

Crop Residue Burning Program 2019 Annual Report



State of Idaho
Department of Environmental Quality
March 2020



Acknowledgments

The Idaho Department of Environmental Quality appreciates the Crop Residue Burning advisory committee for their participation in keeping the program processes up to date, the hundreds of growers who tackled registration and reporting on the new application this year, and the DEQ field staff who worked hard to represent the program to our grower partners and the public.

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Abbreviations, Acronyms, and Symbols

CRB	Crop Residue Burning (Program)
CRP	Conservation Reserve Program
DEQ	Idaho Department of Environmental Quality
EPA	United States Environmental Protection Agency
ISP	institutions with sensitive populations
m ³	cubic meter
NAAQS	National Ambient Air Quality Standards
NTC	notice to comply
PCT	pollutant concentration threshold
PM	particulate matter
ppb	parts per billion
SMA	smoke management area
µg	microgram

Executive Summary

The Idaho Department of Environmental Quality (DEQ) works continuously to improve the Crop Residue Burning (CRB) Program. Each year changes are investigated and discussed, and when appropriate, changes are implemented. Changes to the program are considered on their potential to reduce smoke impacts and to improve burning, registration, and permitting processes. In 2019, the CRB Program implemented two program modifications.

During the 2018 calendar year, the advisory committee and DEQ explored options to improve the process of paying for field burning fees. As a result, DEQ submitted a rule and a state implementation plan (SIP) modification that requires growers to pay fees for acreage burned at the end of the burn season rather than 7 days before the proposed burn date. This change was accepted by the Idaho Legislature during the 2019 session, and the new fee schedule was adopted into our program on February 27, 2019. This fee payment schedule is providing streamlined registration as expected. The first annual invoicing effort was completed on January 6, 2020, resulting in a simplified process for the fiscal portion of the program.

In 2019, the CRB Program implemented a web application for grower registration, approval, and reporting to replace an old system that created data and registration problems for both growers and DEQ. Due to the commitment from DEQ's technical, in-house programming, and database staff, we launched the application only slightly behind schedule. The delay did not impact program implementation but did limit opportunities to provide timely outreach and training to our grower partners. With positive feedback on the improvements made to registration and administration functions, we will continue to work to incorporate additional training support and application enhancements when staff is available.

DEQ and the growers who participate in this program continue to operate a successful comprehensive burning program designed to protect public health in Idaho.

The following sections provide additional information and analysis of the CRB Program during the 2019 burn season. Topics from the March 5, 2019, advisory committee meeting are also addressed.

Burn Season Summary

Although most of the agriculture residue burn activity in Idaho occurs in distinct seasons, the CRB Program must make burn decisions for Idaho every weekday for the entire year. Weekends are also evaluated for conditions appropriate for spot and bale permits and propane-flaming burns. In 2019, 21 spot and bale permits were issued for 12 counties. This activity is consistent with prior year spot and burn permit levels.

With the new web application, DEQ included a report feature for spot and bale permits. For growers who use the spot and bale permit, the recordkeeping function provides an easy-to-use option for complying with permit recordkeeping requirements and reduces the need for burn decisions to be processed when permits are completed. To date, only one user reported spot and bale permit records using this new application function.

The acres burned under spot and bale permits and propane-flaming are not included in the acreage totals for this annual report, but these added 280 acres to the statewide totals reported (number of spot and bale permits times 10 acres per permit).

In 2019, spring burning made up 10% of the total acreage, which is the same breakout as the 2018 spring burning where 9% of the total acreage was burned. The previous 5 years of data show an average of 14% of burning occurs in the spring. The total crop residue acreage burned for 2019 was 34,123, which is a decrease from the 40,536 acres burned in 2018 and is the lowest acreage burned since program adoption in 2008. The average acres burned per year since the program began is 47,673 acres.

Much of the 2019 agriculture field burning season was hampered by precipitation. In September several areas experienced traces of snowfall. Periods of rain and cooler temperatures affected field and fuel conditions, limiting burning opportunities.

The original SIP anticipated the CRB Program would burn over 200,000 acres of cereal grain stubble annually by the 2015 season. Cereal grain and other stubble burning remains at levels less than 15% of the SIP burning assumption. The percentage of acres of cereal grain residue burned compared with the total acres of cereal grain harvested in Idaho remains consistently at or below 3% since 2008. In 2019, just over 25,000 acres of cereal grain stubble were burned. This amount represents 1.5% of the acres harvested based on average harvest data. Data from 2012–2017 report the 6-year average of cereal grain acres harvested in Idaho is 1.8-million acres (https://www.nass.usda.gov/Statistics_by_State/Idaho/index.php).

During the 2019 burn season, 3,578 acres of Kentucky Bluegrass residue was burned. Idaho code limits Kentucky Bluegrass residue burning to 20,000 acres per year without an additional emissions evaluation. Idaho growers are consistently burning about 15% to 20% of the program's design limits for Kentucky Bluegrass residue.

In 2019, 1,742 Conservation Reserve Program (CRP) acres were registered with only 208 acres burned. This crop type has the most variability for acres per year over the life of the program. The CRP operates under contracts that could expire in 10 years if not renewed or have midterm management requirements that are unknown to DEQ. Once CRP land is expired, it may be burned in an effort to return the land to production. At times, burning specific CRP land is required for mid-contract management.

Air Quality Summary

DEQ operates the CRB Program under specific guidelines and procedures designed to protect public health, avoid adverse impacts to institutions with sensitive populations, and avoid public roadway safety hazards. These guidelines and procedures are included in the *Crop Residue Burning Program Operating Guide* (DEQ 2019). DEQ reviews the operating guide annually and, after consulting with the advisory committee, updates procedures based on the lessons learned in the field and any improvements in smoke management techniques discovered during the year. DEQ carefully evaluates the program's effectiveness in meeting its goals and adherence to the established procedures (DEQ 2019, section 4).

An evaluation of air quality data collected throughout the 2019 burn season indicated that approved crop residue burning occurred during 13 instances where pollutant concentrations exceeded program-defined postburn concentration thresholds (section 4.1). Evaluating the meteorology, timing of DEQ-approved burns, and field locations relative to the monitors that recorded the exceedances of the program-defined postburn concentration thresholds revealed DEQ-approved crop residue burning likely contributed to four of these impacts. No health concerns were reported resulting from any approved crop residue burning in 2019.

1 Introduction

This report analyzes the Idaho Department of Environmental Quality (DEQ) Crop Residue Burning (CRB) Program for the 2019 burn season. DEQ is required by the “Rules for the Control of Air Pollution in Idaho” (IDAPA 58.01.01.622.02) to prepare an annual report that, at a minimum, analyzes the causes of any exceedance of the program-defined ambient air Pollutant Concentration Thresholds (PCT) and assesses the circumstances related to any reported endangerment to human health associated with a crop residue burn (section 4). This report also summarizes program updates undertaken in 2019, including outreach efforts over the past year, analyses of the 2019 burn season, and advisory committee recommendations.

2 2019 Program Updates

The annual CRB Program advisory committee meeting was held in Boise, Idaho, on March 5, 2019. The advisory committee made no formal recommendations for program enhancements for this coming year, but they made the following requests:

- Schedule the annual advisory committee meeting to coincide with the annual Ag Expo, which occurs in late February each year.

DEQ Response—With approval of the advisory committee chair, DEQ scheduled the advisory committee meeting for February 18, 2020.

- Seek candidates interested in serving as an environmental representative on the advisory committee.

DEQ Response—DEQ posted a request for candidates through print media, Facebook, and Twitter on October 18, 2019.

3 Outreach for the 2019 Burn Season

Outreach remains an important component of the CRB Program with two main objectives: public awareness and grower education. In 2019, DEQ continued to use a variety of outreach methods: distributing brochures; providing telephone hotlines; maintaining an internet website with public and grower sections; maintaining an email list service; communicating directly with fire and sheriff departments; county representatives; and visiting institutions with sensitive populations (ISPs) (e.g., schools, hospitals, and assisted living facilities). Additionally, DEQ used social media posts as another outreach method. DEQ’s Twin Falls Regional Office continued to issue Public Service Announcements through local radio stations and purchased an advertisement in a local movie theater to highlight the CRB Program.

To announce the launch of the CRB Program’s new web application for grower registration, approval, and reporting on June 10, 2019, DEQ sent 1,042 emails and 1,273 postcards to current and past registered growers. Planned outreach events to highlight the new application could not be scheduled due to the uncertainty of the application delivery date to DEQ. Fortunately, the new

online application tool proved to be user friendly, and only minor enhanced training efforts were needed.

Current education and outreach opportunities are effective, and DEQ will continue to look for opportunities to provide information to local and regional grower associations in 2020.

4 Burn Season Analysis

To manage the CRB Program, the state is divided into 13 smoke management areas (SMAs) based on the similarity of meteorological conditions, topography, presence or absence of crop residue burning activity, and proximity to DEQ regional offices (Figure 1). This burn season analysis examines statewide air quality impacts, complaints, compliance and enforcement, monitoring network, meteorology, and summary of burn decisions during 2019.

4.1 Air Quality Impacts

The CRB Program evaluated compliance with the PCT, considered circumstances surrounding approved burning on days when measured pollutant concentrations were above the PCT, and determined possible adverse impacts to ISPs. DEQ also completed a burn day analysis for a burn day that triggered 11 complaints from a downwind community.

4.1.1 Program Concentration Threshold Compliance

To approve a request to burn, DEQ must determine that ambient air quality levels meet three criteria: (1) do not exceed 90% of the ozone National Ambient Air Quality Standard (NAAQS) and 75% any other NAAQS on any day; (2) are not projected to exceed the NAAQS 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 PCT for the pollutants of concern for crop residue burning—given as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of particulate matter 2.5 ($\text{PM}_{2.5}$) or PM_{10} , or parts per billion (ppb) of ozone—are defined as follows:

- $\text{PM}_{2.5}$ 1-hour average ($64 \mu\text{g}/\text{m}^3$)
- $\text{PM}_{2.5}$ 24-hour average ($26 \mu\text{g}/\text{m}^3$)
- PM_{10} 1-hour average ($308 \mu\text{g}/\text{m}^3$)
- PM_{10} 24-hour average ($112 \mu\text{g}/\text{m}^3$)
- Ozone 8-hour average (63 ppb)

For this report, DEQ did not evaluate days on which no crop residue burning was approved. For days when measured $\text{PM}_{2.5}$ or ozone levels were above the PCT and crop residue burning was approved and conducted, DEQ evaluated the location of the permitted burns, timing of the burn, and weather conditions in relation to the air quality monitoring data to determine if the air quality impacts could be attributed to DEQ-approved burns. These reviews identified potential areas of improvement to the program or decision-making processes.

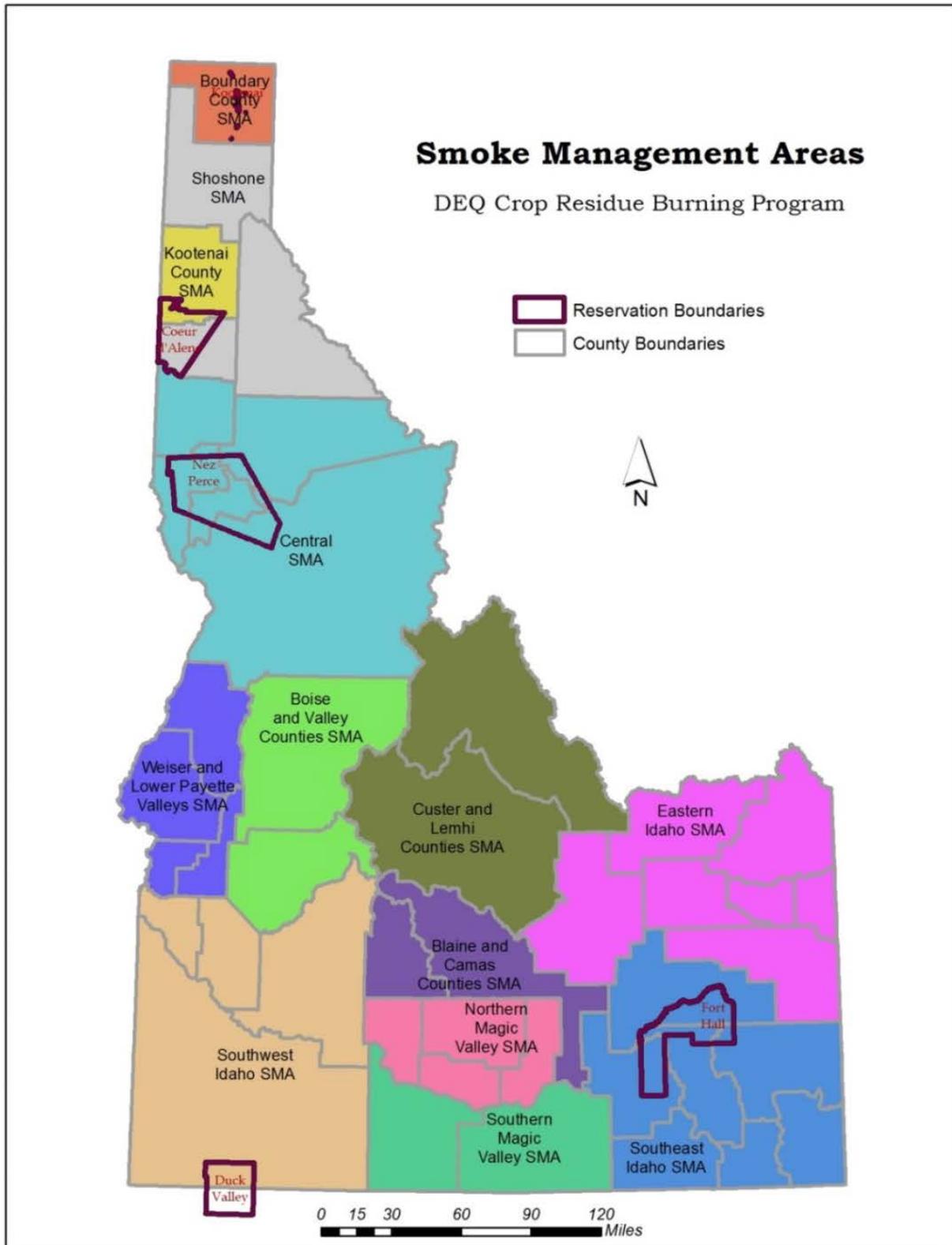


Figure 1. Idaho smoke management areas.

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

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

DEQ relies upon a network of air quality monitors to evaluate compliance with the PCT. Monitors within this network that recorded values above the PCT are identified in section 4.1.2. This monitoring network is detailed in the *Crop Residue Burning Program Operating Guide* (DEQ 2019), and includes a statewide network of real-time and continuous PM_{2.5} monitors operated year-round, nine additional real-time continuous PM_{2.5} monitors deployed to increase geographic coverage during the burning seasons, and a combination of in- and out-of-state ozone monitors. In addition to monitoring data from this network, daily forecasting and burn decisions incorporate ozone forecast model data from the *National Weather Service* and *Washington State University Airpact*. Air quality monitors in locations where crop residue burning does not occur were not evaluated for PCT exceedances in 2019.

In addition to the PCTs described above, DEQ evaluated the effectiveness of the CRB Program by using the PM_{2.5} 4-hour average concentration preburn and postburn triggers of 22 µg/m³ and 32 µg/m³, respectively; the PM_{2.5} 24-hour average concentration preburn trigger of 16 µg/m³; and possible visibility hazards on public roadways. The 4-hour average concentrations can identify potential particulate sources that last longer than 1 hour but less than 24 hours. A typical time frame for a crop residue burn is between 1 to 2 hours.

DEQ uses four ozone monitors located throughout Idaho and three ozone monitors located in Washington, Wyoming, and Utah. Approved crop residue burning is typically at least 50 miles, and in many cases 100 miles or more, from any ozone monitor. DEQ uses ozone models to assist with forecasting ozone concentrations. DEQ considers smoke from crop residue burning to have little if any impact on ozone concentrations. The impact of crop burning in Idaho on ozone concentrations is documented in the *2017 Crop Residue Burning Ozone State Implementation Plan Revision* (DEQ 2017).

4.1.2 Evaluation of Burn Days

The following days are listed because approved crop residue burning was conducted, and monitoring values were recorded at concentrations above a PCT. DEQ uses wind data and documentation of observations by field staff to determine if DEQ-approved burning is reasonably suspected to have caused or contributed to the measured concentrations above a PCT. The program thresholds are not NAAQS. The information below is a brief overview of the burn days with concentrations above PCTs. Enhanced documentation was completed for each of the following dates and is stored in DEQ's CRB application.

Preburn 4-Hour Average PM_{2.5} Concentration Triggers above 22.0 µg/m³

September 4, 2019—The Soda Springs monitor exceeded the 4-hour preburn threshold at 36.5 µg/m³. The monitor values were suspect during this period due to local observations, and concentrations were forecast much lower. In addition, with the proximity of the proposed burn and favorable surface and transport winds forecast for the day, no impact was expected. Monitor

maintenance was conducted in the morning and resulted in concentrations averaging $6.0 \mu\text{g}/\text{m}^3$ throughout the burn window.

October 11, 2019—The Potlatch monitor exceeded the 4-hour preburn trigger at $22.1 \mu\text{g}/\text{m}^3$. Ventilation was expected to improve and support good smoke management. By 9:00 a.m. the 4-hour preburn concentration improved to $15.5 \mu\text{g}/\text{m}^3$ and continued to improve throughout the day. At start of the burn window, the 4-hour concentration was $7.6 \mu\text{g}/\text{m}^3$.

Preburn 24-Hour Average $\text{PM}_{2.5}$ Concentration Trigger above $16.0 \mu\text{g}/\text{m}^3$

There were no instances during 2019 where burning was approved when conditions exceeded the 24-hour preburn trigger.

Postburn $\text{PM}_{2.5}$ 1-Hour Average Exceedance above $64 \mu\text{g}/\text{m}^3$

There were no instances during 2019 where burning was approved when conditions exceeded the postburn $\text{PM}_{2.5}$ 1-hour threshold of $64.0 \mu\text{g}/\text{m}^3$.

Postburn $\text{PM}_{2.5}$ 4-Hour Average Exceedance above $32 \mu\text{g}/\text{m}^3$

There were no instances during 2019 where burning was approved when conditions exceeded the postburn $\text{PM}_{2.5}$ 4-hour threshold of $32.0 \mu\text{g}/\text{m}^3$.

Postburn Ozone 8-Hour Concentration Exceedance above 63 ppb

There were no instances during 2019 where burning was approved when conditions exceeded the postburn ozone 8-hour threshold of 63.0 ppb.

Postburn Visibility Impacts

August 26, 2019—An approved crop residue burn in the eastern Idaho SMA contributed to visibility impacts at two nearby ISPs. DEQ staff was on site to provide observations. Wind direction shifted from northeast to east during burn. Limited ground-level smoke moved toward the ISPs. Crop residue burning is reasonably suspected to have caused or contributed to the visibility impairment. DEQ contacted the ISP, and there were no adverse impacts reported.

August 27, 2019—Visibility in Boundary County was reduced due to poor dispersion conditions that developed later in the burn window. An earlier burn in the same area resulted in favorable conditions of smoke transport and dispersion. The second and third fields approved contained heavier fuel loads and generated thicker smoke plumes with limited transport and dispersion. Smoke settled to ground level and drifted towards Creston, British Columbia, Canada impacting the Porthill monitor with concentrations less than PCT. Crop residue burning is reasonably suspected to have caused or contributed to the visibility impairment. There were no ISP impacts. Several complaints were received from Creston.

4.1.3 Institutions with Sensitive Populations

DEQ is prohibited from approving a request to burn if conditions will adversely impact an ISP or if the plume is predicted to impact an ISP. To safeguard these populations, DEQ uses procedures,

such as maintaining a current database of all known ISPs with 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 DEQ personnel on site and providing final approval to burn for fields within 3 miles of an ISP (with some exceptions). DEQ staff frequently conduct an in-person examination of ISPs near proposed crop residue burns to ensure the location and operational status of the ISP is accurate.

