Idaho 5-Year Regional Haze Progress Report

State of Idaho
Department of Environmental Quality

March 2016

Printed on recycled paper, DEQ March 2016, PID RHPB, CA 81020. Costs associated with this publication are available from the State of Idaho Department of Environmental Quality in accordance with Section 60-202, Idaho Code.

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March 2016

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Definitions and Acronyms

The following definitions apply to this 5-year regional haze report and can be separated into three categories: (1) general definitions from 40 CFR 51.301 related to visibility, some of which were added or revised with adoption of the Regional Haze Rule in 1999; (2) definitions relating to fire; and (3) abbreviations and acronyms. Additional general definitions can be found at the Visibility Information Exchange Web System (VIEWS) at *http://views.cira.colostate.edu/web/Glossary.aspx*.

General Definitions from Section 301 Related to Visibility

Best available retrofit technology (BART)—an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant that is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, considering the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source, and the degree of improvement in visibility that may reasonably be anticipated to result from the use of such technology.

***Class I*—**are those national parks exceeding 6,000 acres, wilderness areas and national memorial parks exceeding 5,000 acres, and all international parks that were in existence on August 7, 1977. Congress decided these areas were worthy of visibility protection.

***Deciview*—**a measurement of visibility impairment. A deciview is a Haze Index derived from calculated light extinction, such that uniform changes in haziness correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to highly impaired. The deciview Haze Index is calculated based on the following equation (for the purposes of calculating deciview, the atmospheric light extinction coefficient must be calculated from aerosol measurements):

$$\text{Deciview Haze Index} = 10\ 1n_e\ (b_{ext}/10\ Mm^{-1}).$$

Where b_{ext} = the atmospheric light extinction coefficient, expressed in inverse megameters (Mm^{-1}).

***Existing stationary facility*—**any of the following stationary sources of air pollutants, including any reconstructed source that was not operating prior to August 7, 1962, and was in existence on August 7, 1977, and has the potential to emit 250 tons per year or more of any air pollutant. In determining potential to emit, fugitive emissions, to the extent quantifiable, must be counted.

- Fossil-fuel fired steam electric plants of more than 250 million British thermal units per hour heat input
- Coal cleaning plants (thermal dryers)
- Kraft pulp mills
- Portland cement plants
- Primary zinc smelters
- Iron and steel mill plants

- Primary aluminum ore reduction plants
- Primary copper smelters
- Municipal incinerators capable of charging more than 250 tons of refuse per day
- Hydrofluoric, sulfuric, and nitric acid plants
- Petroleum refineries
- Lime plants
- Phosphate rock processing plants
- Coke oven batteries
- Sulfur recovery plants
- Carbon black plants (furnace process)
- Primary lead smelters
- Fuel conversion plants
- Sintering plants
- Secondary metal production facilities
- Chemical process plants
- Fossil-fuel boilers of more than 250 million British thermal units per hour heat input
- Petroleum storage and transfer facilities with a capacity exceeding 300,000 barrels
- Taconite ore processing facilities
- Glass fiber processing plants
- Charcoal production facilities

***Federal Class I area*—**any federal land that is classified or reclassified Class I.

***Federal land manager*—**the secretary of the department with authority over the Federal Class I area (or the secretary's designee).

***Federally enforceable*—**all limitations and conditions that are enforceable by the administrator under the Clean Air Act including those requirements developed pursuant to 40 CFR Parts 60 and 61, requirements within any applicable State Implementation Plan, and any permit requirements established pursuant to 40 CFR 52.21 of this chapter or under regulations approved pursuant to 40 CFR Parts 51, 52, or 60.

***Implementation plan*—**for the purposes of this part, any State Implementation Plan, Federal Implementation Plan, or Tribal Implementation Plan.

***Least impaired days*—**the average visibility impairment (measured in deciviews) for the 20% of monitored days in a calendar year with the lowest amount of visibility impairment.

***Major stationary source and major modification*—**as defined in 40 CFR 51.166.

***Mandatory Class I federal area*—**any area identified in 40 CFR Part 81, Subpart D.

***Most impaired days*—**the average visibility impairment (measured in deciviews) for the 20% of monitored days in a calendar year with the highest amount of visibility impairment.

***Natural conditions*—**includes naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration.

***Reasonably attributable*—**attributable by visual observation or any other technique the state deems appropriate.

***Reasonably attributable visibility impairment*—**visibility impairment that is caused by the emission of air pollutants from one or a small number of sources.

Regional haze—visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. Such sources include, but are not limited to, major and minor stationary sources, mobile sources, and area sources.

