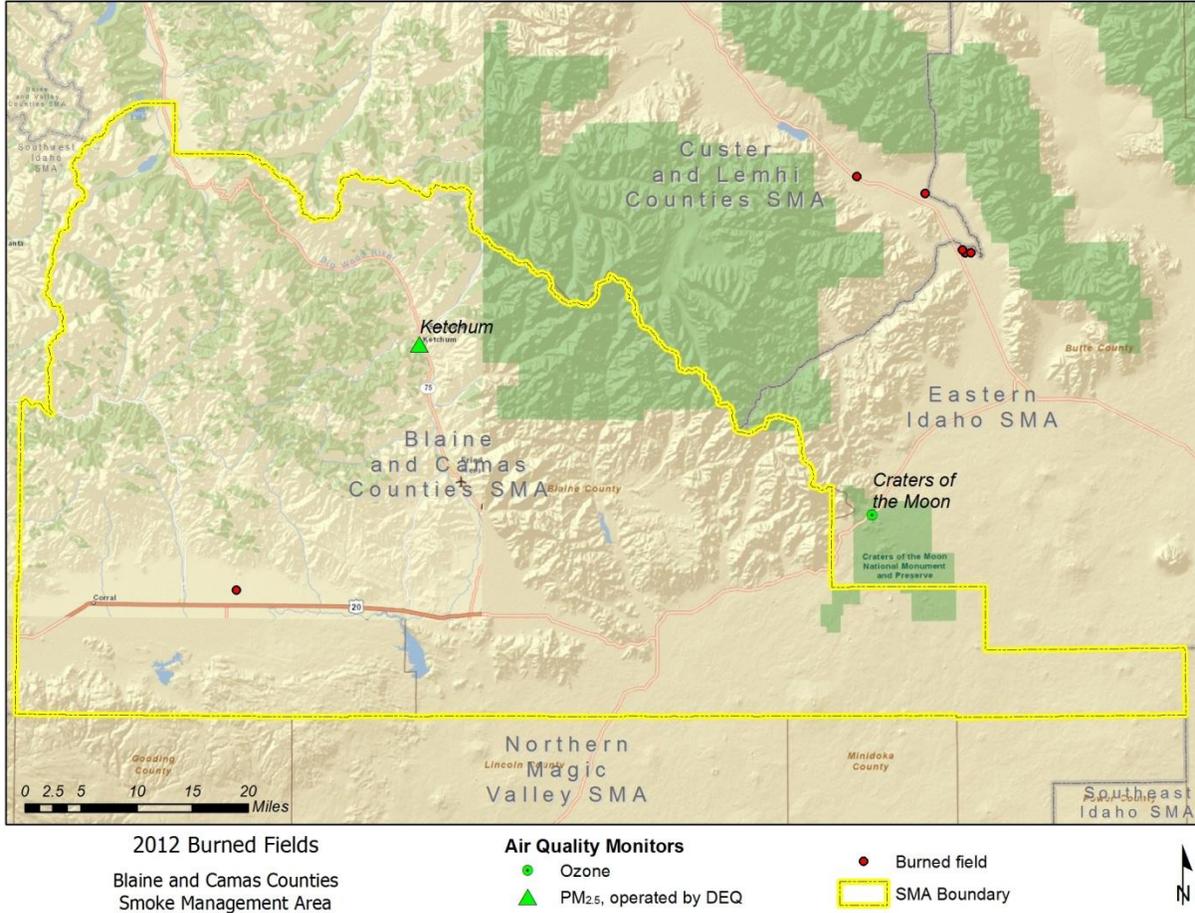


Figure 12. Location of 2012 burns in the Blaine and Camas Counties Smoke Management Area.

4.6.6.2 Daily Burn Decisions and Air Quality

Table 13 shows the summary of burn decisions for the two counties in this SMA for 2012. The most common reason for a no-burn decision was that no requests to burn were received. Forecasted ozone concentrations above the PCL were the reason for no-burn decisions on 5 days in Blaine County, while fuel moisture was cited 8 times as a reason for a no-burn decision in Camas County.