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

- When a monitor is present and the maximum hourly $PM_{2.5}$ concentration is below $20.0 \mu\text{g}/\text{m}^3$ (or visibility is at least 10 miles if no monitor is available):
 - Conclude that no adverse impact occurred.
 - If a complaint is received from an ISP, full evaluation and enhanced documentation will be completed. No additional documentation is needed unless DEQ receives a complaint from an ISP.
- When a monitor is present and the maximum hourly $PM_{2.5}$ concentration is between 20.0 and $26.2 \mu\text{g}/\text{m}^3$:
 - Conclude adverse impact unlikely.
 - Briefly evaluate the following to determine whether an adverse impact occurred:
 - Monitoring data
 - Weather data
 - Field notes
 - If a complaint is received from an ISP, enhanced documentation and an evaluation will be completed.
- When a monitor is present and the maximum hourly $PM_{2.5}$ concentration is greater than $26.2 \mu\text{g}/\text{m}^3$ (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:
 - Monitoring data
 - Weather data
 - Field notes
 - Contact ISP to complete the enhanced documentation form and document ISP responses.

The following discusses the 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 $20.0 \mu\text{g}/\text{m}^3$ or more.

Postburn $PM_{2.5}$ 1-hour Average Exceedance between 20.0 and $26.2 \mu\text{g}/\text{m}^3$

Eight instances occurred where $PM_{2.5}$ concentrations exceeded $20.0 \mu\text{g}/\text{m}^3$ but were below $26.2 \mu\text{g}/\text{m}^3$. DEQ conducted a brief evaluation of these occurrences and concluded that approved crop residue burning was unlikely to have caused an adverse impact. Impacts from wildfire smoke likely contributed to the slight increase of $PM_{2.5}$ levels in most instances. The dates and monitors are provided below:

March 22, 2019—Canyon County: The Nampa PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 25.0 µg/m³ at 5:00 p.m. One field was approved in Canyon County for 6 acres. The approved burn was reported to be out by 2:30 p.m. Observed winds were from the northwest and dispersed smoke away from ISPs and the monitor location. Due to the size, location, timing, and wind direction, burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT.

August 19, 2019—Idaho County: The Grangeville PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 25.0 µg/m³ at 4:00 p.m. All other hourly concentrations were single digits throughout the burn window to midnight. A test burn of 40 acres of bluegrass and a 10-acre bluegrass field were completed. Based on surface and transport dispersion and other open burning sources in the area, the field staff did not proceed with additional burning. Wind observed were approximately 12 miles per hour (mph) from the north-northeast taking smoke from the DEQ-approved burn away from the monitor at the time of the monitor impact. Due to the size, location, timing, and wind direction, DEQ-approved burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT.

August 21, 2019—Owyhee County: The Nampa, Garden City, and St. Lukes PM_{2.5} monitors exceeded program concentration thresholds with a maximum hourly concentration of 23.0 µg/m³ at 9:00 p.m. All field burns in Owyhee County were completed by 4:10 p.m. Smoke dispersion for this day was observed as good with no smoke impacts noted. The increased concentrations can be attributed to area source wind-blown dust from a high wind event that occurred between 9:00 p.m. and 1:00 a.m., impacting all air quality monitoring sites throughout Canyon and Ada Counties. Burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT.

September 13, 2019—Idaho County: The Grangeville PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 23.0 µg/m³ at 4:00 p.m. The other recorded hourly exceedance of 22.0 µg/m³ was at 3:00 p.m., with overwhelmingly single-digit hourly concentrations throughout the remainder of the day. Winds in the area were from the north and northwest and consistently moved smoke from approved burns away from the ISPs and the monitor location. Due to the observed wind direction and burn locations, approved burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT. Cumulative effects from multiple burning sources, including prescribed and other agriculture burning reportedly active in the area, may have contributed to the short-lived elevated concentrations.

September 16, 2019—Idaho County: The Grangeville PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 23.0 µg/m³ at 2:00 p.m. Winds in the area were from the north and northwest and consistently moved smoke from approved burns away from the ISPs. Good fast burns were reported throughout the burn area, except for one slow-burning cereal grain stubble field located 7 miles northeast of Grangeville. Over 1,000 acres were approved for burning. With observed winds from the northwest, approved burning was not reasonably suspected to have caused or contributed to

the measured concentrations above the PCT. The Cottonwood PM_{2.5} monitor measured single-digit concentrations throughout the day.

September 17, 2019—Latah County: The Juliaetta PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 23.0 µg/m³ at 6:00 p.m. Hourly single-digit concentrations were recorded throughout the remainder of the day. The day was partly sunny, and cool light winds out of the south-southwest moved smoke away from populated areas. Burns were reported to go well, with high plume heights dispersing nicely. Visibility of 10 miles was noted immediately after the burn. Due to the location and observed wind direction, the 275 acres approved for burning by DEQ was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT. Other burns in area could have contributed to the impact considering the wind direction.

October 16, 2019—Latah County: The Moscow PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 25.0 µg/m³ at 6:00 p.m. Winds were from the east-southeast to southeast at 5 to 6 mph during the burn window. Visibility was excellent. Good smoke dispersion was noted by field staff. The 44 acres approved by DEQ were burned and completed by 2:00 p.m. Ventilation was forecast as limited to good with mixing heights between 1,000 and 2,000 feet above ground level. Due to the size, location, timing of the burn, and low mixing heights, DEQ-approved burning could have caused or contributed to the measured concentrations above the PCT. Other sources could have also contributed to the elevated concentrations. No ISPs reported impacts.

October 25, 2019—Washington County: The St. Lukes, Garden City, and Nampa PM_{2.5} monitors exceeded program concentration thresholds with a maximum hourly concentration of 23.0 µg/m³ at 9:00 p.m. Air quality levels remained in the single digits for PM_{2.5} throughout the afternoon until around 6:00 p.m. when levels started to climb on a regional basis. All three PM_{2.5} monitors in the Treasure Valley and three outlying monitors experienced the same gradual increase through the evening with multiple hourly readings over 20 µg/m³. The three approved burns were reported complete by 2:30 p.m. Due to the small combined field size (61 acres), distance from air quality monitors, pre- and post-PM_{2.5} readings, and timing of the increased levels later in the evening, approved burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT.

Postburn PM_{2.5} 1-hour Average Exceedance above 26.2 µg/m³

Five instances occurred where PM_{2.5} concentrations exceeded 26.2 µg/m³. DEQ evaluated these occurrences and concluded that approved crop residue burning was likely to have contributed to three of these occasions. No adverse impacts were reported to DEQ during direct contact and interview of ISP personnel. Impacts from wildfire smoke, prescribed fire or other agriculture burning activities likely contributed to the slight increase of PM_{2.5} levels in two instances. The dates and monitors are provided below:

August 5, 2019—Idaho County: The Grangeville PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 27.0 µg/m³ at 9:00 p.m. The observed winds were out of the east-northeast and northeast at 2 to 6 mph during the

burn. Wildfire smoke coming into the affected area was noted as one possible contributor. Due to the burn location and size of burn (61 acres), approved burning was not reasonably suspected to have caused or contributed to the measured concentrations above the PCT. DEQ contacted the Grangeville hospital, and no adverse impacts were reported.

August 20, 2019—Minidoka, Lincoln Counties: The Minidoka PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 27.0 µg/m³ at 9:00 p.m. The measured winds near this monitor were out of the north-northwest backing to the west and leading up to the measured concentration. During the burn window, winds were out of the north-northwest. Field size was 47 acres, and location was approximately 16 miles north-northwest of the monitor. Due to the size, location, and timing of the burns, approved burning it is reasonably suspected to have caused or contributed to the measured concentrations above the PCT. There were no ISPs in the vicinity, and no adverse impacts were reported.

August 27, 2019—Idaho County: The Grangeville PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 52.0 µg/m³ at 3:00 p.m. The observed winds were out of the north at approximately 4 mph during the burn window. Field was 180 acres of bluegrass stubble located approximately 5 miles north of the Grangeville monitor. Limited ventilation was forecast for the day. A late burn and narrow window was identified to allow for limited burning. Ignition started at 2:00 p.m. and concluded at 3:30 p.m. Due to the field location, size, and distance to the monitor, approved burning is reasonably suspected to have caused or contributed to the measured concentrations above the PCT. DEQ contacted nearby ISPs, and no issues or complaints were reported.

September 4, 2019—Idaho County: The Grangeville PM_{2.5} monitor and Cottonwood PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 52.0 µg/m³ at 5:00 p.m. at the Grangeville PM_{2.5} monitor. Wind observed during the burn window and impact time was north to south at 2 to 5 mph. The Grangeville PM_{2.5} monitor remained elevated above PCTs until 10:00 p.m. when a concentration of 19.0 µg/m³ was recorded. Air quality remained relatively elevated into the next day. Reported wildfire and prescribed fire smoke along with the acreage from the approved crop residue burning is reasonably suspected to have caused or contributed to the measured concentrations above the PCT. DEQ contacted all listed ISPs in Grangeville, and no adverse impacts were reported. While no problems were reported by the local hospital, hospital staff noted a slight increase in allergy-type symptoms/complaints from patients. An employee from a local assisted living facility reported an asthma attack.

October 23, 2019—Idaho County: The Cottonwood PM_{2.5} monitor exceeded program concentration thresholds with a maximum hourly concentration of 35.0 µg/m³ at 8:00 p.m. Winds were from the southwest at approximately 5 mph during the burn window. A prescribed burn outside of Idaho was noted directly southwest of Cottonwood. Two acres of the 70 acre approved burned were completed. The field is located approximately 11 miles south-southeast of the monitor. Due to the size, location, wind direction, and timing, approved crop residue burning is not reasonably suspected to have caused or contributed to the measured concentrations above the PCT. There were no ISPs in the vicinity, and no adverse impacts were reported.

4.2 Complaints

Complaint response remains a critical part of DEQ's Air Quality Program as a whole and the CRB Program specifically. As with ambient monitoring or meteorological data, complaints provide smoke managers with information to help them understand how the public perceives burning, air quality, and smoke behavior in areas that do not have monitors. DEQ uses complaint information such as location, content, and circumstances to improve future burn decisions. Some complaints involve smoke from crop residue burning conducted within the CRB Program. Other complaints involve crop residue burning conducted outside DEQ's CRB Program, such as burning an unregistered field, burning on a no-burn day, crop residue burning conducted on tribal land, prescribed burning, wildfire smoke, and smoke from field burning in other states.

This year, DEQ used the toll-free hotline number identified in IDAPA 58.01.01.623.02d for the public to submit questions, comments, and complaints. DEQ, in cooperation with the Nez Perce and Coeur d'Alene Tribes, used a contractor to answer and document these calls. Information from each call was emailed to CRB Program staff to provide immediate feedback for burn coordinators considering burn decisions throughout the day. 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

DEQ follows up with all hotline complaints, contacts the complainants directly when requested, and documents the follow-up in the Complaint Tracking System database. In addition to the complaint hotline, DEQ's regional offices directly receive questions, comments, and complaints. DEQ smoke management staff follows up on these complaints and enters them into DEQ's Complaint Tracking System. Table 1 shows the total number of crop residue burning complaints received by SMA, including those related to DEQ's CRB Program and those from non-DEQ crop residue burning and other smoke events.

Although complaints occur during burning, some complaints are general in nature and do not provide real-time feedback for decision-making or reporting health impacts.

In 2019, DEQ received 20 complaints; 12 which were likely associated with approved crop residue. Appendix A provides further information about these complaints.

Table 1. Summary of complaints responded to by the CRB Program during 2019.

Smoke Management Area ^a	Total Crop Residue Burning-Related Complaints	Complaints Likely Associated with Approved Crop Residue Burning	Complaints Associated with Other Smoke Sources ^b
Central	2	1	1
Boundary	15	11	4
Southwest Idaho	2	0	2
Eastern Idaho	1	0	1

a. Smoke management areas with no related complaints during 2019 are not included.

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

4.3 Compliance and Enforcement

DEQ's existing Air Quality Division Compliance and Enforcement Program is used for CRB Program enforcement when needed. DEQ continued to focus on compliance assistance during 2019, with the goal of educating growers new to the program about their permits and requirements and assisting them in complying with those requirements. Where a violation was documented and an enforcement action was appropriate, DEQ continued to use both informal and formal enforcement tools.

During 2019, DEQ issued two notices to comply (NTC). An NTC is issued in lieu of a notice of violation and is usually minor in nature. A NTC was issued for one grower who failed to register with the program, and the second NTC was issued to a grower who burned on a burn day without direct approval. Two letters were issued during 2019 enforcement response. One letter communicated with a grower struggling to understand the field burning approval requirements. The second letter documented the education and outreach efforts used to address the grower burning without a valid registration. A total of 125 acres were burned outside of the CRB Program. DEQ invoiced the acres burned outside of the program during the annual invoice process in January 2020.

4.4 Crop Residue Burning Ambient Air Quality Monitoring Network

DEQ continued to operate the existing air quality monitors and additional seasonal CRB Program PM_{2.5} monitors during 2019. Figure 2, Figure 3, and Figure 4 show the locations of monitors in the northern, central, and southern Idaho SMAs, respectively.

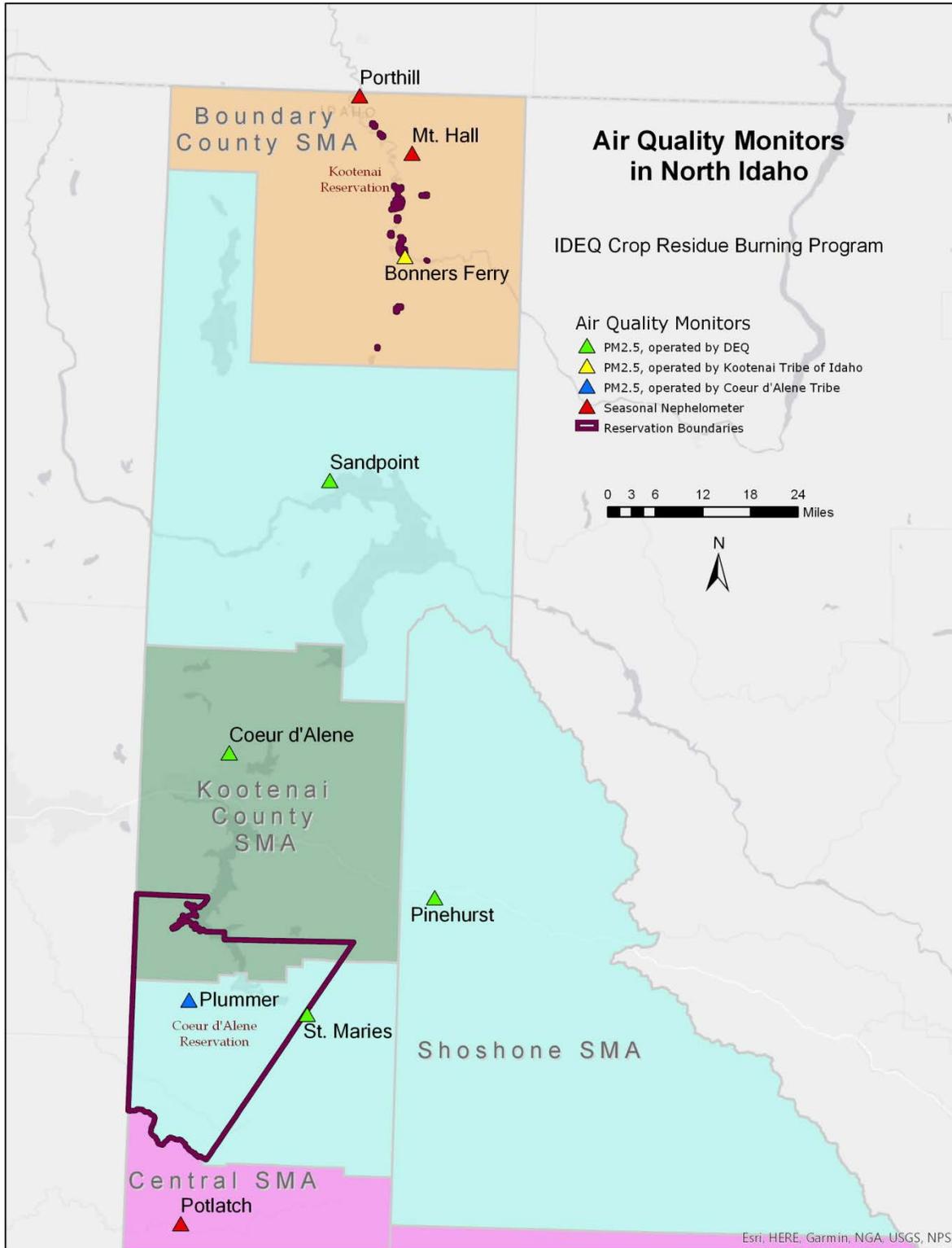


Figure 2. Air quality monitor locations for the northern Idaho SMA.

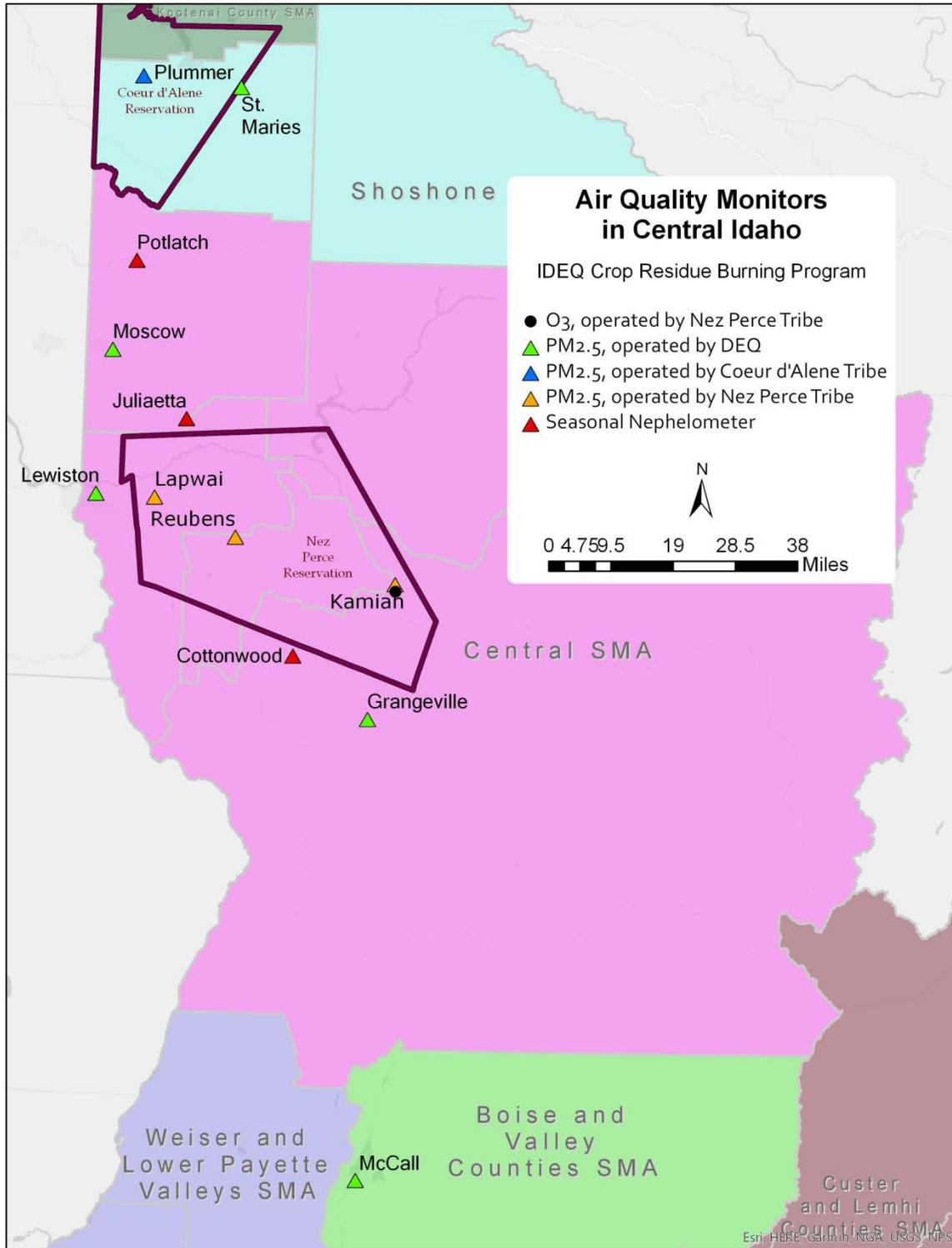


Figure 3. Air quality monitor locations for the central SMA.