***State*—**as defined in section 302(d) of the Clean Air Act.

***Stationary source*—**any building, structure, facility, or installation that emits or may emit any air pollutant.

Visibility impairment—any humanly perceptible change in visibility (light extinction, visual range, contrast, coloration) from that which would have existed under natural conditions.

Definitions Relating to Fire

Fire—any wildfire, wildland fire, prescribed fire, and agricultural burning that is conducted on federal, state, and private wildlands and farmlands. Except where "prescribed fire" is noted, the term "fire" shall apply to the sources identified herein.

Land manager—any federal, state, local, or private entity that owns, administers, directs, oversees, or controls the use of public or private land, including the application of fire to the land.

Prescribed fire or prescribed burn—any fire ignited by management actions to meet specific objectives, such as achieving resource benefits.

Abbreviations and Acronyms

BACT	best available control technology
BART	best available retrofit technology
CAFO	confined animal feedlot operations
CFR	Code of Federal Regulations
CIA	Class I area
CO	carbon monoxide
DEQ	Idaho Department of Environmental Quality
dv	deciview
EC	elemental carbon
EPA	US Environmental Protection Agency

FLM	federal land manager
FR	Federal Register
HI	Haze Index
IMPROVE	Interagency Monitoring of Protected Visual Environments
LCDA	lime-concentrated dual-alkali
Mm	megameter
MODIS	Moderate Resolution Imaging Spectroradiometer
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
NH_3	ammonia
NO_x	a mixture of NO_2 (nitrogen dioxide), nitric oxide (NO), and other nitrogen oxide gases
NSR	New Source Review
OC	organic carbon
$PM_{2.5}$	particulate of 2.5 microns or less
PM_{10}	particulate of 10 microns or less
POA	primary organic aerosol
ppm	parts per million
PSD	Prevention of Significant Deterioration
RHR	Regional Haze Rule
RPG	reasonable progress goal
SIP	State Implementation Plan
SO_2	sulfur dioxide
TASCO	Amalgamated Sugar
tpy	tons per year
VOC	volatile organic compound
WESTAR	Western States Air Resources Council
WRAP	Western Regional Air Partnership

Executive Summary

To address the problem of regional haze and to meet the national goal of reducing man-made visibility impairment in all Class I areas, the US Environmental Protection Agency (EPA) adopted “Phase II” visibility rules in 1999—also known as the Regional Haze Rule. The primary purpose of the rule is to improve visibility over the next 60 years in all 156 Class I areas across the country through the development of regional haze state implementation plans that focus on improving visibility on the 20% worst days and protecting the cleanest days (best 20% days).

In October 2010, Idaho submitted a regional haze plan to EPA that contained reasonable progress goals toward improving visibility on the 20% worst days for Idaho Class I areas, which include Craters of the Moon National Monument, Sawtooth Wilderness, and Selway-Bitterroot Wilderness. The plan contained several control measures to improve visibility, including several existing federal and state programs as well as installing best available retrofit technology on some older facilities. The Regional Haze Rule (40 CFR 51.308(g)) also requires states to submit periodic reports describing progress toward the reasonable progress goals 5 years after submitting regional haze plans. The intent of this report is to satisfy the periodic reporting requirements of the Regional Haze Rule.

This progress report examines the control measures in place and the impact those control measures have on reducing visibility-impairing pollutants. During this first 5-year review period, Idaho control measures, in conjunction with federal control measures, have reduced nitrogen oxides by 41% and sulfur oxides by 62% from the base year period of (2000-2004) to 2011. The monitoring data from 2002 to 2011 show the 2018 reasonable progress goals for visibility at Craters of the Moon and Selway-Bitterroot Wilderness have been met, and Sawtooth Wilderness is already at 98% of the 2018 reasonable progress goals. Idaho has determined the current regional haze plan strategies are sufficient for Idaho and its neighboring states to meet their 2018 reasonable progress goals. Therefore, no further substantive revision of the plan is warranted at this time in order to achieve the 2018 reasonable progress goals for visibility improvement.

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1 Introduction and Regional Haze Requirements

To address the problem of regional haze and to meet the national goal of reducing man-made visibility impairment in all Class I areas, the US Environmental Protection Agency (EPA) adopted "Phase II" visibility rules in 1999—also known as the Regional Haze Rule (RHR). The primary purpose of the rule is to improve visibility over the next 60 years in all 156 Class I areas (CIAs) across the country through the development of regional haze state implementation plans that focus on improving visibility on the 20% worst days and protecting the cleanest days (best 20% days).