Table 13. Summary of burn decisions for the Blaine and Camas Counties 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	
Blaine	0	227	5	0	0	0	2
Camas	7	215	0	8	2	0	0

a. This summary includes all burn decisions issued for 2012. 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 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 J.

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; however, CRP has become a significant portion of the acres burned. Burning may occur year-round, but the peak burn period are March–May and July–October. The Southern Magic Valley SMA has one PM_{2.5} air quality monitor located in Twin Falls and an ozone monitor operated by the National Park Service at Craters of the Moon National Monument. Additionally, a PM_{2.5} monitor located in Paul (in the Northern Magic Valley SMA) is within the relevant vicinity of portions of this SMA and is 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 2010–2012 burn seasons. Figure 13 shows the locations of fields burned during 2012: 152 fields totaling 7,185 acres were burned in this SMA, and 98 fields (64%) amounting to 1,984 acres (28%) were located within 3 miles of an ISP. In 2012, 52 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		
	2010	2011	2012
Spring^a			
CRP	0	61	1,001
Cereal grain	71	381	1,762
Other crops	56	0	418
Subtotal	127	442	3,181
Fall^b			
CRP	0	120	2,350
Cereal grain	2,603	4,495	1,602
Other crops	52	45	52
Subtotal	2,655	4,660	4,004
Total	2,782	5,102	7,185

a. Spring season is January–June 30.

b. Fall season is July 1–December 31.