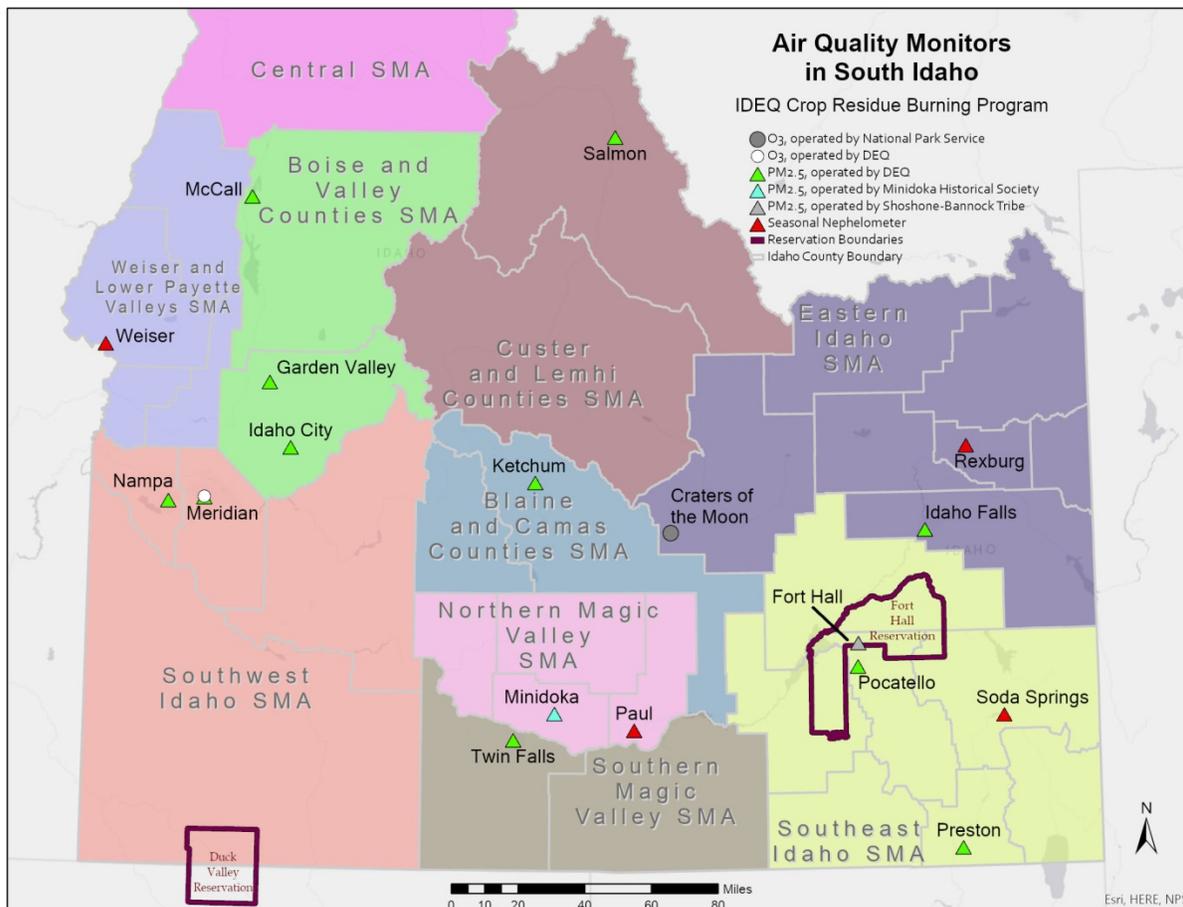


Figure 4. Air quality monitor locations for the southern Idaho SMA.

4.5 Meteorology

The CRB Program meteorologists use a variety of weather forecasting tools to evaluate many parameters during the burn decision process, including surface wind speed, surface wind direction, atmospheric mixing height, transport wind speed, transport wind direction, maximum temperature, minimum relative humidity, cloud cover, probability of precipitation, and general weather. In addition, DEQ seasonal smoke specialists conduct *in-situ* observations of meteorological conditions to assist in verifying smoke dispersion forecasts.

Forecast weather models reportedly performed well during the 2019 CRB season. Some models continue to struggle in complex terrain. High resolution models (e.g., High-Resolution Rapid Refresh and Weather Research and Forecasting) were used successfully to augment complex terrain forecasting, highlighting the need for a multi-model approach to accurate smoke management forecasting.

In 2019 DEQ increased meteorologists available to the CRB Program, which allowed increased coverage, more detailed products, and greater flexibility. Field tours to northern Idaho are planned for the 2020 burn season as well as increased training for complex terrain-driven boundary layer dynamics.

Appendix B contains a summary of the meteorological conditions throughout the state during the fall burn season.

4.6 Burn Day Analysis

A burn day analysis is used to investigate unexpected smoke dispersion conditions in an effort to avoid those meteorological and field conditions in the future. Analysis can be used when smoke dispersion results in a complaint, when roadway visibility is reduced, or other factors that suggest the burn decision process should be investigated.

A burn day analysis is prepared by DEQ meteorologists and field and CRB Program staff. The team analyzes the forecast, meteorological conditions observed during the burn, and field conditions. Results from the analysis reveal why smoke dispersion was hindered, and the information is used in future burn decisions when similar field and meteorological conditions are present.

One burn day analysis for Boundary County was conducted on August 27, 2019, due to poor smoke dispersion that resulted in 11 complaints from Creston, British Columbia, Canada.

A burn recommendation of “Conditional” was provided by DEQ meteorologists for light winds and limited-to-good ventilation. Forecast winds were south-southwest at 2 to 8 mph. Mixing heights were forecast to range from 3,000 to 7,000 feet above ground level in the afternoon, depending on location. The burn decision for Boundary County required a test burn and, if local conditions were supported, up to 600 acres could be approved by on-site field staff.

A total of 555 acres were burned in the SMA. The 65-acre wheat stubble test burn emitted minimal smoke, and dispersion was good, so additional fields were approved by on-site field staff. The second field was 220 acres of barley stubble. This burn went well, but the heavy fuel load generated increased smoke. Smoke transport was slow, but plume rise was good. The third burn approved was a 270-acre barely stubble field. Heavy fuel load in the barley field also generated increased smoke; however, the smoke did not transport away from the valley and ultimately cooled and dropped back down to the surface before drifting down valley toward Creston, British Columbia, Canada. The smoke did not impact any program-identified ISPs.

After reviewing the meteorological data, the meteorological team determined the current model runs handled initialization correctly and could be relied upon in the decision. Based on the analysis, DEQ concluded that the heavy fuel load and subsequent smoke generated from burning 490 acres of barley stubble was too much for the airshed to handle on the afternoon of August 27, 2019. The ventilation conditions, at the time of the two later burns, appeared to be inadequate to support the amount of smoke generated.

4.7 2019 Burns

During 2019, 34,123 acres of residue were burned statewide under the CRB Program. The majority of the burning (90%) occurred during the fall burn season.

For this review, the acres burned under the CRB Program are broken down by burn season and crop type. Crop types include Kentucky Bluegrass, other grass species, cereal grain, corn, alfalfa,

pastures, other crops, and CRP lands. This section includes the total number of burn days and justification for no-burn days. Appendix A contains the summary of all acres burned in 2019.

Figure 5 shows the number of acres burned in Idaho under the CRB Program since 2008.

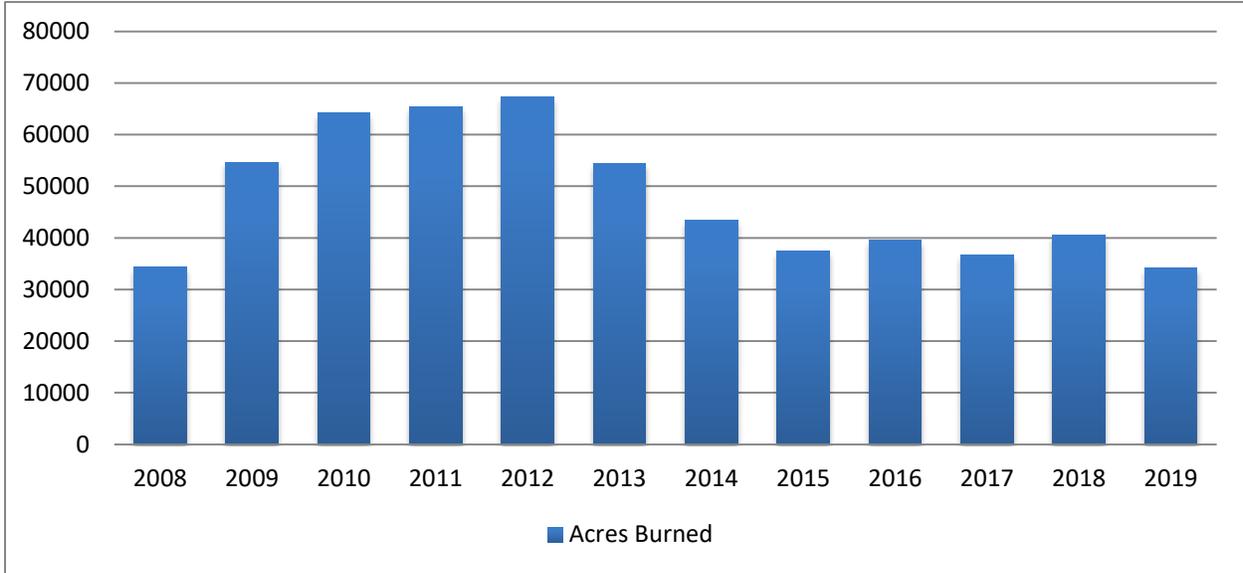


Figure 5. Acres burned in Idaho since 2008.

4.7.1 Acres Burned By Crop

Since 2008, DEQ consistently burns between 1% and 3% of all cereal grain acres harvested in the Idaho. In 2019, 75% of all acres burned were cereal grain. Figure 6 shows the relationship between cereal grain acres burned and harvested while Figure 7 shows the percentage of cereal grain acres burned.

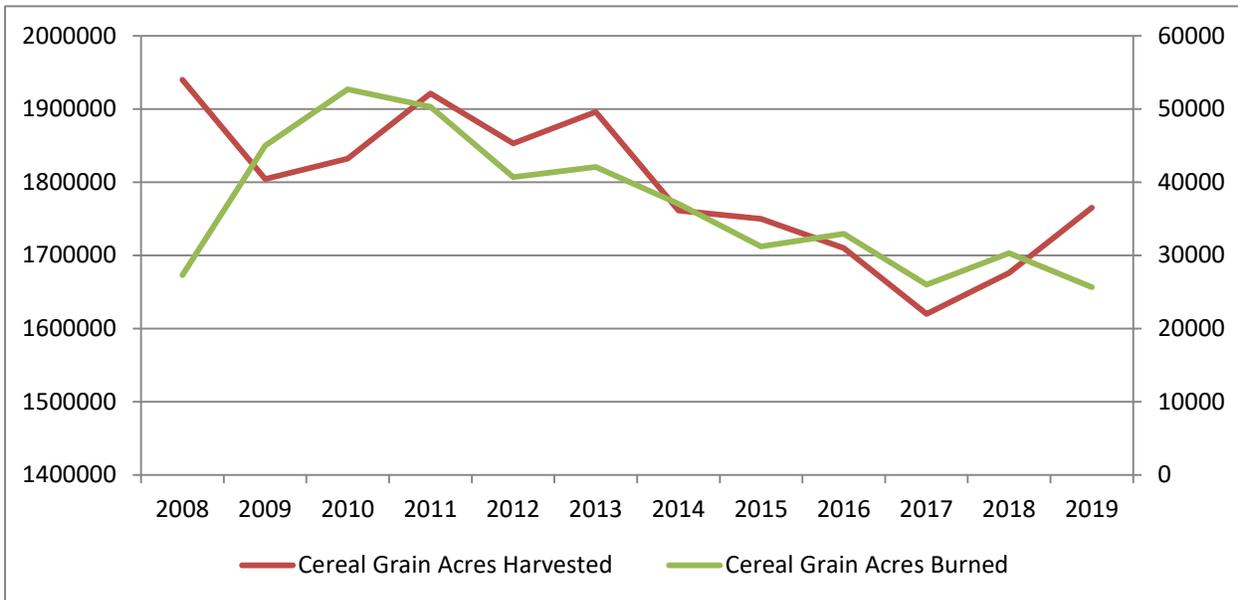


Figure 6. Cereal grain acres burned in relationship to cereal grain acres harvested.

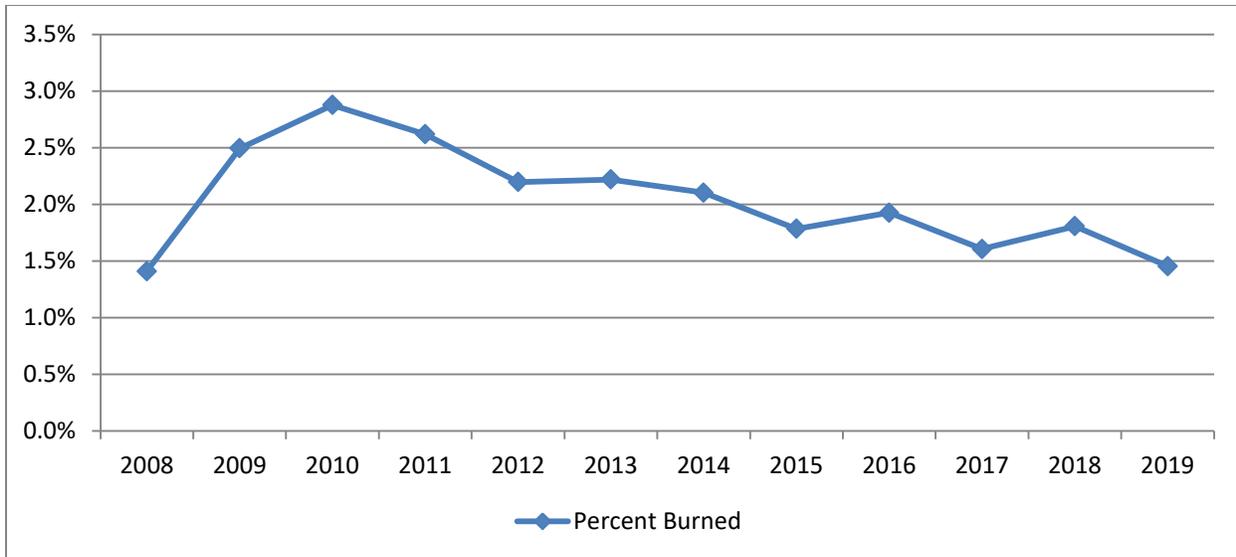


Figure 7. Cereal grain acres percent burned in relationship to cereal grain acres harvested.

One crop type that has not remained consistent throughout the program is CRP lands. In 2012, over 20,000 CRP acres were burned, and in 2019, approximately 200 CRP acres were burned. Figure 8 shows the variability in CRP acres burned since 2008. Table 2 summarizes the acres burned by all crop types over the past 3 years. A map containing the locations of all crop residue burns in 2019 is provided in Appendix A.

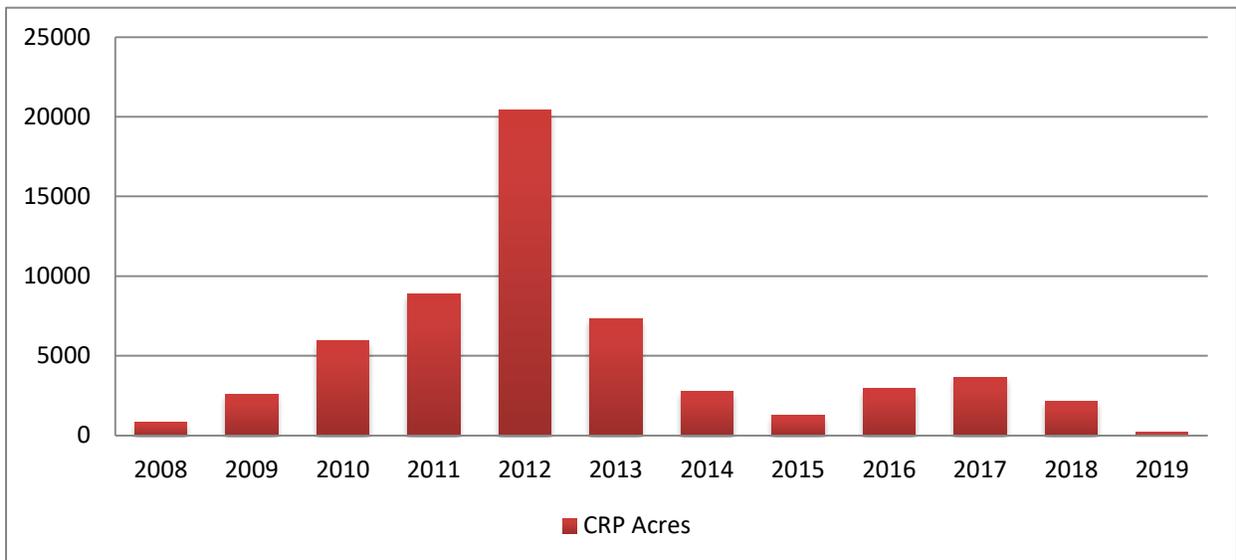


Figure 8. CRP acres burned from 2008 to 2019.

Table 2. Summary of acres burned in Idaho.

Crop Type	Acres Burned		
	2017	2018	2019
Cereal grain	26,034	30,234	25,647
Corn	1,179	1,405	1,424
Legumes	176	0	13
CRP	3,674	2,171	208
Other ^a	560	817	672
Grass ^b	5,114	5,909	6,159
Total	36,737	40,536	34,123

a. Includes alfalfa and pastures.

b. Includes Kentucky Blue Grass and other grass species.

Total acres burned for each SMA and county is provided in Table 3. The Central SMA continues to lead all SMAs with over 17,000 acres burned in 2019. No burning was conducted in the Custer and Lemhi Counties SMA and Shoshone SMA in 2019. Historically, these SMAs have minimal burning.

Table 3. Total acres burned for each SMA and county.

Boundary County SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Boundary	2,315	0	0	0	0	0	2,315
Total	2,315	0	0	0	0	0	2,315
Kootenai County SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Kootenai	0	0	95	0	0	0	95
Total	0	0	95	0	0	0	95
Central SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Clearwater	2,107	0	677	0	0	0	2,784
Idaho	7,934	0	905	0	51	0	8,890
Latah	284	0	1,848	0	5	8	2,145
Nez Perce	1,010	0	2,512	0	0	124	3,646
Total	11,335	0	5,942	0	56	132	17,465
Boise and Valley Counties SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Valley	25	0	0	0	0	0	25
Total	25	0	0	0	0	0	25
Southwestern Idaho SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Ada	0	0	0	0	0	15	15
Canyon	166	0	22	0	0	26	214
Elmore	0	260	0	0	0	0	260
Owyhee	472	0	0	0	15	0	487
Total	638	260	22	0	15	41	976
Weiser and Lower Payette Valleys SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Payette	0	0	0	0	0	40	40
Washington	58	136	0	0	0	99	293
Total	58	136	0	0	0	139	333
Blaine and Camas SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Blaine	260	0	0	0	0	0	260
Total	260	0	0	0	0	0	260
Northern Magic Valley SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Gooding	20	32	0	0	0	0	52
Jerome	1,040	0	0	0	0	14	1054
Lincoln	540	0	0	0	112	0	652
Minidoka	2,167	0	0	0	0	0	2167
Total	3,767	32	0	0	112	14	3,925
Southern Magic Valley SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Cassia	294	0	0	0	0	26	320
Twin Falls	755	996	0	13	0	146	1,910
Total	1,049	996	0	13	0	172	2,230
Southeastern Idaho SMA							
County	Cereal Grain	Corn	Grass^a	Legumes	CRP	Other^b	Total
Bingham	4	0	25	0	0	0	29
Caribou	2,416	0	40	0	0	0	2,456
Oneida	70	0	35	0	0	1	106
Power	0	0	0	0	25	0	25
Total	2,490	0	100	0	25	1	2,616

Eastern Idaho SMA							
County	Cereal Grain	Corn	Grass ^a	Legumes	CRP	Other ^b	Total
Bonneville	1,248	0	0	0	0	40	1,288
Butte	0	0	0	0	0	60	60
Fremont	74	0	0	0	0	28	102
Jefferson	2,056	0	0	0	0	45	2,101
Madison	112	0	0	0	0	0	112
Teton	220	0	0	0	0	0	220
Total	3,710	0	0	0	0	173	3,883

a. Includes Kentucky Blue Grass and other grass species.

b. Includes alfalfa and pastures.