In October 2010, Idaho submitted a regional haze plan to EPA that contained reasonable progress goals (RPGs) toward improving visibility on the 20% worst days for Idaho CIAs, which include Craters of the Moon National Monument, Sawtooth Wilderness, and Selway-Bitterroot Wilderness. The plan contained several control measures to improve visibility, including several existing federal and state programs as well as installing best available retrofit technology (BART) on some older facilities. The RHR (40 CFR 51.308(g)) also requires states to submit periodic reports describing progress toward the RPGs 5 years after submitting regional haze plans. The intent of this report is to satisfy the periodic reporting requirements of the RHR.

1.1 Introduction to Visibility

Good visibility is essential to enjoying everyday life and viewing national parks and scenic areas. Visibility impairment occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere, which affects the clarity and color of what we see. Without the effects of air pollution, natural visual range is approximately 140 miles in the West and 90 miles in the East. However, over the years, air pollution in many parts of the United States has significantly reduced the range of distances that people can see. In the West, the current range is 35–90 miles, and in the East only 15–25 miles.

Regional haze is air pollution that is transported long distances that reduces visibility. The pollutants that create this haze are sulfates, nitrates, organic carbon, elemental carbon, and soil dust (i.e., particulate matter). Human-caused haze sources include industry, motor vehicles, agricultural and forestry burning, and windblown dust from farming practices and roads.

A national RHR has been adopted that requires states to improve visibility over a 60-year time span in 156 national parks and wilderness areas in the country. These national parks and wilderness areas receive special visibility protection as "mandatory federal Class I areas." In 1977, Congress designated all wilderness areas with more than 5,000 acres and all national parks with more than 6,000 acres as mandatory Class I federal areas, subject to the visibility protection requirements in the Clean Air Act. Most CIAs in the United States are in the West (Figure 1).

Figure 1. Map of all Class I areas in the United States.

1.2 The Clean Air Act and Regional Haze Rule

In 1977, Congress amended the Clean Air Act to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, in Section 169A, Congress declared as a national visibility goal:

> … the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from man-made air pollution.

To meet this goal, in 1980 EPA adopted regulations to address "reasonably attributable visibility impairment," or visibility impairment caused by one or a small group of man-made sources generally located in close proximity to a specific CIA. These became known as EPA's "Phase I" visibility rules. At that time, EPA deferred writing rules to address regional haze because the agency lacked the monitoring, modeling, and scientific information needed to understand the nature of long-range transport and formation of regional haze.

In the 1990 amendments to the Clean Air Act, Congress established the requirements to address regional haze. It gave EPA the authority to establish visibility transport commissions and to promulgate regulations to address regional haze.

To address the problem of regional haze and meet the national goal of reducing man-made visibility impairment in all CIAs, EPA adopted "Phase II" visibility rules in 1999—also known

as the Regional Haze Rule (RHR).[1] The primary purpose of the rule is to improve visibility over the next 60 years in all 156 CIAs across the country by developing regional haze state implementation plans (SIPs) that focus on improving the haziest days (the worst 20%) and protecting the clearest days (the best 20%) through the year 2064. Each SIP provides a comprehensive analysis of natural and man-made sources of haze in each CIA and contains strategies to control sources and reduce emissions that contribute to haze. Each SIP must also address the transport of haze across state boundaries in coordination with other states.

Two of the primary SIP requirements in Idaho's original 2010 SIP were to address BART and demonstrate "reasonable progress" in improving visibility by 2018 for each CIA in the state. The BART requirements address certain larger industrial sources that began operation before the 1977 Prevention of Significant Deterioration Rules were adopted. As part of developing a regional haze SIP, states were to demonstrate "reasonable progress," which required setting goals for the 20% worst and best visibility days in each CIA, based on evaluating how BART and other regional haze strategies will reduce emissions and improve or protect visibility.

In the mid-1980s, a program known as Interagency Monitoring of Protected Visual Environments (IMPROVE) was established to measure visibility impairment in mandatory federal CIAs throughout the United States. IMPROVE monitoring sites are operated and maintained through a formal cooperative relationship between the EPA, National Park Service, US Fish and Wildlife Service, Bureau of Land Management, and US Forest Service. In 1991, several additional organizations joined the effort: state and territorial air pollution program administrators, the Association of Local Air Pollution Control Officials, the Western States Air Resources Council, the Mid-Atlantic Regional Air Management Association, and Northeast States for Coordinated Air Use Management.

The objectives of the IMPROVE program include establishing the current visibility and aerosol conditions in mandatory federal CIAs; identifying the chemical species and emissions sources responsible for existing man-made visibility impairment; and documenting long-term trends for assessing progress toward the national visibility goals in supporting the requirements of the RHR by providing regional haze monitoring, where practical, for all visibility-protected federal CIAs.