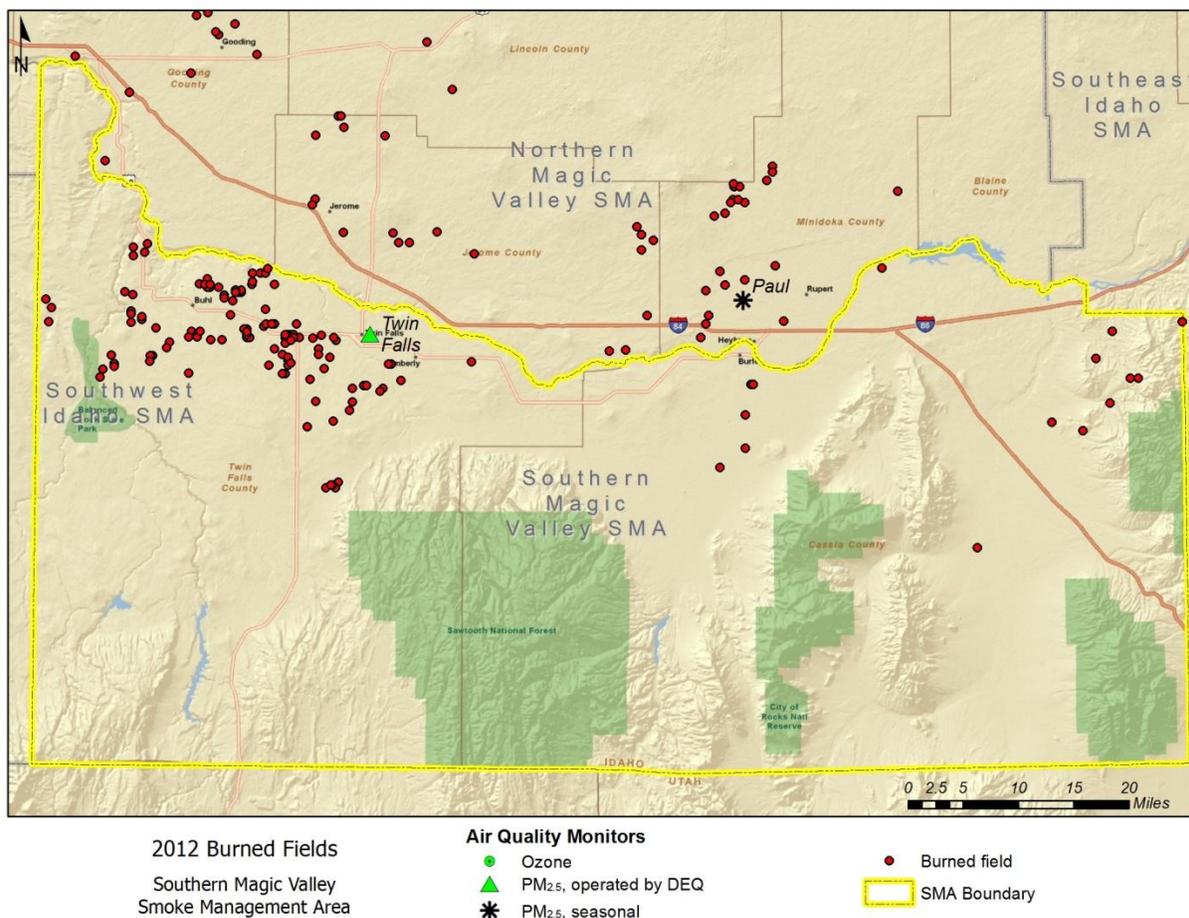


Figure 13. Location of 2012 burns in the Southern Magic Valley Smoke Management Area.

4.6.7.2 Daily Burn Decisions and Air Quality

Table 15 shows the summary of 2012 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.

The IDL issued a Stage 1 burn ban from July 13 to October 5 that covered all of this SMA. DEQ was required to submit each field burn request to IDL for review. IDL’s review found that none of the requested fields were subject to the IDL burn ban; however, the process required about 1 week to complete, from submitting the fields for review to obtaining the IDL determination.

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
				Fuel moisture	Wind	Ventilation	
Cassia	24	163	20	14	10	0	5
Twin Falls	54	119	26	21	12	0	5

a. This summary includes all burn decisions issued for 2012. 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 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 K.

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 2010–2012 burn seasons. Figure 14 shows the locations of fields burned during 2012: 57 fields totaling 3,605 acres were burned in this SMA, and 19 fields (33%) and 691 acres (19%) were located within 3 miles of an ISP. In 2012, 35 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		
	2010	2011	2012
Spring^a			
CRP	0	62	0
Cereal grain	254	428	193
Other crops	0	0	83
Subtotal	254	490	276
Fall^b			
CRP	568	193	150
Cereal grain	3,535	5,537	3,067
Other crops	273	231	112
Subtotal	4,376	5,961	3,329
Total	4,630	6,451	3,605