4.7.2 Summary of Burn Decisions

DEQ issued 109 burn days in 2019. Burn decisions are made each workday throughout the year. Burn decisions are based on air quality, meteorology, and fuel conditions. DEQ uses best management practices to approve burns on days that promote good smoke dispersion.

DEQ's seasonal smoke specialists evaluate field and weather conditions for potential burning, observe smoke from approved burns, and document these conditions to provide feedback to the program office. This information is used to make decisions during the growing season and to enhance future burn decisions. The seasonal smoke specialists are deployed in the field during the spring and fall burn seasons.

Table 4 shows the summary of 2019 burn decisions for all counties in Idaho.

Table 4. Summary^a of 2019 burn decisions by county.

County	Approved Burn Days	No-Burn Days Due to Air Quality	No-Burn Days Due to Meteorological Conditions				No-Burn Days Due to Other Reasons
			Fuel Moisture	Wind	Ventilation	Red Flag Warning	
Ada	0	0	0	0	0	0	0
Adams	0	0	0	0	0	0	0
Bannock	1	0	1	0	0	0	0
Bear Lake	0	0	0	0	0	0	0
Benewah	0	0	0	0	0	0	0
Bingham	4	0	2	1	0	0	0
Blaine	6	0	0	1	0	0	0
Boise	0	0	0	0	0	0	0
Bonner	0	0	0	0	0	0	0
Bonneville	9	0	17	6	0	1	0
Boundary	19	0	13	2	3	0	0
Butte	1	0	3	1	0	0	0
Camas	0	0	0	0	0	0	0
Canyon	15	0	4	0	1	2	0
Caribou	29	0	15	10	0	1	0
Cassia	10	0	2	4	0	1	0
Clark	0	0	0	0	0	0	0
Clearwater	17	0	14	1	2	0	0
Custer	0	0	0	0	0	0	0
Elmore	5	0	1	2	0	0	0
Franklin	0	0	0	0	0	0	0
Fremont	3	0	3	2	0	0	0
Gem	0	0	0	0	0	0	0
Gooding	2	0	0	4	0	0	0
Idaho	43	3	22	7	3	2	0
Jefferson	25	0	16	7	0	1	0
Jerome	22	0	2	2	0	1	0
Kootenai	1	0	1	0	3	0	0
Latah	34	1	17	4	2	0	0
Lemhi	0	0	0	0	0	0	0
Lewis	0	0	0	0	0	0	0
Lincoln	4	0	1	0	0	0	0
Madison	2	0	0	0	0	0	0
Minidoka	17	0	4	3	0	2	0
Nez Perce	33	1	18	2	2	0	0
Oneida	4	0	0	0	0	0	0
Owyhee	16	0	3	0	0	4	0
Payette	4	0	4	1	0	0	0
Power	4	0	3	1	0	0	0
Shoshone	0	0	0	0	0	0	0
Teton	1	0	1	0	0	0	0
Twin Falls	39	0	11	11	0	4	0
Valley	1	0	0	0	0	0	0
Washington	13	0	4	0	0	2	0

a. This summary includes burn decisions issued for 2019. Burn decisions are provided weekdays throughout the year. No-burn decisions accounted for a substantial number of days (not noted in the table) due to no requests or the days occurred outside the typical burn seasons (i.e., summer and winter).

5 Rule Change: Fee Invoice Timing

The CRB advisory committee and DEQ explored options to improve the process for paying field burning fees. DEQ submitted a rule and SIP modification that requires growers to pay fees for acreage burned at the end of the burn season rather than 7 days before the field burn occurs. The change provided DEQ a more streamlined administrative process.

This rule change was accepted by the Idaho Legislature in 2019, and the new fee schedule was adopted into our program shortly afterwards.

The United States Environmental Protection Agency (EPA) took direct final action to approve the SIP revision on September 3, 2019. Direct final action is contingent on the EPA receiving no adverse comments by the October 3, 2019, deadline. One adverse comment was received, and EPA published a withdrawal of the direct final rule approval in the Federal Register on October 21, 2019, to inform the public. EPA issued a final approval on December 9, 2019, with an effective date of January 8, 2020.

To date, the fee payment schedule is providing streamlined registration. Crop residue burning fees were invoiced and mailed out on January 6, 2020. In addition to mailing invoices, DEQ emailed a copy of the invoice to growers with valid email address on file. The process went well and resulted in a streamlined process for the fiscal portion of the CRB Program. Growers with unpaid invoices from the previous year will not be eligible to burn until all outstanding fees have been paid.

6 Conclusions

DEQ continues to operate the CRB Program under the rules and operating guidelines designed to protect public health. These procedures continue to achieve the program's goals and provide fire as a tool to manage crop residue disposal in Idaho. DEQ's evaluation of the program's effectiveness in meeting these goals in 2019 revealed that our focus on internal training and communication of program limitations, meteorological considerations, and coordination should continue to be a program focus for 2020. Additionally, input from our prescribed fire smoke management programs must be increased to avoid overloading the airshed. External training will continue in 2020 with an emphasis on grower burn approval processes.

On-site visits to Idaho fields by staff meteorologists were not completed in 2019. An important part of the meteorological program is visits to airsheds during the burn season help coordinators assess problem spots and determine optimum weather for burning in more difficult fields. In 2020, DEQ will identify available agency resources to support travel for these visits.

The 2019 burn season evaluation identified four instances where DEQ-approved crop residue burning likely contributed to measured air pollutant concentrations exceeding the 1-hour program-defined postburn concentration threshold of $26.2 \mu\text{g}/\text{m}^3$. DEQ determined one instance where approved crop residue burning may have caused an adverse impact to an ISP. This impact occurred on September 4 in Idaho County when prescribed fire and wildfire impacts also occurred in the area. There were 700 acres approved for burning by DEQ in the area. No adverse impacts were reported from the schools in the area, and no problems were reported by hospital

staff. Hospital staff reported a slight increase in allergy-type symptoms/complaints from patients. The event revealed that additional attention to wildfire and prescribed fire activity is needed to avoid overloading the airshed in the future.

Eight instances occurred where pollutant concentrations exceeded program-defined postburn concentration thresholds of $20.0 \mu\text{g}/\text{m}^3$ but were below $26.2 \mu\text{g}/\text{m}^3$. One of these instances appeared to have been partly attributed to CRB Program burning.

The 2019 agriculture field burning season was hampered by abnormally high precipitation during parts of August and September with several storms influencing burn areas. Fall burning activity level was low and slow to get started, which resulted in late fall burning that extended through October and into November for Southeast, Eastern and Central Idaho SMAs. The latest completed crop residue burning occurred on November 22 in the Southeast SMA. Wildfire smoke had limited but important impacts this year. Very few days were excluded from crop residue burning due to wildfire smoke this year, but on one occasion, wildfire smoke combined with approved crop residue burning exceeded a PCT.

Annual total residue burning acreage for 2019 was 34,123, which is the lowest acreage burned since program adoption in 2008. Annual acreage has ranged from 34,124 to 67,370. Acreage for 2019 was well under the average annual acreage of 47,673.

7 CRB Program Advisory Committee Recommendations

Following the annual evaluation of the CRB Program, the advisory committee makes recommendations for the 2020 season. These recommendations are presented to the DEQ director for approval.

The CRB advisory committee made no formal recommendations for 2020 but requested DEQ consider the following:

- Improve the spot and bale permit description language used on the website to better describe the elements of the Spot and Bale Permit Program and improve grower understanding of this tool.
 - Response—DEQ will update the language on the CRB application and offer advisory committee members an opportunity to comment on draft language to ensure the final posted message meets the intent of the request.
- Seek opportunities to provide outreach to cereal grain schools to increase program awareness and improve DEQ's relationship with the grower community.
 - Response—DEQ will research opportunities for face-to-face outreach efforts. CRB Program staff will approach the University of Idaho Extension Office for cereal grain school opportunities (and other possible resources) and will identify staff to participate in events.
- Update and post the New Committee Member Introductory document on DEQ's website on an annual basis to provide helpful information to new members or current members.
 - Response—DEQ will update this document and target distribution to all committee members by late spring 2020. The document will also be posted on DEQ's website after distribution to committee members.

- Send hard-copy past due invoices to growers with outstanding balances from 2019 burning activity with a reminder that burning will not be approved for any field if the grower has an outstanding balance.
 - Response—DEQ will develop an appropriate cover letter and mail past due notices. The past due mailings will likely begin in March 2020.
- Commit to having an agriculture representative on the prescribed fire advisory committee when it is formed. The committee also requested DEQ seek a representative from the prescribed fire community to participate on the CRB advisory committee.
 - Response—DEQ will research original CRB Program agreements and applicable guidance to determine how to transparently establish a new member category for the CRB advisory committee and determine how that membership can be directly filled. DEQ will contact members of the prescribed fire community to seek involvement in the CRB advisory committee. During the next CRB advisory committee meeting in February 2021, DEQ will discuss the commitment to provide an agriculture representative on the prescribed fire advisory committee, if a prescribed fire advisory committee is formed by that time.

References Cited

DEQ (Idaho Department of Environmental Quality). 2019. *Crop Residue Burning Program Operating Guide*. Boise, ID: DEQ.

DEQ (Idaho Department of Environmental Quality). 2017. *2017 Crop Residue Burning Ozone State Implementation Plan Revision*. Boise, ID: DEQ.

Appendix A. Complaints

Date	Region	Description	Associated with Approved Burning
5/10/2019	Coeur d'Alene	Burning Near Heath Lake on Weekend	No
7/31/2019	Lewiston	Bluegrass field burned. Smoked out neighbor.	Yes
8/1/2019	Boise	Grass or range fire. Wondering where the smoke is coming from.	No
8/3/2019	Coeur d'Alene	Possible Smoke from Porthill	No
8/21/2019	Lewiston	Burning Grass. Trouble Breathing	No
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/27/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
8/28/2019	Coeur d'Alene	Idaho Smoke Going to Canada	Yes
10/7/2019	Coeur d'Alene	Prescribed Burning Near Hayden Lake	No
10/9/2019	Coeur d'Alene	Smoke in the air. Wondering where it is coming from. Visibility issues.	No
10/10/2019	Idaho Falls	Ranch Burning Hay Bales	No
11/18/2019	Boise	Possible Fields or Wood Burning	No

Appendix B. Meteorological Summary for Fall Burn Season

ANNUAL WEATHER SUMMARY FOR THE SMOKE DISPERSION FORECAST SEASON FOR IDAHO, 2019

Prepared for: Idaho Department of Environmental Quality (IDEQ) for Agricultural Field Burning in Idaho

Prepared by: Jacob Wolf– Senior Air Quality Meteorologist, Idaho Department of Environmental Quality

Operations:

The 2019 Agricultural Field Burning Smoke Management program for Idaho began on August 5th with full operational forecasts for north Idaho. Full operational forecasts for south Idaho began on August 19th. Idaho Department of Environmental Quality (IDEQ) manages the Crop Residue Burning (CRB) program for southern Idaho and portions of northern Idaho. Smoke dispersion forecasts were e-mailed to IDEQ recipients by 8:00 AM local time each day of the forecast season. The delivery of forecasts via e-mail was followed by conference calls at 8:30 am local time each day. The morning conference calls were used to discuss the weather forecast for the “burn day” (i.e. today) and a brief review of the previous day was held prior to the weather forecast discussion on the morning call.

Three pre-season meetings occurred this summer prior to the start of the CRB fall burning operations. The first meeting was over July 16th and 17th and was in north Idaho for the Coeur d’Alene and Lewiston Regional Offices. The second meeting was on July 30-31st for the Boise and Twin Falls Regional Offices. The third and final pre-season meeting occurred in Pocatello over August 13th and 14th for the Pocatello and Idaho Falls Regional Offices. On site visits to Idaho fields were curtailed in 2019 due to the timing of pre-burn meetings and delivery of forecast products. Visits to airsheds during the burning season are rare and difficult due to travel restrictions and forecast duties. Visits are used to aid coordinators with problem spots and discuss optimum weather for burning in some of the more difficult fields. This is an important part of the meteorological program to make sure all coordinators and operational personnel, including farmers, are on the same page meteorologically.

Burning Season Weather in brief:

August:

The 2019 CRB season began with full operational forecasts on August 5th, 2019. Several pre-season meetings occurred across the state from mid-July to mid-August. This served to establish daily expectations, goals, and to pre-emptively identify any potential issues with the current process. The start of the season experienced warm and dry temperatures as an upper level ridge pattern dominated the region (Figure 1) while by the end of the week, an active weather pattern driven by an upper level low pressure system served to limit burning via the establishment of critical fire weather conditions (Figure 2).

UW WRF-GFS 36km Domain Init: 00 UTC Mon 05 Aug 19
 Fcst: 21 h Valid: 21 UTC Mon 05 Aug 19 (14 PDT Mon 05 Aug 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

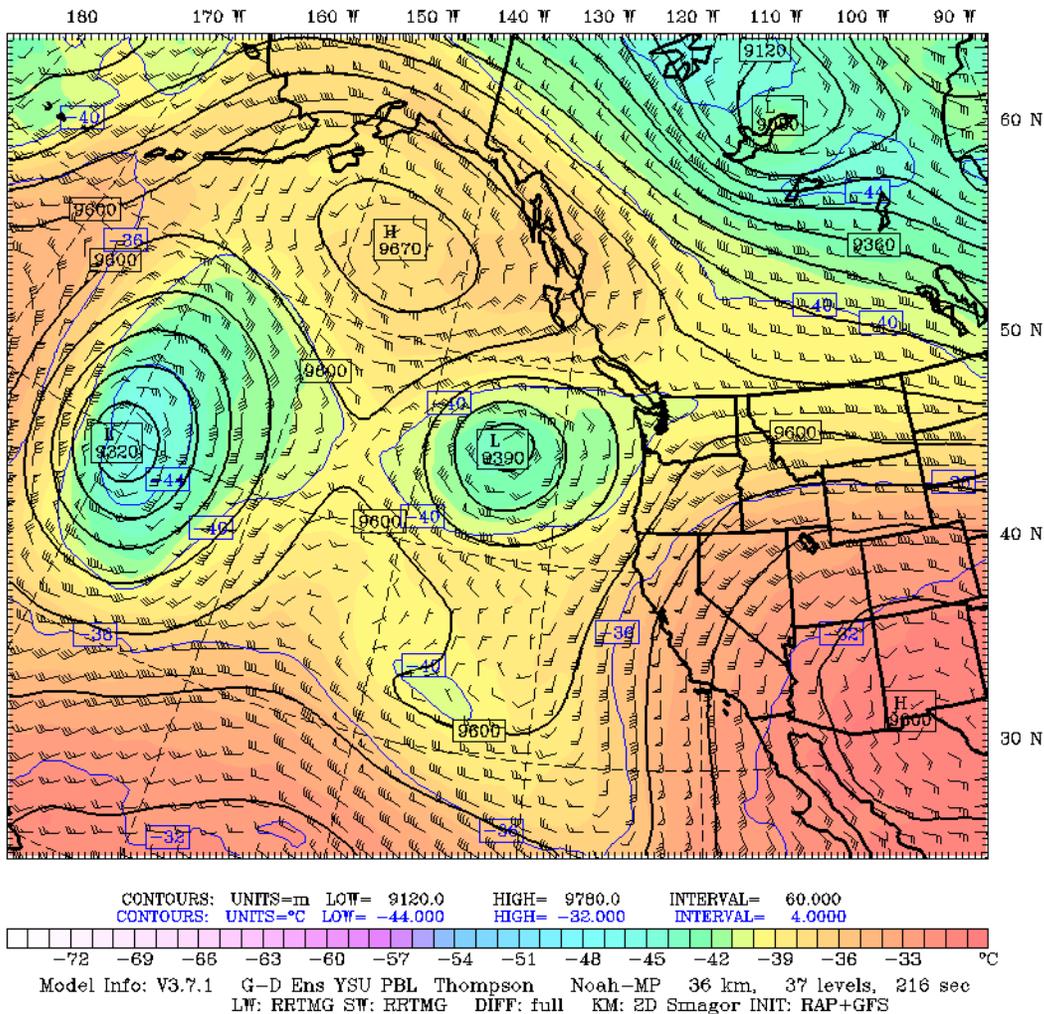


Figure 1: 300mb Temperature initialized 00Z 05 August 2019 and valid 21Z 05 August 2019.

UW WRF-GFS 36km Domain Init: 00 UTC Mon 12 Aug 19
 Fcst: 21 h Valid: 21 UTC Mon 12 Aug 19 (14 PDT Mon 12 Aug 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

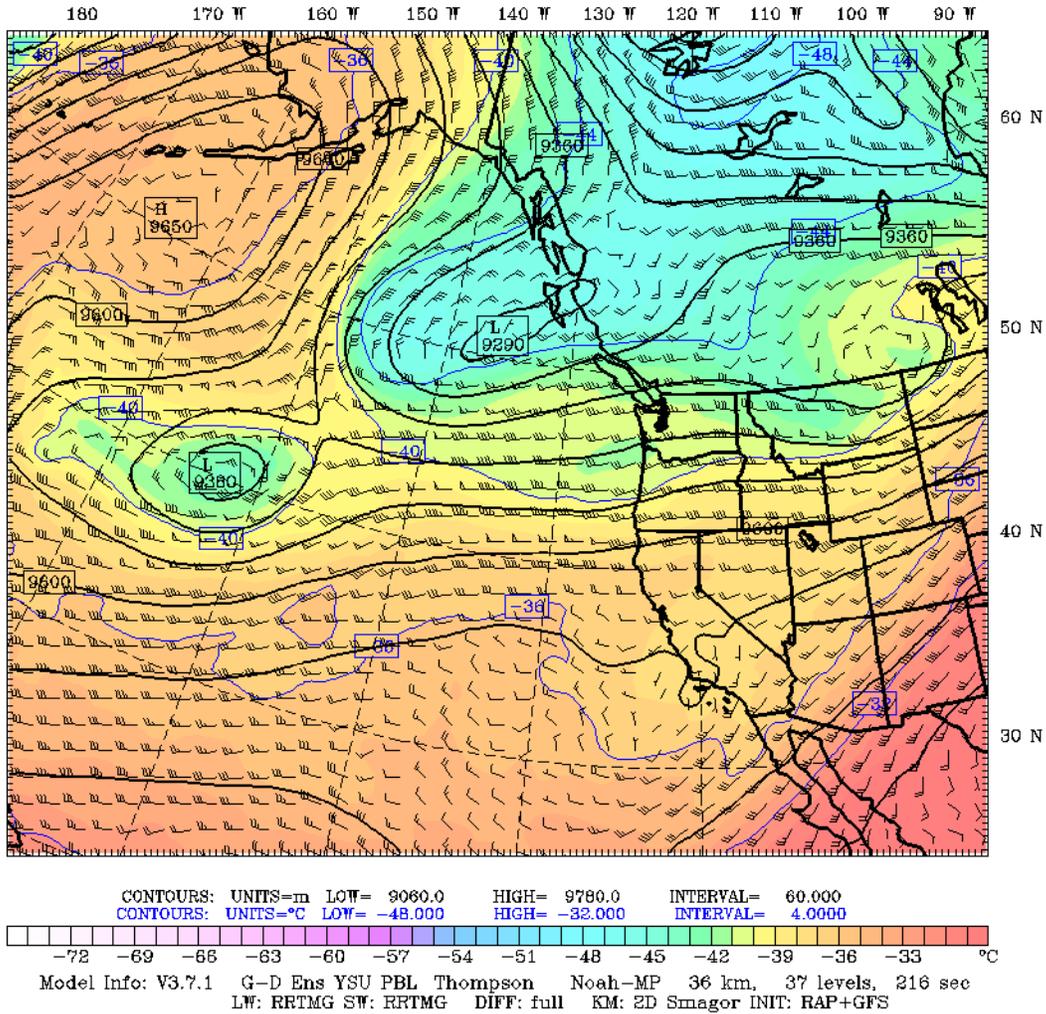


Figure 3: 300mb Temperature initialized 00Z 12 August 2019 and valid 21Z 12 August 2019.