Each IMPROVE monitor collects particulate concentration data that are converted into reconstructed light extinction through a complex calculation using the IMPROVE equation (simplified equation in section 1.3). Reconstructed light extinction (denoted as b_{ext}) is expressed in units of inverse megameters (1/Mm or Mm^{-1}). However, the RHR requires tracking of visibility conditions in terms of the Haze Index (HI) metric expressed in deciview (dv) units (40 CFR 51.308(d)(2)). Generally, a 1-deciview change in the HI is likely perceptible to the human eye. The relationship between extinction (Mm^{-1}), Haze Index (dv), and visual range (in miles) is shown in Figure 2.

[1] See 40 CFR Part 51 Regional Haze Regulations; Final Rule, July 1, 1999, available online at *www.epa.gov/airquality/visibility/actions.*

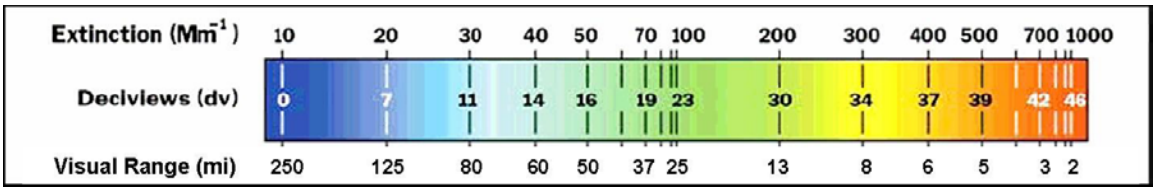

Figure 2. Relationship between various measures of visibility.

The deciview measurement is important since it provides visibility impairment in context of a human's ability to see and is used in establishing RPGs.

The RHR requires calculating baseline conditions for each CIA. For each area, the baseline condition is defined as the 5-year average, using annual values for 2000–2004, based on IMPROVE monitoring data (expressed in deciviews) for the most impaired (20% worst) days and the least impaired (20% best) days. For the first regional haze SIP, the baseline conditions are the reference point against which visibility improvement is tracked. For subsequent regional haze SIP updates, baseline conditions are used to calculate progress from the beginning of the regional haze program. Current conditions for the best and worst days can be calculated from a multiyear average, based on the most recent 5 years of monitored data available. This value will be revised at the time of each periodic SIP revision and will be used to illustrate the progress made since the last SIP revision and from the baseline period.

1.3 Measuring Visibility

Visibility-impairing pollutants both reflect and absorb light in the atmosphere, thereby affecting the clarity of objects viewed at a distance by the human eye. Each haze pollutant has a different light extinction capability. In addition, relative humidity changes the effective light extinction of both nitrates and sulfates. Since haze pollutants can be present in varying amounts at different locations throughout the year, aerosol measurements of each visibility-impairing pollutant are made every 3 days at the IMPROVE monitors located in or near each CIA.

Five primary pollutants are involved in visibility impairment: nitrates, sulfates, organic carbon, elemental carbon (also known as light-absorbing carbon), and soil (i.e., particulate matter) (see Figure 3). These pollutants have different effects on light, depending on the size of the pollutant particle. Smaller particles of 2.5 microns or less impair light more efficiently than pollutants 10.0 microns or greater.

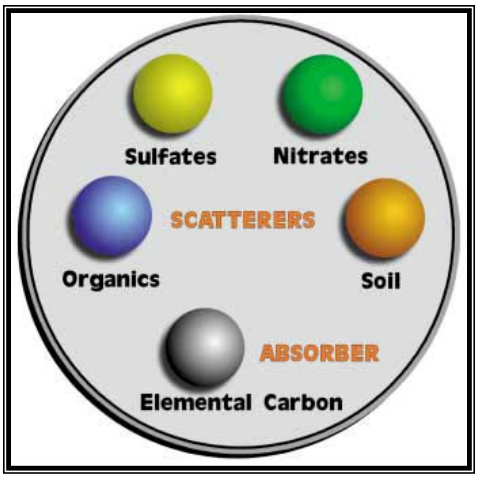

Figure 3. Five primary pollutants that impair visibility (Malm 1999)[2].

To understand how these pollutants affect light, it is important to first understand light waves that are visible to the human eye. Light waves are made up of electromagnetic waves containing energy known as photons. The wavelengths are measured in microns. The human eye is capable of seeing photons in the range of 0.4 to 0.7 microns. Other light waves—such as x-rays and ultraviolet light—are too small for the eye to see, while infrared light, radio waves, and microwaves are too large for the eye to see. Within the size range of light wavelengths that the human eye can see are three primary colors: blue, green, and red. What we see as colors are actually the photons reflected off an object. For example, if the only photons being reflected off an object are those that we see as blue, then the object appears blue to us. Figure 4 shows the relationship between wavelengths and colors.