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

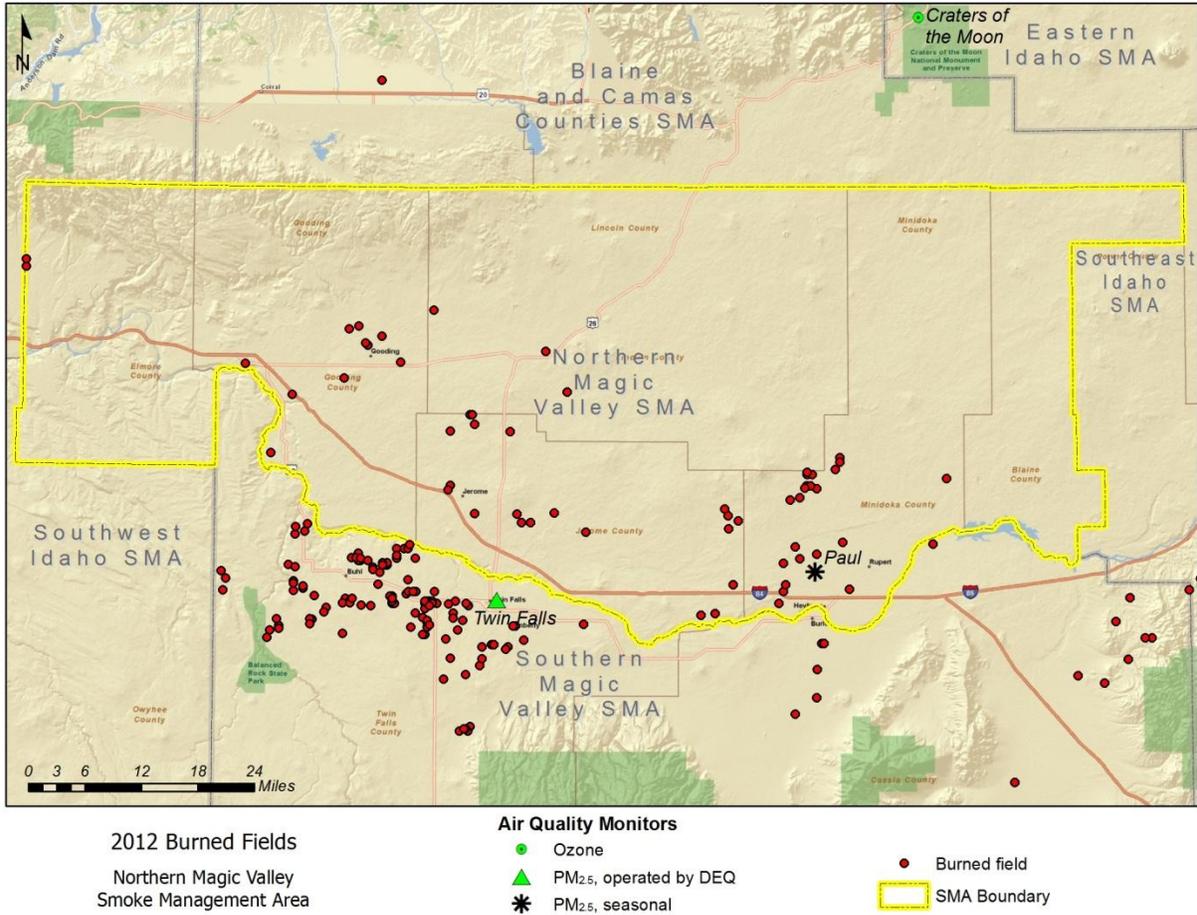


Figure 14. Location of 2012 burns in the Northern Magic Valley Smoke Management Area.

4.6.8.2 Daily Burn Decisions and Air Quality

Table 17 shows the summary of 2012 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.

The IDL issued a Stage 1 burn ban from July 13 to October 5 that covered all of this SMA. DEQ was required to submit each field burn request to IDL for review. IDL’s review found that none of the requested fields were subject to the IDL burn ban; however, the process required about 1 week to complete, from submitting the fields for review to obtaining the IDL determination.

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 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	9	207	8	2	2	0	4
Jerome	1	202	8	1	4	0	7
Lincoln	4	216	9	0	0	0	4
Minidoka	16	192	8	5	1	0	9

a. This summary includes all burn decisions issued for 2012. 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 and fire safety burn bans.

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 Northern Magic Valley SMA. Only those weeks when burning occurred are included in Appendix L.