The zonal pattern would give way to a ridge pattern at the end of the week (Figure 4). This promoted drying and warming conditions that allowed for burn operations to continue.

UW WRF-GFS 36km Domain Init: 00 UTC Mon 19 Aug 19
 Fcst: 21 h Valid: 21 UTC Mon 19 Aug 19 (14 PDT Mon 19 Aug 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

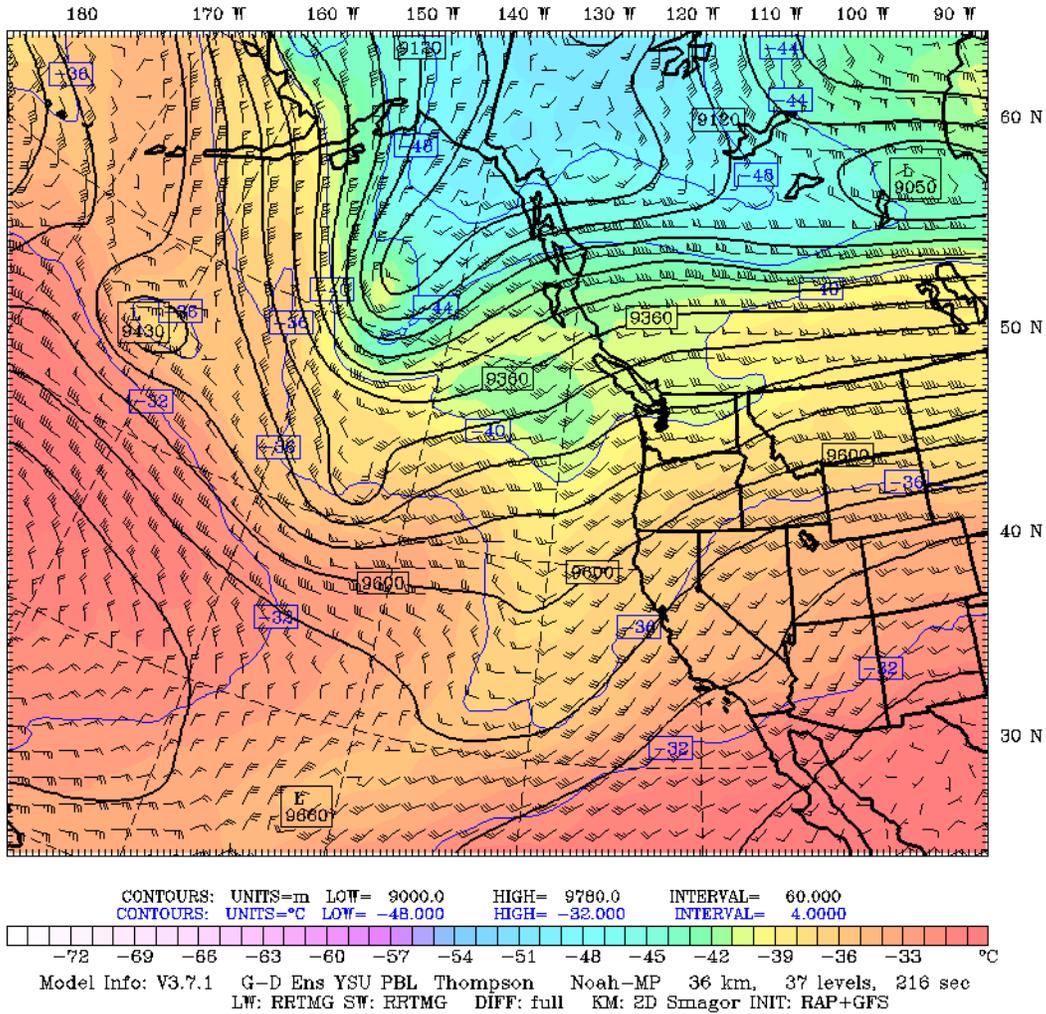


Figure 5: 300mb Temperature initialized 00Z 19 August 2019 and valid 21Z 19 August 2019.

A marine push was evident this day into the Palouse region of northern Idaho (Figure 6). A strong tongue of cooler air reaches well east of the Cascades and into the Columbia Plateau and Palouse of eastern Washington/western Idaho.

UW WRF-GFS 4km Domain Init: 00 UTC Mon 19 Aug 19
 Fcst: 21 h Valid: 21 UTC Mon 19 Aug 19 (14 PDT Mon 19 Aug 19)
 Temperature at 925mb (°C)
 925 mb Geopotential Height (m) 925 mb Wind (full barb = 10kts)

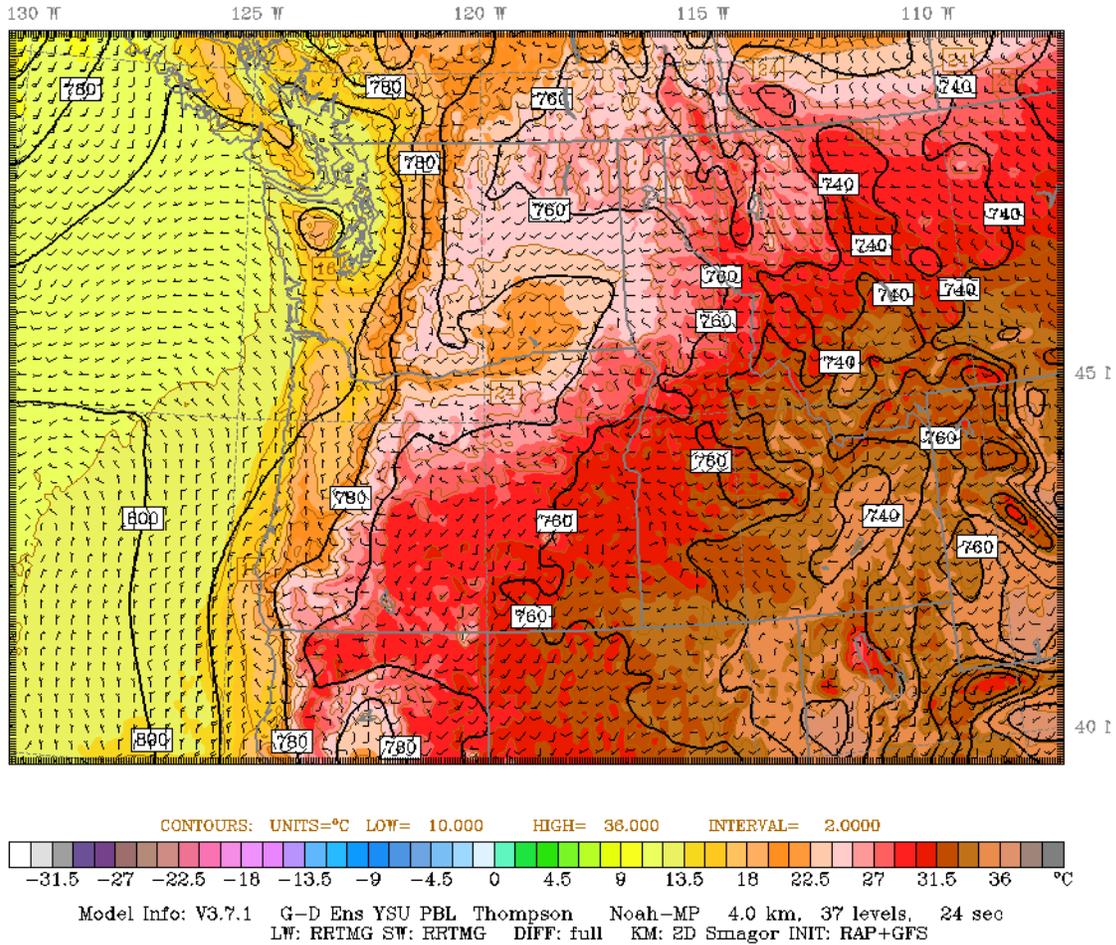


Figure 6: 925mb Temperature initialized 00Z 19 August 2019 and valid 21Z 19 August 2019.

UW WRF-GFS 36km Domain Init: 00 UTC Mon 26 Aug 19
 Fcst: 21 h Valid: 21 UTC Mon 26 Aug 19 (14 PDT Mon 26 Aug 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

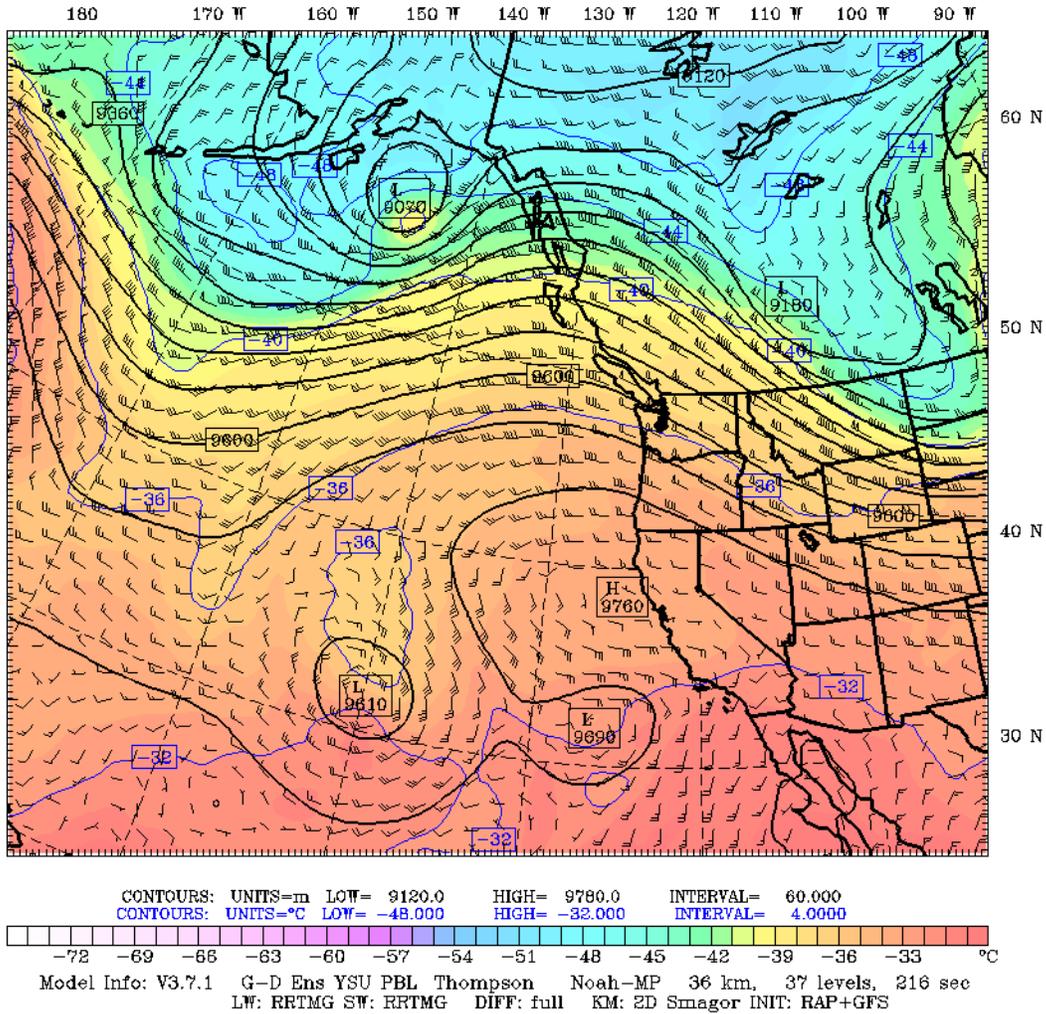


Figure 8: 300mb Temperature initialized 00Z 26 August 2019 and valid 21Z 26 August 2019.

By Friday, the upper level ridge was beginning to break down in response to an upper level low pressure system well off the Washington Coast (Figure 9). The breakdown of this ridge allowed for gusty winds, thunderstorm outbreaks, and generally active weather conditions by the end of the week.

UW WRF-GFS 36km Domain
 Fcst: 21 h
 Init: 00 UTC Tue 03 Sep 19
 Valid: 21 UTC Tue 03 Sep 19 (14 PDT Tue 03 Sep 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

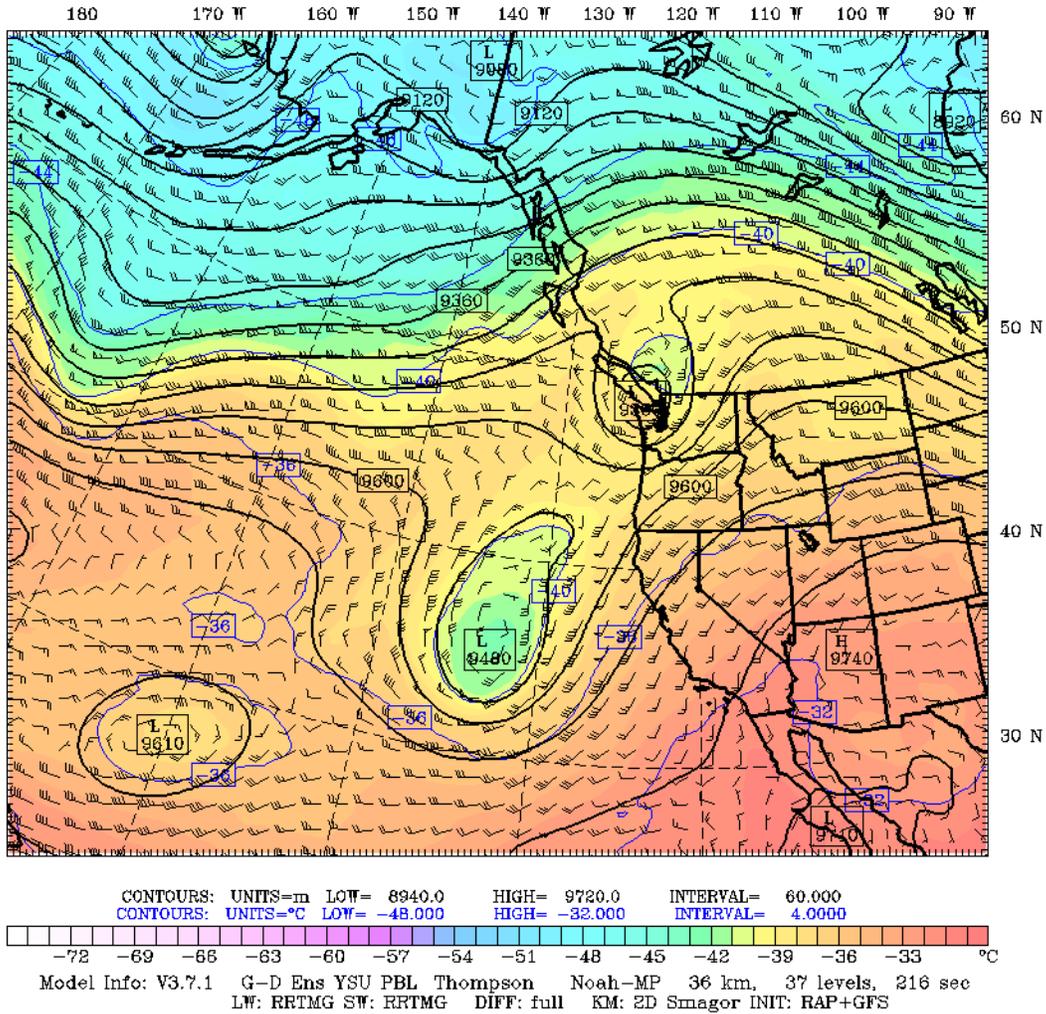


Figure 10: 300mb Temperature initialized 00Z 03 September 2019 and valid 21Z 03 September 2019.

By the end of the week (Figure 11), the upper level systems had sufficiently saturated the atmospheric column, thereby allowing critical fire weather conditions to develop. This would hinder burn operations.

UW WRF-GFS 36km Domain
 Fcst: 21 h
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

Init: 00 UTC Fri 06 Sep 19

Valid: 21 UTC Fri 06 Sep 19 (14 PDT Fri 06 Sep 19)

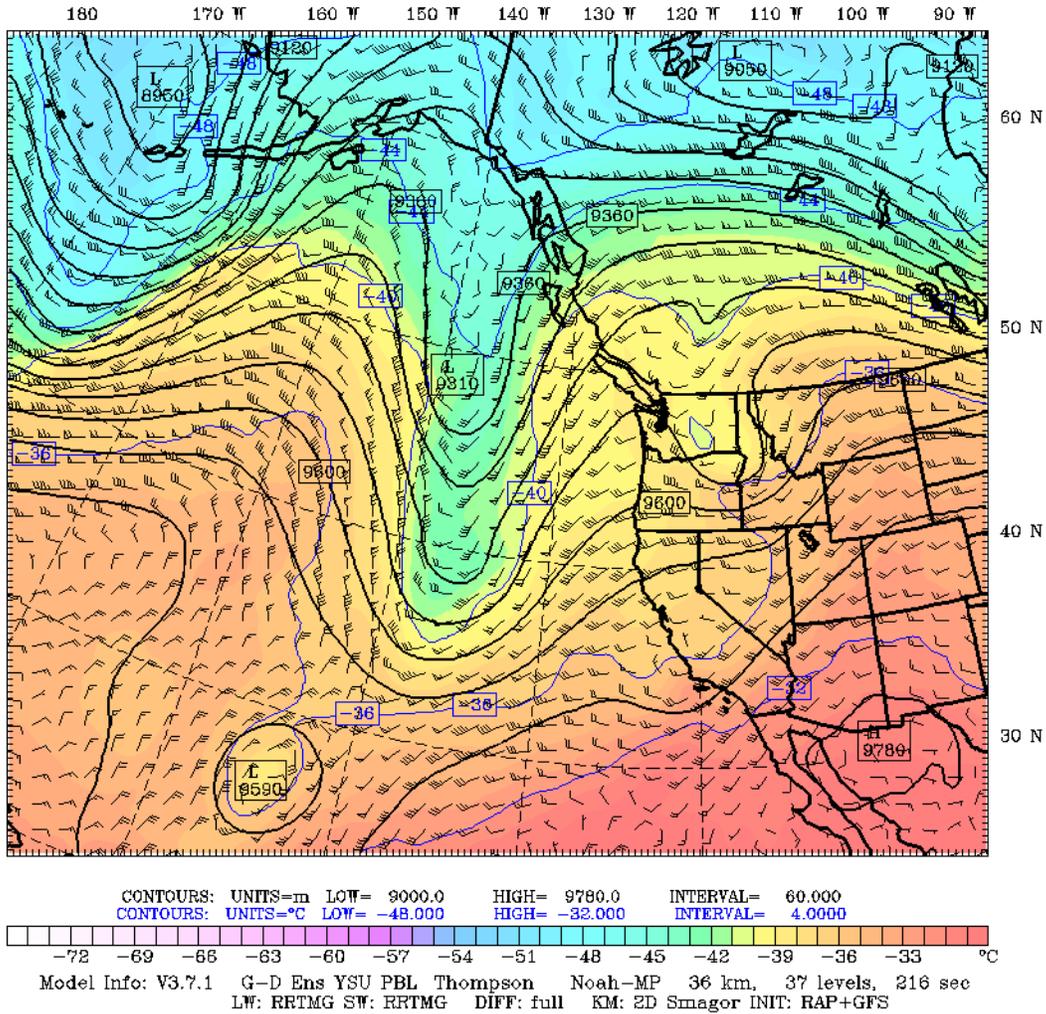


Figure 11: 300mb Temperature initialized 00Z 06 September 2019 and valid 21Z 06 September 2019.