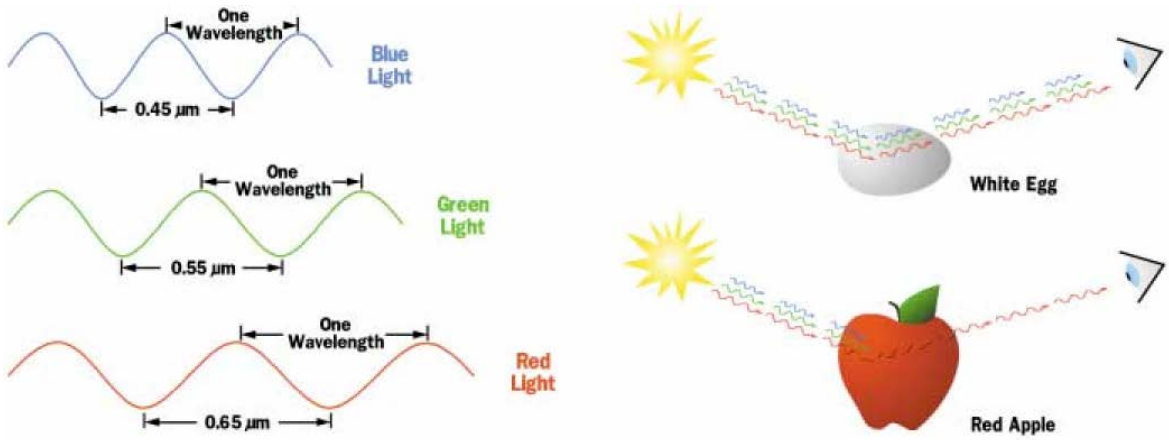

Figure 4. Wavelengths of light visible to humans (Malm 1999).

[2] The information and figures in this section were taken from "Introduction to Visibility" (May 1999), William Malm of the Air Resources Division of the National Park Service, available at: *http://www3.epa.gov/visibility/pdfs/introvis.pdf*

In the fall, we see leaves change color because the chlorophyll that was absorbing the blue and red wavelengths fades away and allows the other colors' wavelengths to show more clearly. In a similar fashion, nitrogen dioxide in the air captures the blue wavelengths, so the air appears reddish brown, which is most noticeable near the skyline. This coloring happens due to the particle sizes of nitrogen dioxide being very close to the size of the blue wavelengths. The closer a visibility impairing pollutant particle is in relationship to the size of light wavelength, the greater the efficiency of the particle to interfere with visibility of the light.

As air pollutants begin to combine into compounds such as ammonium nitrate, they are known as aerosols. As mentioned above, each pollutant—whether in gaseous or aerosol form—has a different efficiency at impairing light, and this is partially based on the size of the pollutant particle. Aerosols are more efficient at scattering light than visibility impairing pollutants in the gaseous state since aerosols are larger in particle size (Malm 1999, p. 8–10).

Aerosol measurements are weighted by their atmospheric light extinction coefficients, and their contribution to light extinction (i.e., their ability to impair visibility) is summed in the following equation:[3]

$$b_{ext} = (3)f(RH)[sulfate] + (3)f(RH)[nitrate] + (4)[OMC] + (10)[LAC] + (1)[fine\ soil] + (0.6)[CM] + 10$$

Where:

B_{ext}	= light-extinction coefficient or reconstructed light extinction
f(RH)	= relative humidity at the particular CIA at the time of year the measurement is made
sulfate	= mass of ammonium sulfate collected from the IMPROVE sampler
nitrate	= mass of ammonium nitrate collected from the IMPROVE sampler
OMC	= mass of organic carbon collected from the IMPROVE sampler
LAC	= mass of elemental carbon collected from the IMPROVE sampler
fine soil	= corrected mass of aluminum, silicon, calcium, iron, and titanium collected from the IMPROVE sampler
CM	= mass of coarse particulates, which is the difference between particles 10 microns (PM_{10}) and particles 2.5 microns ($PM_{2.5}$)
10	= constant for Rayleigh scattering

1.4 Idaho Class I Areas

Idaho has five CIAs: Hells Canyon Wilderness, Sawtooth Wilderness, Craters of the Moon National Monument, Yellowstone National Park, and Selway-Bitterroot Wilderness (Figure 5). Both Hells Canyon and Yellowstone have portions within Idaho, but the majority of the land

[3] This light extinction equation is the old IMPROVE equation, which does not account for changes in light impairment do to different concentrations of some visibility-impairing pollutants. For more information on the new IMPROVE equation, visit the IMPROVE website and search for "revised IMPROVE equation."

mass for both of these CIAs is in other states. For this reason Idaho, is responsible for setting RPGs and doing the 5-year progress report for Sawtooth Wilderness, Craters of the Moon National Monument, and Selway-Bitterroot Wilderness. Oregon is responsible for Hells Canyon, and Wyoming is responsible for Yellowstone National Park.