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

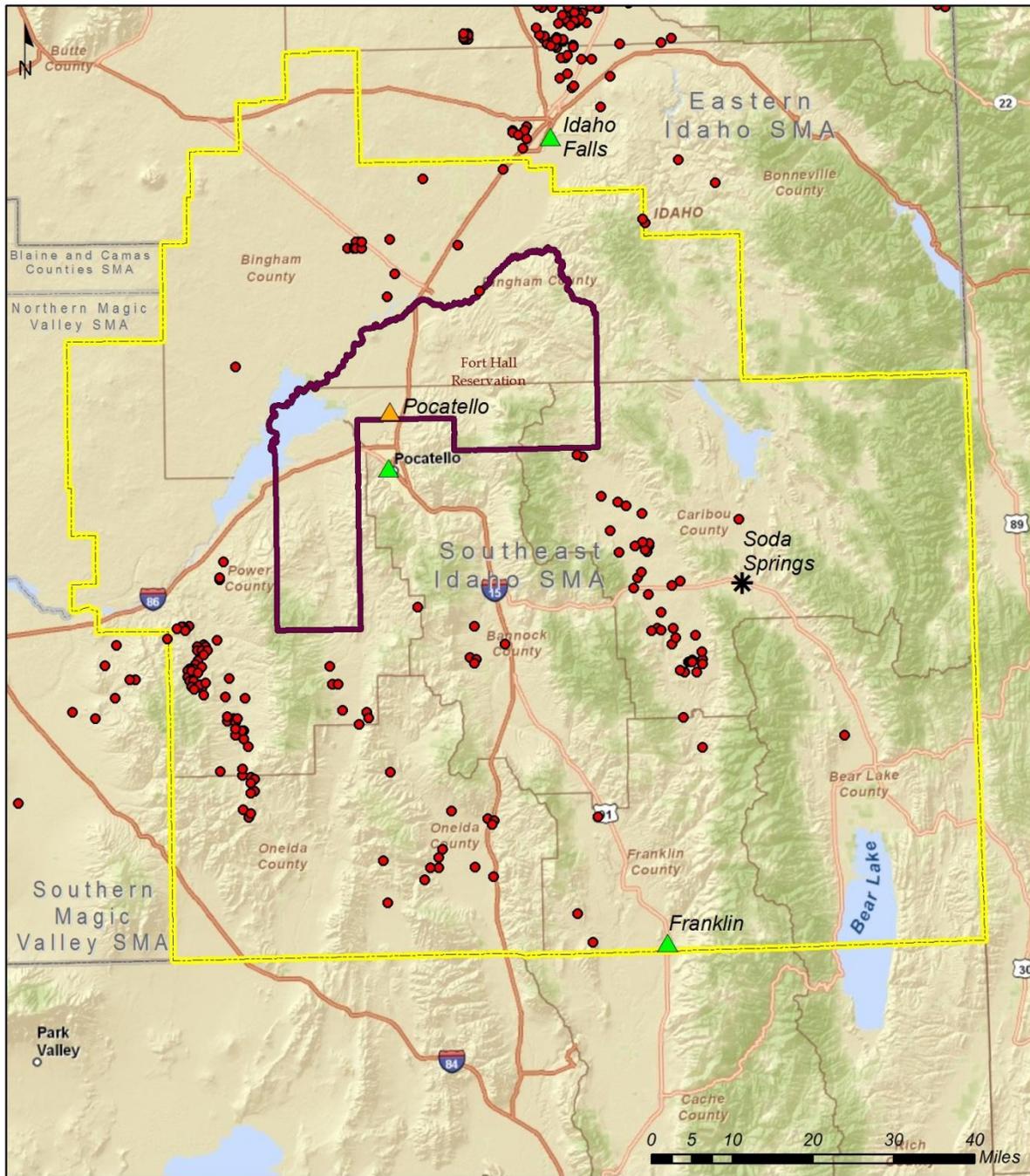
Table 18 shows the acres burned during the spring and fall burn seasons for each crop type during the 2010–2012 burn seasons. Figure 15 shows the locations of fields burned during 2012: 156 fields totaling 19,344 acres were burned in this SMA, and 29 fields (19%) totaling 2,208 acres (11%) were located within 3 miles of an ISP. In 2012, 64 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		
	2010	2011	2012
Spring^a			
CRP	286	2,216	3,716
Cereal grain	1,289	424	514
Other crops	4	0	199
Subtotal	1,579	2,640	4,430
Fall^b			
CRP	3,891	4,395	10,647
Cereal grain	8,270	6,152	4,142
Other crops	43	0	125
Subtotal	12,204	10,547	14,914
Total	13,783	13,187	19,344

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.



2012 Burned Fields
Southeast Idaho
Smoke Management Area

Air Quality Monitors

- Ozone
- ▲ PM_{2.5}, operated by DEQ
- ▲ PM_{2.5}, operated by Shoshone-Bannock Tribe
- * PM_{2.5}, seasonal
- Burned field
- ▭ Reservation Boundaries
- ▭ SMA Boundary

Figure 15. Location of 2012 burns in the Southeast Idaho Smoke Management Area.