This pattern tracked as modeled over the weekend and brought high winds and precipitation to the state on Monday as the upper level low pressure system settled over Washington, putting Idaho in a region of favorable storm activity and development (Figure 12). This hindered burn operations both in the near term during the event as well as the rest of the week as issues driven by soil and fuel moisture developed.

UW WRF-GFS 36km Domain Init: 00 UTC Mon 09 Sep 19
 Fcst: 21 h Valid: 21 UTC Mon 09 Sep 19 (14 PDT Mon 09 Sep 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

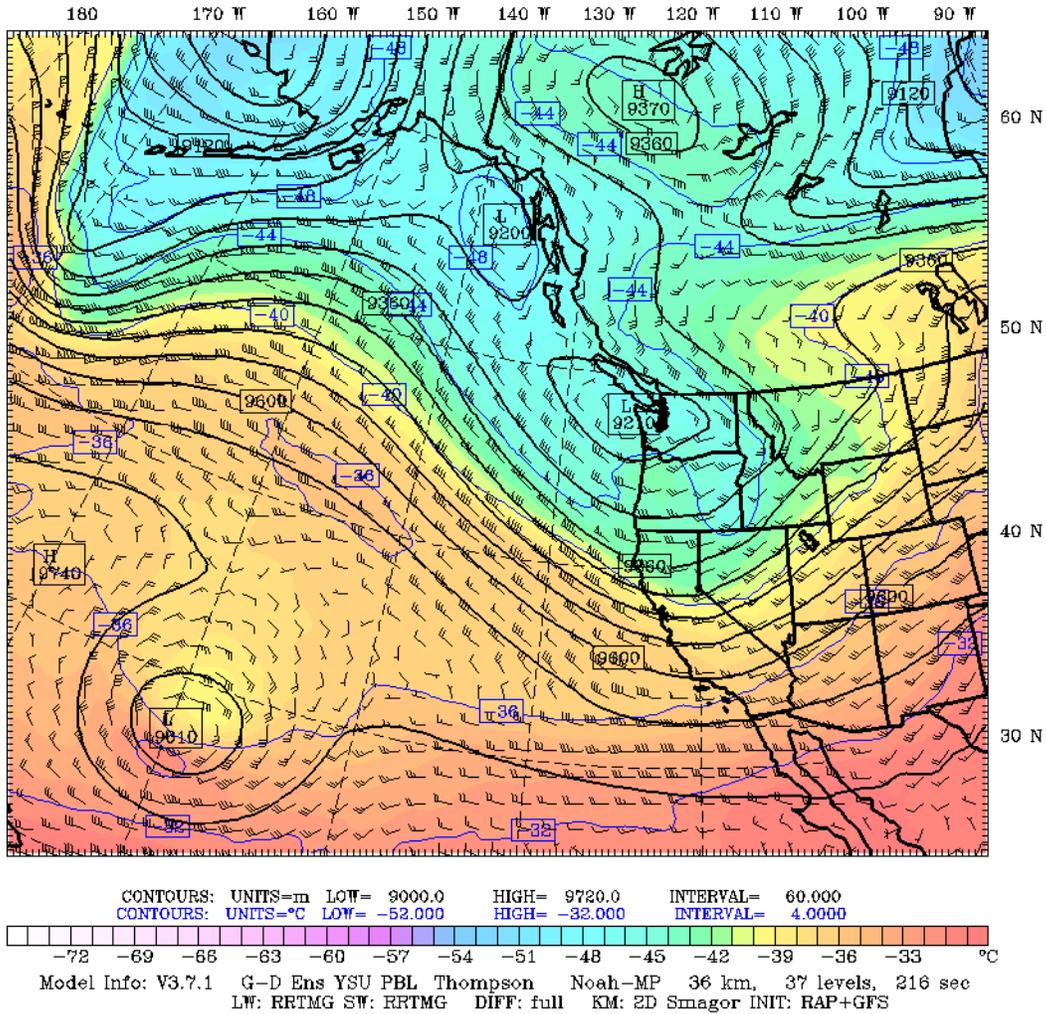


Figure 12: 300mb Temperature initialized 00Z 09 September 2019 and valid 21Z 09 September 2019.

Conditions improved over portions of north Idaho by the end of the week before another upper level low pressure system moved in over the weekend. On Monday, an upper level trough of low pressure was located over Washington and Oregon (Figure 13).

UW WRF-GFS 36km Domain Init: 00 UTC Mon 16 Sep 19
 Fcst: 21 h Valid: 21 UTC Mon 16 Sep 19 (14 PDT Mon 16 Sep 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

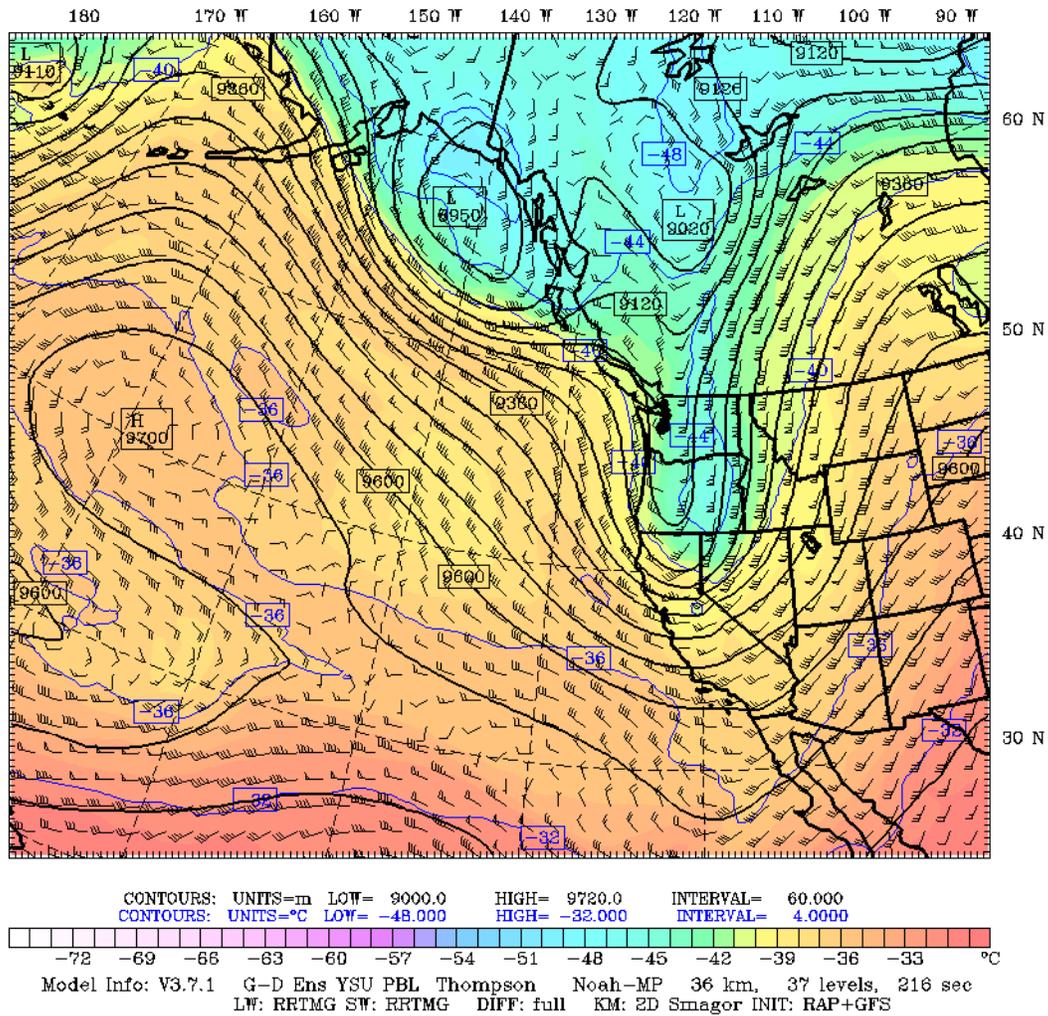


Figure 13: 300mb Temperature initialized 00Z 16 September 2019 and valid 21Z 16 September 2019.

This pattern remained throughout the week, offering limited opportunity for burning to be conducted. By Monday the 23rd, the last of a series of disturbances passed through the state (Figure 14).

UW WRF-GFS 36km Domain Init: 00 UTC Mon 23 Sep 19
 Fcst: 21 h Valid: 21 UTC Mon 23 Sep 19 (14 PDT Mon 23 Sep 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

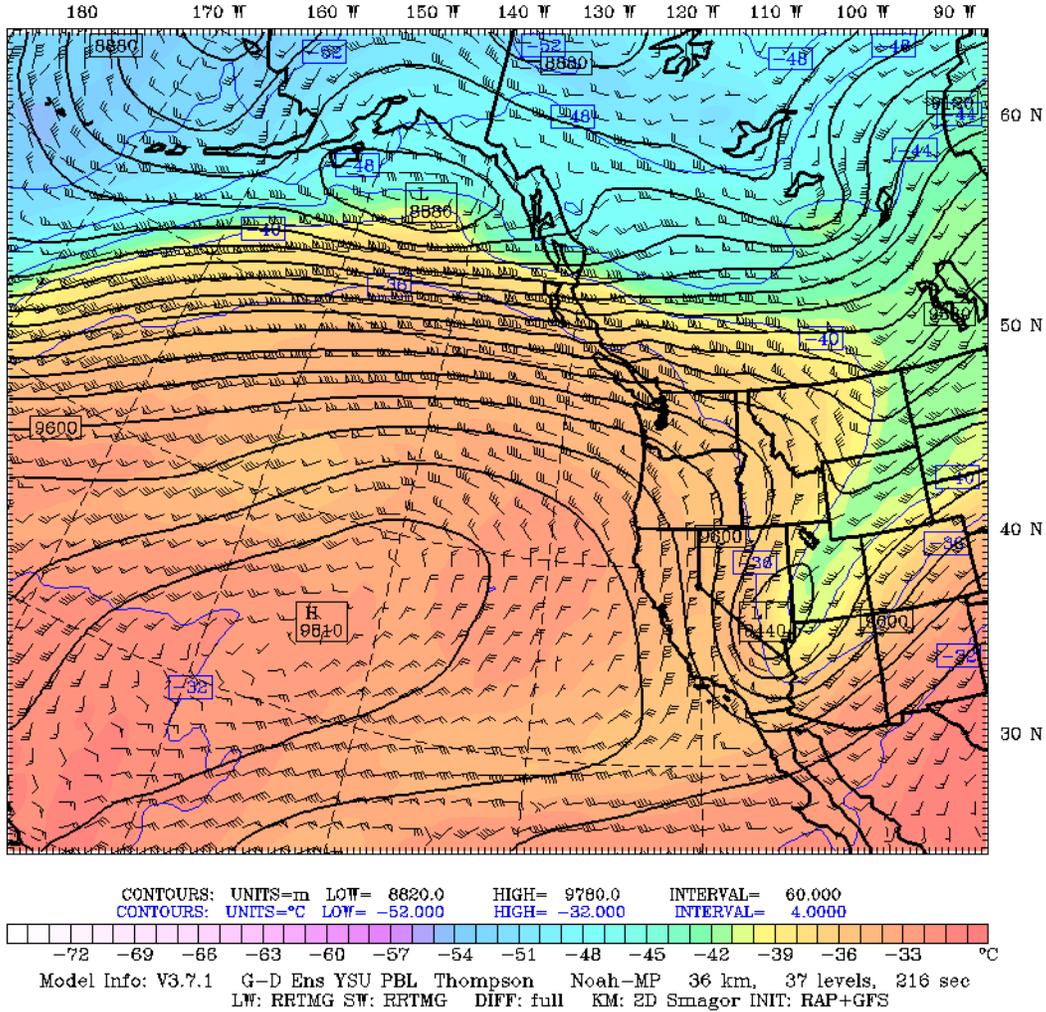


Figure 14: 300mb Temperature initialized 00Z 23 September 2019 and valid 21Z 23 September 2019.

By the end of the week, a zonal flow pattern had developed (Figure 15); however, this was due to an embedded upper level shortwave trough that suppressed the previous ridge of high pressure. This brought a threat of precipitation and strong surface winds to many airsheds across the state on Friday, thus limiting burning operations.

UW WRF-GFS 36km Domain

Init: 00 UTC Fri 27 Sep 19

Fcst: 21 h

Valid: 21 UTC Fri 27 Sep 19 (14 PDT Fri 27 Sep 19)

Temperature at 300mb (°C)

Geopotential Height at 300mb (m)

Wind at 300mb (full barb = 10kts)

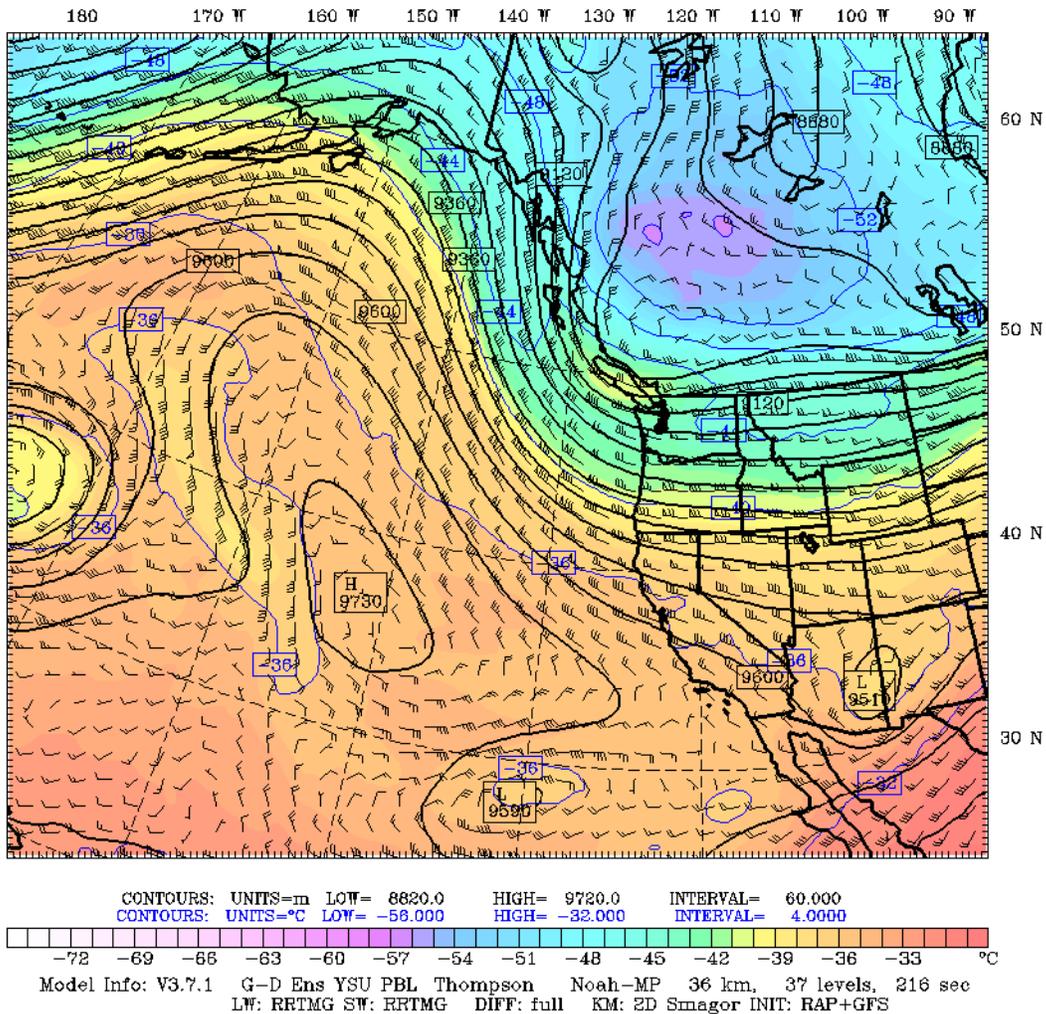


Figure 15: 300mb Temperature initialized 00Z 27 September 2019 and valid 21Z 27 September 2019.

September ended much how it began, with a threat of precipitation and high fuel and soil moisture levels.

October:

This active weather continued into October and by Friday, an upper level trough axis would be located aloft (Figure 16). This would bring precipitation to most airsheds and continue to provide high levels of fuel and soil moisture.

UW WRF-GFS 36km Domain

Init: 00 UTC Fri 04 Oct 19

Fcst: 21 h

Valid: 21 UTC Fri 04 Oct 19 (14 PDT Fri 04 Oct 19)

Temperature at 300mb (°C)

Geopotential Height at 300mb (m)

Wind at 300mb (full barb = 10kts)

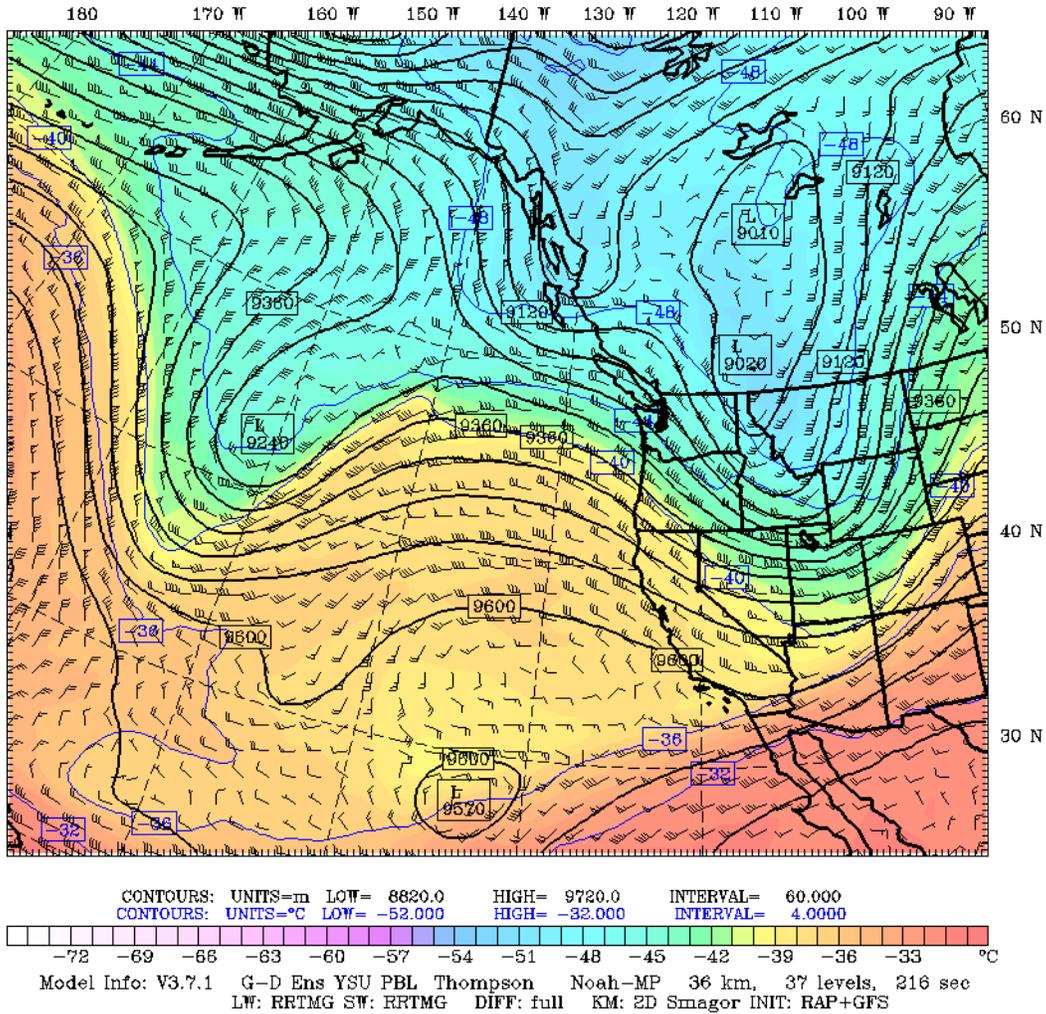


Figure 16: 300mb Temperature initialized 00Z 04 October 2019 and valid 21Z 04 October 2019.

By the 7th, a zonal flow pattern had become established (Figure 17); however, embedded within this flow were minor disturbances that would bring strong winds over north Idaho.