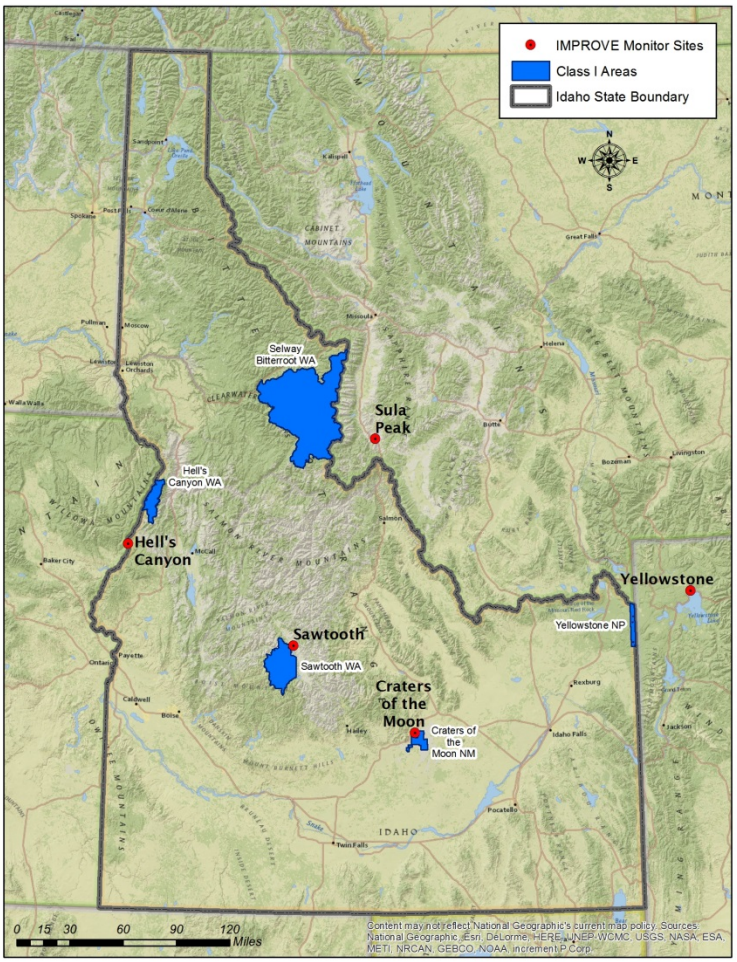

Figure 5. Idaho Class I areas.

1.5 Impacts on Visibility

A better understanding of visibility improvement emerges from relating reductions in precursor emissions in and near the CIAs to changes in concentrations of haze species measured at the monitors. Also important is the change in each haze species' contribution to light extinction, as the mix of precursor emissions changes. Emissions from both natural sources and man-made activities (anthropogenic sources) affect visibility. These sources can be located within Idaho, but long-range transport also brings visibility-impairing pollutants from out-of-state and international sources into Idaho's atmosphere. Idaho's emissions control strategy focuses on sources within the state's regulatory jurisdiction.

However, the fact that "uncontrollable" natural and anthropogenic sources affect visibility is not neglected in this analysis. For example, visibility progress in western states is slowed by the

increased frequency and intensity of wildfires during the summer. Smoke originating from wildfires within and outside Idaho generates enormous concentrations of organic carbon aerosols that impact many visibility monitors before dissipating. Another event occurring beyond Idaho's borders are spring windstorms in the desert (haboobs), which have detectable but minor haze consequences in Idaho at this time.

Uncontrollable emissions sources add to the atmospheric mix of visibility-impairing pollutants produced by anthropogenic sources in Idaho, all detected but not differentiated by the IMPROVE monitors. Seasonal inversions, wind patterns, and humidity enhance the impact of these variable emissions. Idaho's complicated topography, and complex meteorology, may result in somewhat uneven year-to-year deciview progress at some sites, despite steady reductions of emissions.