4.6.9.2 Daily Burn Decisions and Air Quality

Table 19 shows the summary of 2012 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.

Bannock County was under a fire safety burn ban from June 28 until October 24, while Caribou County was under a burn ban from July 1 until August 27, at which time the burn ban was lifted for irrigated fields only in Caribou County. The burning of nonirrigated crop fields and CRP fields remained prohibited in Caribou County. Many growers were aware of the burn bans, and in Bannock County, no growers requested approval for crop residue burning from DEQ while the burn ban was in effect. In Caribou County, a few growers placed their fields on the ready-to-burn list and requested burn approvals while the burn ban was in place. This difference explains why in Table 19 there are only 2 days for Bannock County listed as no-burn for “other” reasons and 41 days listed as no-burn for “other” reasons for Caribou County.

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 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	11	202	8	8	4	0	2
Bear Lake	1	230	1	1	0	0	0
Bingham	12	198	7	12	3	1	2
Caribou	22	163	2	2	1	0	41
Franklin	4	218	4	7	1	0	0
Oneida	21	188	8	9	6	0	1
Power	38	153	12	12	4	0	11

a. This summary includes all burn decisions issued for 2012. 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 a local fire agency burn bans and 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 and Utah DEQ for the Southeast Idaho SMA. Only those weeks when burning occurred are included in Appendix M.

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 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 2010–2012 burn seasons. Figure 16 shows the locations of fields burned during 2012: 174 fields totaling 9,163 acres were burned in the SMA, and 115 fields (66%) totaling 4,778 acres (52%) were located within 3 miles of an ISP. In 2012, 62 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		
	2010	2011	2012
Spring^a			
CRP	0	0	339
Cereal grain	1,642	1,908	599
Other crops	0	0	0
Subtotal	1,642	1,908	938
Fall^b			
CRP	640	0	60
Cereal grain	14,419	11,709	8,076
Other crops	42	0	89
Subtotal	15,101	11,709	8,225
Total	16,743	13,617	9,163

a. Spring season is January 1–June 30.

b. Fall season is July 1–December 31.