UW WRF-GFS 36km Domain Init: 00 UTC Mon 07 Oct 19
 Fcst: 21 h Valid: 21 UTC Mon 07 Oct 19 (14 PDT Mon 07 Oct 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

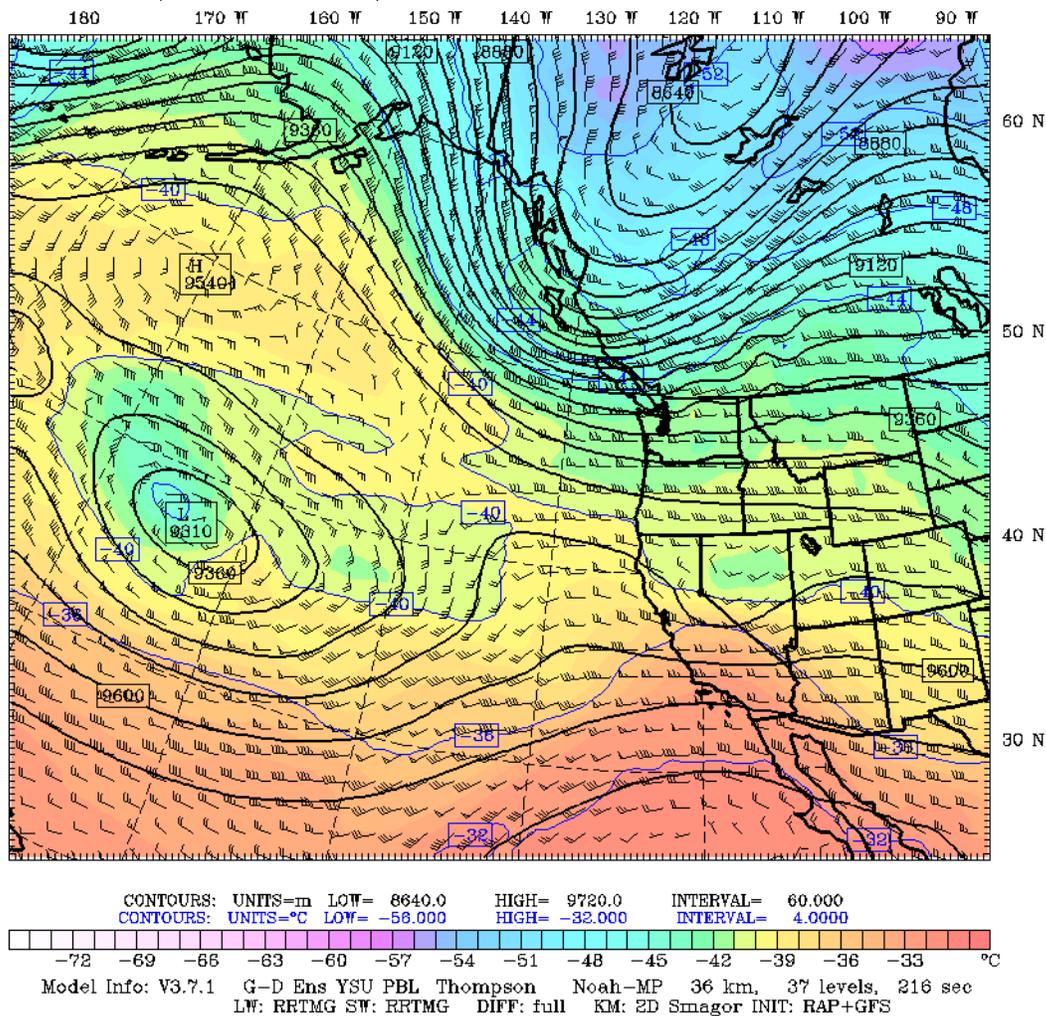


Figure 17: 300mb Temperature initialized 00Z 07 October 2019 and valid 21Z 07 October 2019.

Precipitation, fuel and soil moisture, and ventilation became the limiting factors to conducting burning operations for the remainder of the week. By Friday, a weak ridge developed across the area (Figure 18).

UW WRF-GFS 36km Domain

Init: 00 UTC Fri 11 Oct 19

Fcst: 21 h

Valid: 21 UTC Fri 11 Oct 19 (14 PDT Fri 11 Oct 19)

Temperature at 300mb (°C)

Geopotential Height at 300mb (m)

Wind at 300mb (full barb = 10kts)

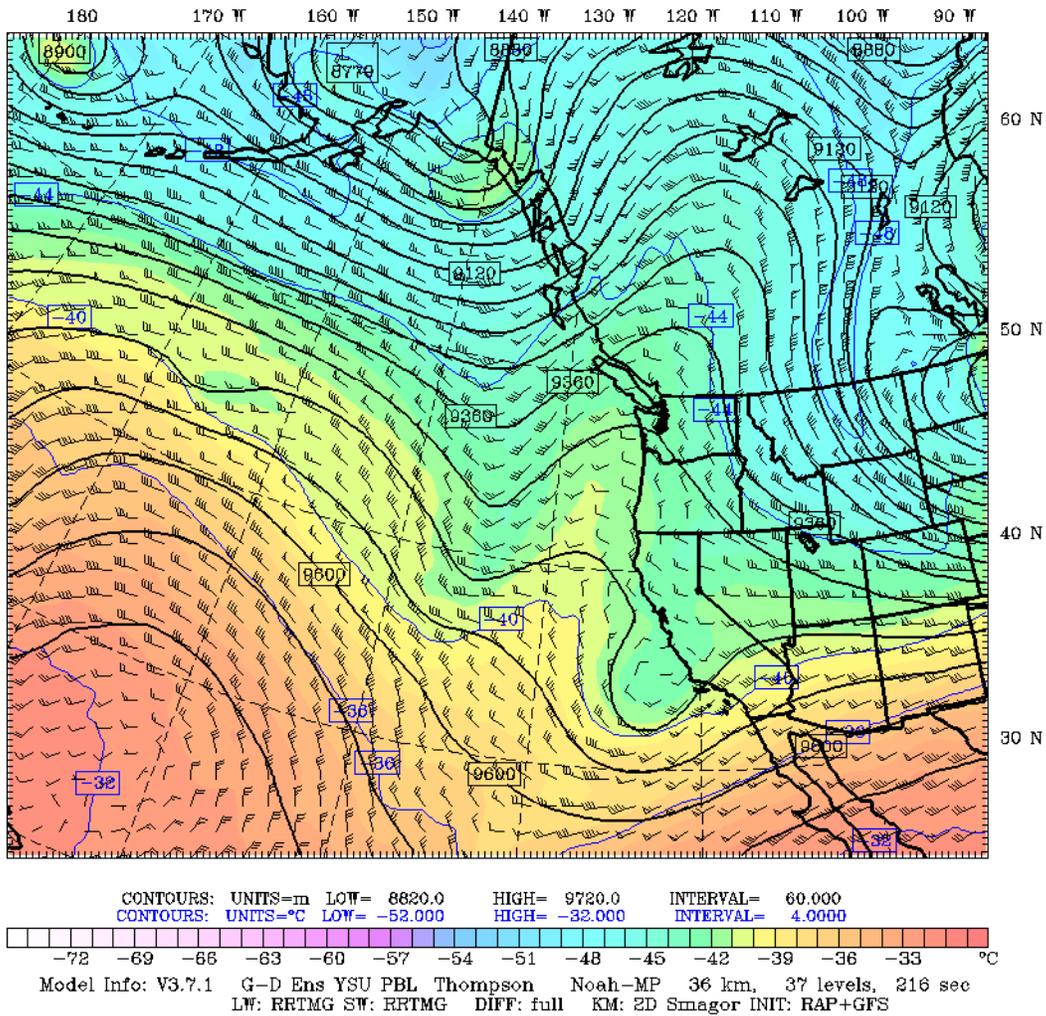


Figure 18: 300mb Temperature initialized 00Z 11 October 2019 and valid 21Z 11 October 2019.

By Tuesday, an upper level ridge remained aloft and brought warmer temperatures-nearly 10-15 degrees higher than Friday's ridge- throughout the column (Figure 19). These warm layers aloft would serve to dry the atmosphere and allow for several days of burning operations.

UW WRF-GFS 36km Domain Init: 00 UTC Tue 15 Oct 19
 Fcst: 21 h Valid: 21 UTC Tue 15 Oct 19 (14 PDT Tue 15 Oct 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

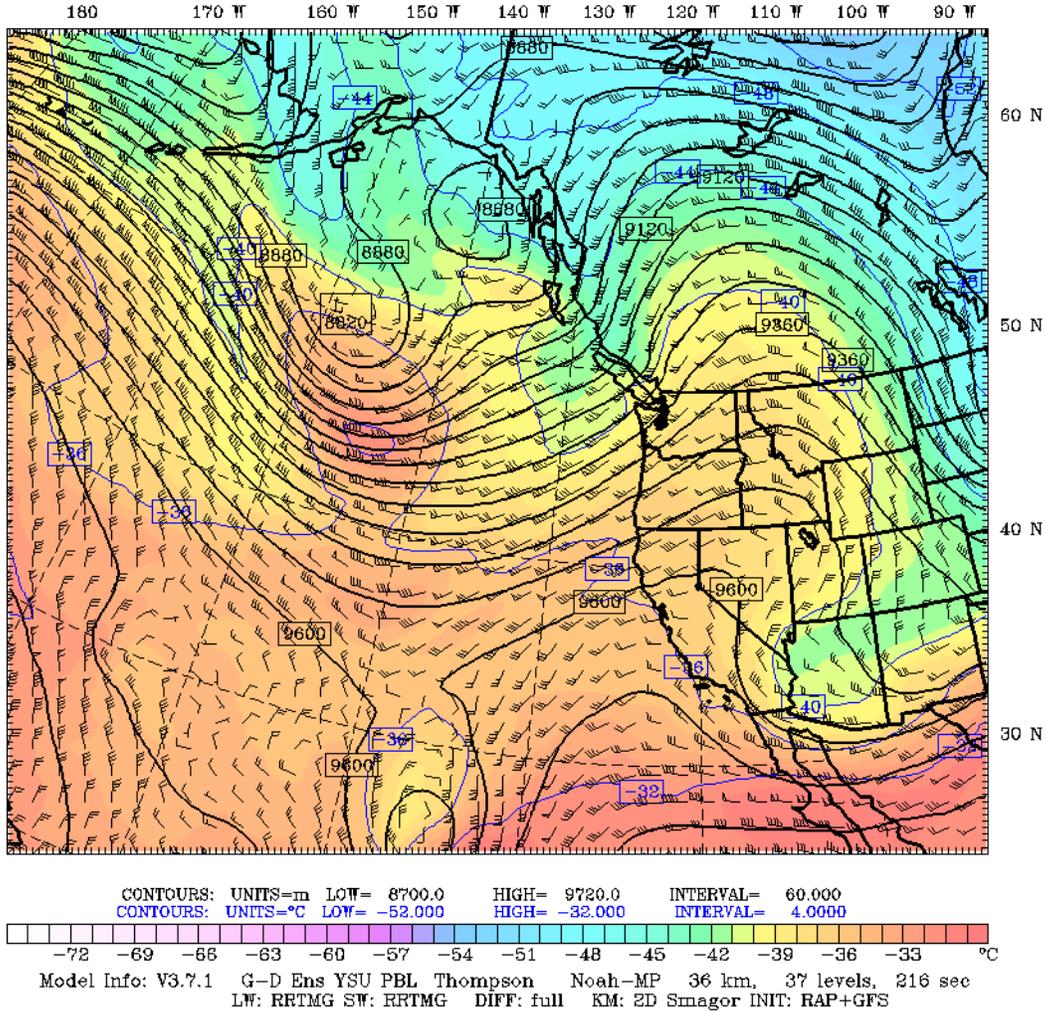


Figure 19: 300mb Temperature initialized 00Z 15 October 2019 and valid 21Z 15 October 2019.

Weather conditions would turn stormy once more by Thursday and Friday, persisting into the weekend.

By Monday, a northwesterly flow pattern had returned and brought strong winds to southern Idaho and maintained a chance for showers over north Idaho (Figure 20).

UW WRF-GFS 36km Domain Init: 00 UTC Mon 21 Oct 19
 Fcst: 21 h Valid: 21 UTC Mon 21 Oct 19 (14 PDT Mon 21 Oct 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

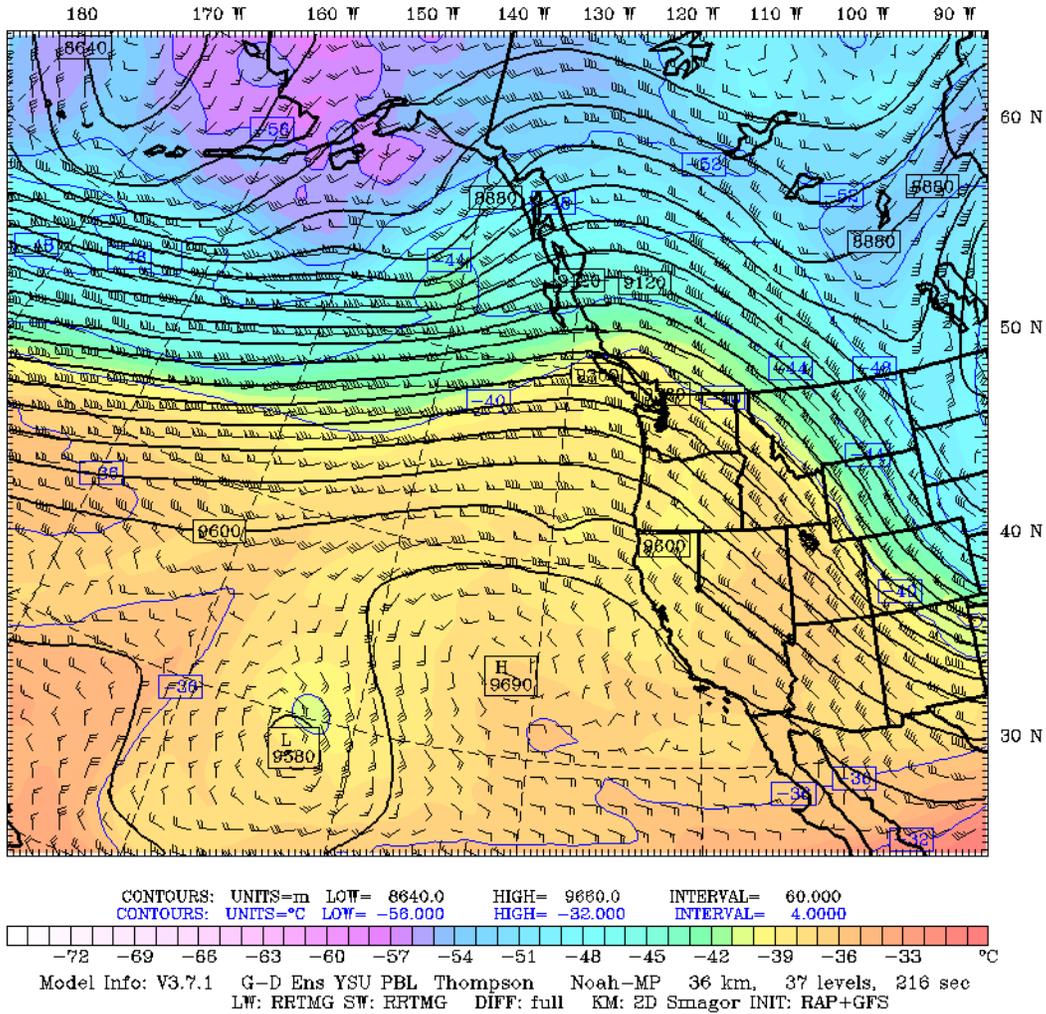


Figure 20: 300mb Temperature initialized 00Z 21 October 2019 and valid 21Z 21 October 2019.

The remainder of the week saw periodic strong winds and ventilation concerns, but limited burning operations were completed. By Friday, an upper level system moving across Canada suppressed the ridge entrenched over Idaho (Figure 21).

UW WRF-GFS 36km Domain

Init: 00 UTC Fri 25 Oct 19

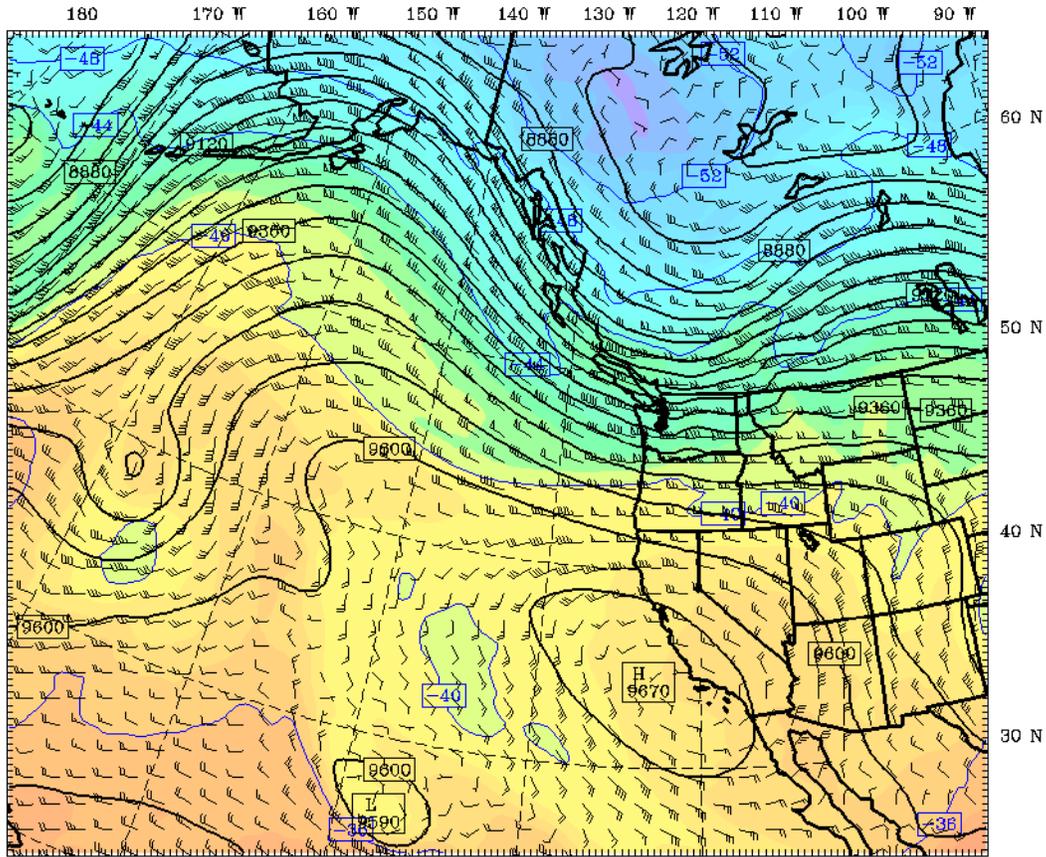
Fcst: 21 h

Valid: 21 UTC Fri 25 Oct 19 (14 PDT Fri 25 Oct 19)

Temperature at 300mb (°C)

Geopotential Height at 300mb (m)

Wind at 300mb (full barb = 10kts)



CONTOURS: UNITS=m LOW= 8700.0 HIGH= 9660.0 INTERVAL= 60.000
 CONTOURS: UNITS=°C LOW= -52.000 HIGH= -36.000 INTERVAL= 4.0000
 Model Info: V3.7.1 G-D Ens YSU PBL Thompson Noah-MP 36 km, 37 levels, 216 sec
 LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor INIT: RAP+GFS

Figure 21: 300mb Temperature initialized 00Z 25 October 2019 and valid 21Z 25 October 2019.

On Monday, a strong upper level low pressure system located just east of the Continental Divide brought rain and high surface winds to much of Idaho (Figure 22).