1.6 Initial Reporting Requirements

In this first progress report, the RHR requires all states to report on the implementation status for emission control measures implemented within the state for achieving reasonable progress toward the 2018 goals for CIAs within and outside the state. In April 2013, EPA issued guidance[4] that states evaluate visibility improvement using the most recent monitoring data available for the initial progress reports.

In this progress report, "current" conditions are the 5-year averages of 2007–2011 visibility data, which is compared with "baseline" conditions, 2000–2004, from the initial Idaho regional haze SIP. For further analysis on a regional scale, Idaho joined with 14 other states to prepare the Western Regional Air Partnership (WRAP) Regional Summary Report). The WRAP summary report was released in June 2013 and includes a comprehensive analysis of both measured visibility changes at the IMPROVE monitors and changes in emissions inventories between the baseline period and the five following years (2005–2009) to meet some of the RHR reporting requirements. Idaho's progress report goes further to update the WRAP summary report with the 2007–2011 Idaho-specific data.

The 2012–2014 visibility monitoring data became available after the WRAP analysis was completed, and the National Emissions Inventory (NEI) data for 2014 are not yet available. The timing of the data does not allow for an extensive reasonable progress analysis to be done in this progress report beyond the 2011 NEI data. However, the 2012–2014 monitoring data are provided throughout the document and in the appendix. The inclusion of 2012–2014 monitoring information and lack of associated emission information for 2014 illustrate progress in visibility improvement and does not change the conclusions of this progress report.

1.7 Overview of Intent of 5-year Regional Haze Report

The RHR specifies that progress is determined for "current conditions," and RHR guidance released in 2003 specifies that progress be tracked against the 2000–2004 baseline period using

[4] "General Principles for the 5-Year Regional Haze Progress Reports for the Initial Regional Haze State Implementation Plans (Intended to Assist States and EPA Regional Offices in Development and Review of the Progress Reports)," EPA, Office of Air Quality Planning Standards, April 2013.

corresponding averages over successive 5-year periods (i.e., 2005–2009, 2010–2014, etc.).[5] More recent guidance, released in April 2013, indicates that progress reports "should include the 5-year average that includes the most recent quality assured public data available at the time the state submits its 5-year progress report for public review"[6] and suggests assessing changes using a rolling 5-year period average. Per 2013 guidance, progress for this support document is reported as changes in monitored between baseline conditions and the 5-year progress period 2007–2011 data (2011is the last National Emission Inventory that can be used to compare the emissions to the IMPROVE monitoring data). Additionally, for summaries here, annual average trend statistics as measured for each aerosol species during the 2002–2011 10-year period are reported to support assessments of changing conditions.

This report includes Idaho CIA-specific summaries that characterize the difference between the baseline conditions and first successive progress period (2007–2011). Assessments include changes in visibility impairment as measured using aerosol data collected by the IMPROVE network. Assessments of progress also include the differences between emissions inventories for years that represent both the baseline and progress periods. The following specific regulatory questions are addressed in this report:

- What is the status of implementation of all measures included in the implementation plan? 40 CFR 51.308(g)(1)
- What emissions reductions have been achieved through implementation of these measures? 40 CFR 51.308(g)(2)
- What are the current visibility conditions for the most impaired (worst) and least impaired (best) days? 40 CFR 51.308(g)(3) (i)
- What is the difference between current visibility conditions and baseline conditions for the most impaired and least impaired days? 40 CFR 51.308(g)(3)(ii)
- What is the change in visibility impairment for the most impaired and least impaired days? 40 CFR 51.308(g)(3)(iii)
- What is the change in emissions that occurred between the baseline period and the progress period? 40 CFR 51.308(g)4)
- What emissions from within or outside of the state have limited or impeded progress in reducing pollutant emission and improving visibility? 40 CFR 51.308(5)
- Are current implementation plan elements and strategies sufficient to enable the state, or other states with mandatory federal CIAs affected by the state, to meet all established RPGs? 40 CFR 51.308(g)(6)
- What is the State's visibility monitoring strategy and ay modifications to the strategy that are necessary? 40 CFR 51.308(g)7

Per regulatory requirements, differences between emissions inventories representing both the baseline and progress periods are presented here. Baseline emissions in most cases are represented using the 2002 inventory that was originally developed, with support from the

[5] See page 4-2 in EPA's September 2003 Guidance for Tracking Progress Under the Regional Haze Rule.

[6] See page 9 in EPA's April 2013 General Principals for the 5-Year Regional Haze Progress reports for the Initial Regional Haze State Implementation Plans (Intended to Assist States and EPA Regional Offices in Development and Review of the Progress Reports).