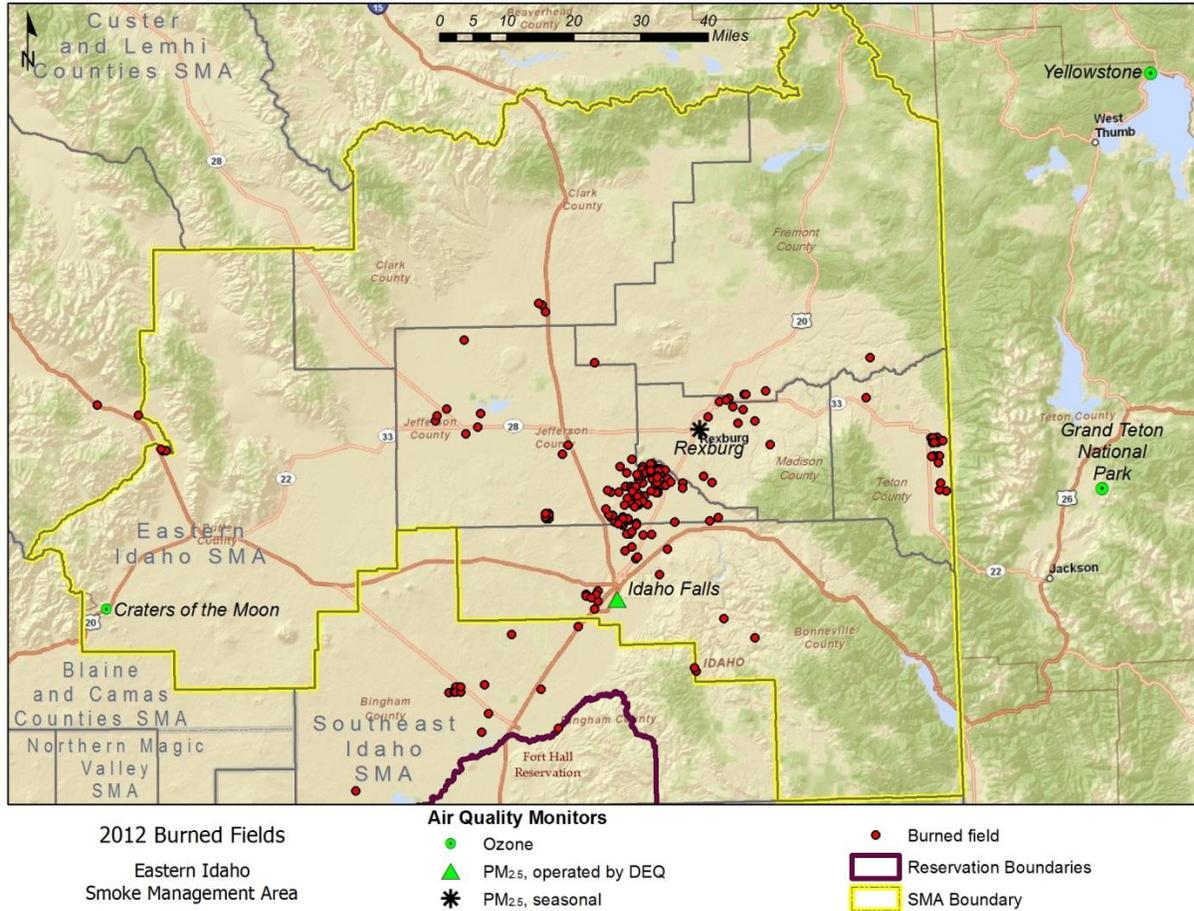


Figure 16. Location of 2012 burns in the Eastern Idaho Smoke Management Area.

4.6.10.2 Daily Burn Decisions and Air Quality

Table 21 shows the summary of 2012 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 and fire safety burn bans. Jefferson, Bonneville, and Teton Counties were under fire safety burn bans for most of August and September.

The primary crop residue burning season of August and September was significantly hampered by wildfire smoke and by county and state fire safety burn bans. By the time the 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 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	208	10	8	4	0	1
Clark	2	219	8	0	0	0	4
Fremont	7	219	1	5	3	0	1
Jefferson	26	158	8	7	3	0	32
Madison	10	197	3	15	4	0	3
Bonneville	17	183	6	5	5	0	18
Teton	6	217	4	0	0	0	6

a. This summary includes all burn decisions issued for 2012. 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 and fire safety burn bans.

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 Eastern Idaho SMA. Only those weeks when burning occurred are included in Appendix N.

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

As DEQ continues to evaluate the implementation and operation of the CRB program, DEQ persistently seeks ways to operate the program more effectively and efficiently without decreasing protection of human health. Subsequent to the evaluation of the 2012 burn season, DEQ determined that no changes were needed at this time to improve the program. However, the CRB Advisory Committee made several recommendations to DEQ. The recommended improvements that were approved by the director are listed below:

- **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.
- **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.
- **Boundary County**—Execute a pilot project in Boundary County to conduct burning under high pressure events, when temperatures are in the range of 80 °–90 °F.
- **Compliance and enforcement**—In the next annual report, clarify the relationship between compliance assistance and enforcement.
- **Monitoring network**—Evaluate the existing 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 EPA to evaluate the usefulness of new portable PM_{2.5} (handheld) monitors.
- **Institutions with sensitive populations (ISPs)**—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 ($26.5 \mu\text{g}/\text{m}^3$) on marginal ventilation days.

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

6. Conclusions

Overall, DEQ considered the 2012 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 $\text{PM}_{2.5}$, only one of these occurrences was likely a direct result of DEQ-approved crop residue burning. DEQ determined that a possible adverse impact to an ISP did result from DEQ-approved crop residue burning. No verified public roadway safety impacts occurred during the 2012 burn season.

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