UW WRF-GFS 36km Domain Init: 00 UTC Mon 28 Oct 19
 Fcst: 21 h Valid: 21 UTC Mon 28 Oct 19 (14 PDT Mon 28 Oct 19)
 Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

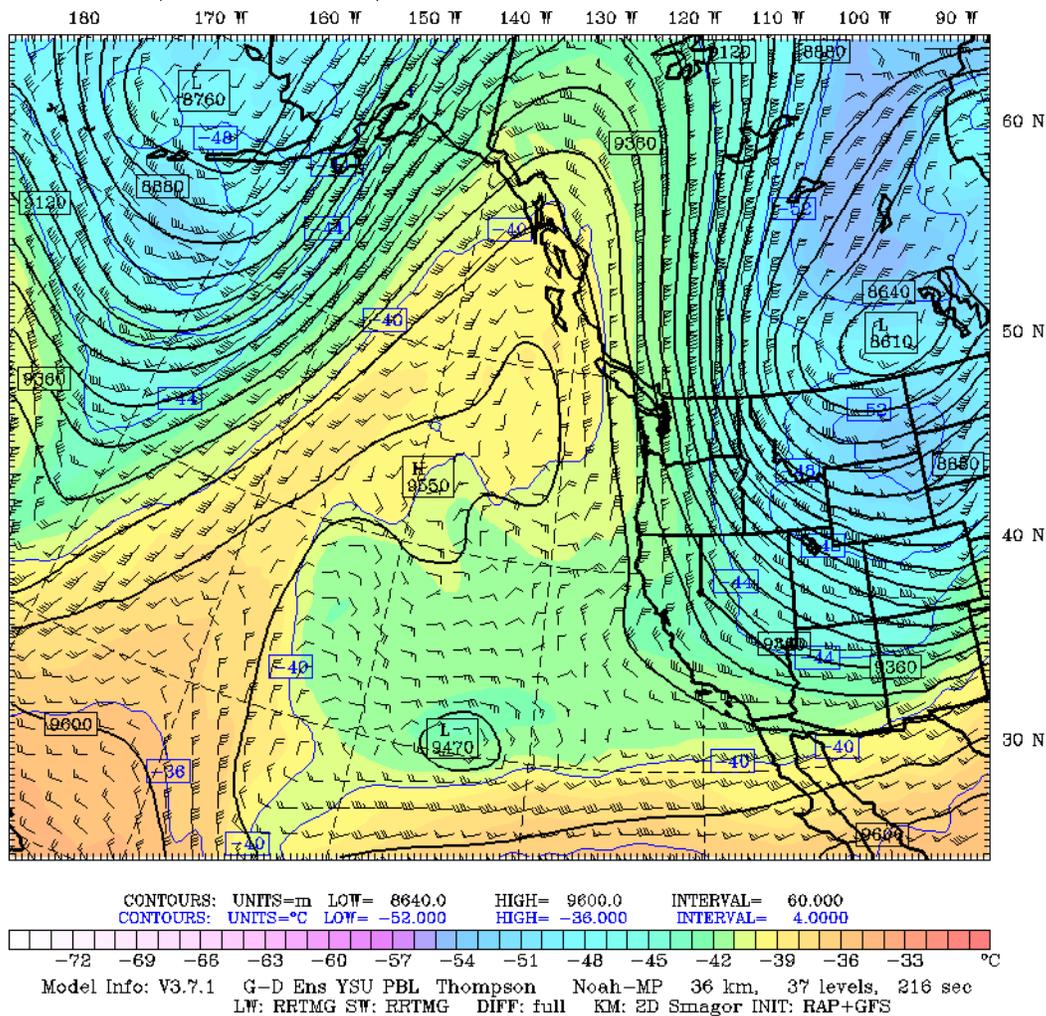


Figure 22: 300mb Temperature initialized 00Z 28 October 2019 and valid 21Z 28 October 2019.

The remainder of the week saw a weak upper level ridge pattern build, thereby limiting ventilation over portions of central Idaho, while limited burning operations were conducted across the state.

November:

The first of November and the last day of full operational forecasts saw an upper level ridge centered off the Pacific Coast, bringing light winds and warm mid-levels to Idaho (Figure 23). This would serve to limit burning operations.

UW WRF-GFS 36km Domain
 Fcst: 21 h

Init: 00 UTC Fri 01 Nov 19
 Valid: 21 UTC Fri 01 Nov 19 (14 PDT Fri 01 Nov 19)

Temperature at 300mb (°C)
 Geopotential Height at 300mb (m)
 Wind at 300mb (full barb = 10kts)

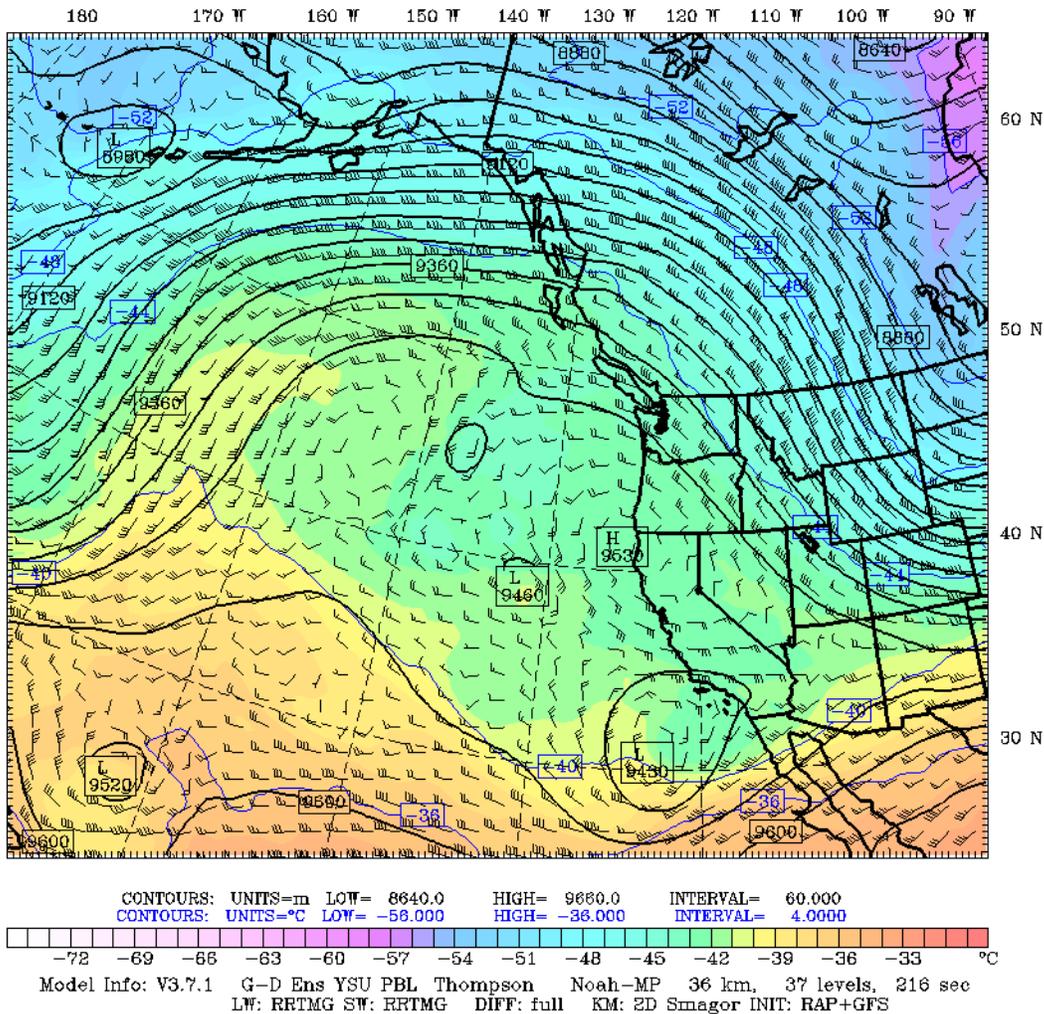


Figure 23: 300mb Temperature initialized 00Z 01 November 2019 and valid 21Z 01 November 2019.

Conclusion:

Daily CRB forecasts ended on November 1st, 2019 with local forecasting services offered as needed. A daily general weather discussion will continue to be provided year round. The 2019 agriculture field burning season was hampered at times by abnormally high summertime precipitation parts of August and September with several storms hitting the area on a weekly basis. Forecast weather models especially from the GFS and NAMnest performed well during the 2019 CRB season but did struggle in the complex terrain regions of the Clearwater drainages and Purcell Trench at times. Other high resolution models such as the HRRR and WRF were successful, highlighting the need for a multi-model approach to accurate forecasting. This past year saw an increase in the number of available meteorologists to the CRB program which allowed for increased coverage, more detailed products, and greater flexibility. In relation to this,

field tours to north Idaho are being planned for the next burn year as well as increased training of complex terrain-driven boundary layer dynamics. There was one request for a Burn Day Analysis in Idaho this season. It was written for a burn conducted in Boundary County on August 27th after 11 complaints were received. The results of this analysis were that modeled and forecast conditions were accurate and that less than optimal dispersion conditions would be present that day.

Jacob Wolf – Senior Air Quality Meteorologist

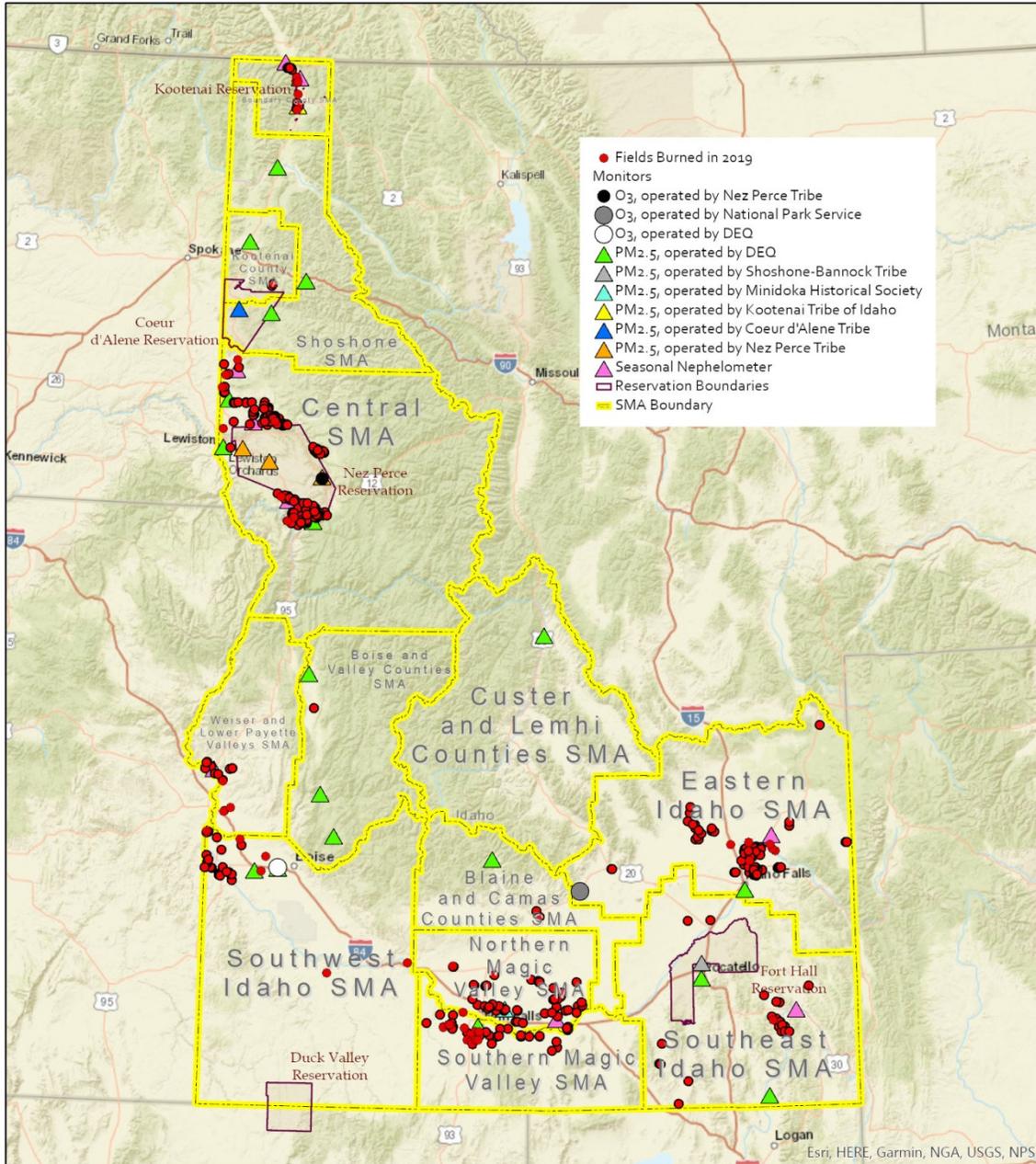
Appendix C. Burned Acres Summary

Date	Blaine and Camas	Boise and Valley	Boundary County	Central	Eastern Idaho	Kootenai County	North Magic Valley	Southeast Idaho	South Magic Valley	Southwest Idaho	Weiser and Lower Payette	Total
Total Acres	260	25	2,315	17,465	3,883	95	3,925	2,616	2,230	976	333	34,123
Max Acre Day	150	25	555	2,473	493	95	830	600	453	179	65	2,647
3/18/19	0	0	0	0	0	0	0	0	130	114	0	244
3/19/19	0	0	0	0	0	0	0	0	109	145	0	254
3/21/19	0	0	0	0	0	0	0	0	72	36	0	108
3/22/19	0	0	0	0	0	0	0	0	48	6	0	54
3/26/19	0	0	0	0	0	0	0	0	4	0	0	4
3/27/19	0	0	0	0	0	0	0	0	27	0	0	27
4/1/19	0	0	0	0	0	0	0	0	13	0	35	48
4/4/19	0	0	0	0	0	0	0	0	0	12	0	12
4/12/19	0	0	0	0	0	0	32	0	0	5	0	37
4/18/19	0	0	0	0	0	0	0	0	147	3	0	150
4/19/19	0	0	0	140	40	0	0	0	453	0	0	633
4/22/19	0	0	0	0	0	0	0	0	10	0	0	10
4/24/19	0	0	0	261	0	0	0	0	0	0	0	261
4/25/19	0	0	0	0	142	0	0	0	18	0	30	190
4/29/19	0	0	0	10	0	0	0	0	0	0	0	10
4/30/19	0	0	0	0	0	0	0	0	50	0	0	50
5/3/19	0	0	140	110	0	0	0	0	0	0	0	250
5/6/19	0	0	102	0	0	0	0	160	0	0	0	262
5/7/19	0	0	98	20	0	0	0	0	0	0	0	118
5/9/19	0	0	100	0	0	0	0	0	0	0	0	100
5/10/19	0	0	215	120	0	0	0	0	34	0	0	369
5/13/19	0	0	0	0	10	0	0	0	0	0	5	15
5/14/19	0	0	85	0	0	0	0	0	0	0	0	85
5/20/19	0	0	0	9	0	0	0	0	0	0	0	9
6/11/19	0	0	0	6	0	0	0	0	0	0	0	6
6/14/19	0	0	0	2	0	0	0	0	0	0	0	2
7/1/19	0	0	0	0	0	0	0	4	0	0	0	4

Date	Blaine and Camas	Boise and Valley	Boundary County	Central	Eastern Idaho	Kootenai County	North Magic Valley	Southeast Idaho	South Magic Valley	Southwest Idaho	Weiser and Lower Payette	Total
7/2/19	0	0	0	0	0	0	0	6	0	0	0	6
7/3/19	0	0	0	0	0	0	0	5	0	0	0	5
7/5/19	0	0	0	0	0	0	0	4	0	0	0	4
7/9/19	0	0	0	0	0	0	0	10	0	0	0	10
7/10/19	0	0	0	0	0	0	0	11	0	0	0	11
7/25/19	0	0	0	0	0	0	0	0	60	0	0	60
7/30/19	0	0	0	129	0	0	0	0	0	0	0	129
7/31/19	0	0	0	325	0	0	0	0	0	0	0	325
8/2/19	0	0	0	0	0	0	0	0	55	86	0	141
8/5/19	0	0	0	61	0	0	0	0	0	0	0	61
8/6/19	0	0	0	0	0	0	150	0	0	0	0	150
8/12/19	0	0	0	0	0	0	356	0	9	20	0	385
8/13/19	0	0	0	0	130	0	296	0	0	179	25	630
8/14/19	0	0	0	0	0	0	162	0	26	122	0	310
8/15/19	0	0	0	0	0	0	0	0	50	30	0	80
8/19/19	0	0	95	50	7	0	830	0	0	0	13	995
8/20/19	0	0	330	461	156	0	164	0	69	68	20	1,268
8/21/19	0	0	0	403	405	0	135	0	233	76	0	1,252
8/23/19	150	0	0	509	122	0	416	0	147	25	0	1,369
8/26/19	0	0	0	935	20	0	32	0	188	0	0	1,175
8/27/19	110	0	555	360	88	0	235	0	161	0	0	1,509
8/28/19	0	0	0	337	199	0	40	0	1	0	0	577
8/29/19	0	0	0	0	0	0	140	0	8	0	0	148
8/30/19	0	0	0	130	40	0	542	35	0	0	0	747
9/3/19	0	0	0	1,052	0	0	69	170	0	0	0	1,291
9/4/19	0	0	0	732	492	95	100	135	24	0	65	1,643
9/5/19	0	0	0	0	110	0	0	0	0	0	0	110
9/9/19	0	0	0	0	0	0	0	0	1	0	0	1
9/11/19	0	0	0	67	0	0	0	0	0	0	34	101
9/12/19	0	0	245	1,548	0	0	0	0	24	20	0	1,837
9/13/19	0	0	0	2,473	167	0	0	0	0	7	0	2,647
9/16/19	0	0	0	885	0	0	132	0	0	0	0	1,017
9/17/19	0	0	0	797	0	0	0	0	0	0	0	797
9/18/19	0	0	0	0	393	0	0	0	0	0	0	393
9/19/19	0	0	115	0	493	0	0	290	0	0	0	898

Date	Blaine and Camas	Boise and Valley	Boundary County	Central	Eastern Idaho	Kootenai County	North Magic Valley	Southeast Idaho	South Magic Valley	Southwest Idaho	Weiser and Lower Payette	Total
9/20/19	0	0	0	351	0	0	0	0	0	0	0	351
9/24/19	0	0	0	1,641	11	0	0	54	0	0	0	1,706
9/25/19	0	0	100	1,436	407	0	0	234	0	0	0	2,177
9/26/19	0	0	0	0	0	0	5	275	0	15	0	295
9/27/19	0	0	135	300	0	0	1	0	33	0	0	469
10/2/19	0	0	0	40	0	0	0	0	0	0	0	40
10/3/19	0	0	0	15	0	0	0	0	0	0	0	15
10/7/19	0	0	0	730	5	0	0	0	0	0	0	735
10/8/19	0	0	0	0	0	0	0	55	0	0	0	55
10/11/19	0	0	0	418	0	0	0	0	0	7	0	425
10/15/19	0	0	0	342	354	0	0	0	0	0	0	696
10/16/19	0	0	0	44	0	0	0	25	0	0	9	78
10/18/19	0	0	0	35	0	0	0	0	0	0	0	35
10/23/19	0	0	0	2	0	0	80	0	0	0	0	82
10/24/19	0	0	0	0	0	0	2	0	26	0	0	28
10/25/19	0	0	0	0	0	0	3	0	0	0	61	64
10/28/19	0	0	0	25	0	0	0	0	0	0	0	25
10/31/19	0	0	0	0	0	0	0	0	0	0	36	36
11/4/19	0	0	0	0	0	0	1	30	0	0	0	31
11/5/19	0	0	0	0	50	0	0	0	0	0	0	50
11/6/19	0	25	0	154	30	0	0	600	0	0	0	809
11/7/19	0	0	0	0	10	0	0	10	0	0	0	20
11/8/19	0	0	0	0	0	0	2	290	0	0	0	292
11/12/19	0	0	0	0	0	0	0	41	0	0	0	41
11/13/19	0	0	0	0	0	0	0	143	0	0	0	143
11/14/19	0	0	0	0	0	0	0	2	0	0	0	2
11/15/19	0	0	0	0	0	0	0	2	0	0	0	2
11/19/19	0	0	0	0	2	0	0	0	0	0	0	2
11/22/19	0	0	0	0	0	0	0	25	0	0	0	25

Appendix D. 2019 CRB Burn Locations



2019 Burned Fields