WRAP, to represent emissions for the initial implementation plans. Current emissions are represented here by leveraging recent work by the WRAP to develop an updated and comprehensive inventory for the year 2008 for use in modeling projects and an updated 2011 emission inventory. Emissions inventory comparisons in this report were complicated by the fact that a number of changes and enhancements have occurred between development of the baseline and current period inventories, such that some of the differences between inventories are more reflective of changes in inventory methodology, rather than changes in actual emissions. Characterizations here focus more on differences in the actual monitored data, which are thought to be more reflective of progress than differences between the emission inventories.

2 Control Strategy Status and Emissions

2.1 Emissions

The emission inventory is divided into the following broad sources: point, area (includes dust, and non-point source), on-road mobile, off-road mobile, anthropogenic fire, and natural fire. Each of these categories contributes a different mix of light-impairing pollutants. The primary visibility impairing pollutants are sulfur dioxide (SO_2), nitrogen oxides (NO_x), organic carbon (OC) –includes both primary organic aerosols (POA) directly emitted and secondary organic aerosols(SOA) that are chemically formed, elemental carbon (EC), and particulate matter, which is further broken down to fine particulate matter of 2.5 microns or less ($PM_{2.5}$) and course particulate matter of 10 microns or smaller (PM_{10}). To a lesser degree, ammonia (NH_3) is also included as it interacts with SO_x and NO_x to form ammonium sulfate and ammonium nitrate, both of which are fine particulates. Table 1 depicts the light impairing pollutants and the primary sources of those pollutants.

Table 1. Light impairing pollutant and associated sources.

Emitted Pollutant	Major Sources	Notes
Sulfur dioxide (SO_2)	Point, on- and off-road mobile	SO_2 emissions are generally associated with anthropogenic sources such as coal-burning power plants, other industrial sources such and refineries and cement plants, and both on- and off-road diesel engines.
Oxides of nitrogen (NO_X)	On- and off-road mobile, point, area	NO_X emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes.
Ammonia (NH_3)	Area, on-road mobile	Gaseous NH_3 has implications in particle formation because it can form particulate ammonium. Ammonium is not directly measured by the IMPROVE network but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate is assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile organic compounds (VOCs)	Biogenic emissions, vehicle emissions, area	Volatile Organic Carbon (VOC) are gaseous emissions of carbon compounds, which are often converted to SOA through chemical reactions in the atmosphere. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions.
Primary organic aerosol (POA)	Wildfires, area	POA represents organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires in the west generally dominate POA emissions, and large wildfire events are generally sporadic and highly variable from year-to-year.
Elemental carbon (EC)	Wildfires, on- and off-road mobile	Large EC events are often associated with large POM events during wildfires. Other sources include both on- and off-road diesel engines.
Fine particulate matter	Windblown dust, fugitive dust, road dust, area	Fine particulate matter is reported here as the crustal or soil components of $PM_{2.5}$.
Coarse particulate matter	Windblown dust, fugitive dust	Coarse particulate matter is reported by the IMPROVE network as the difference between PM_{10} and $PM_{2.5}$ mass measurements. Coarse mass is not separated by species in the same way that $PM_{2.5}$ is speciated, but these measurements are generally associated with crustal components. Similar to crustal $PM_{2.5}$, natural windblown dust is often the largest contributor to course particulate matter.

2.2 Emission Reductions from On-Going Air Pollution Programs

The following summary satisfying 40 CFR 51.308(g)(1) describes ongoing programs and regulations in Idaho that directly protect visibility, or can be expected to improve visibility in Idaho's CIAs, by reducing emissions in general. This summary does not attempt to estimate the actual improvements in visibility that will occur, as many of the benefits are secondary to the primary air pollution objective of these programs/rules and consequently would be extremely difficult to quantify due to the technical complexity and limitations in current assessment techniques.

2.2.1 Prevention of Significant Deterioration/New Source Review Rules

Idaho's Prevention of Significant Deterioration (PSD) and New Source Review (NSR) Program are the primary tools for future protection of visibility at Idaho's CIAs from point sources emissions. These programs require new major sources and major modifications at existing

sources with significant impacts to visibility at CIAs to install best available control technology (BACT). Much like BART, PSD requires new or major modifications to model the emissions impacts on CIAs within 300 kilometers to determine if the change in visibility above natural levels is significant. As new National Ambient Air Quality Standards (NAAQS) are promulgated, these significant levels can change. The PSD NSR permitting program is described at IDAPA 58.01.01.200–228 (specifically see 202.01.b.v, 202.01.c.vi, and also see 40 CFR 52.670 and annual updates at IDAPA 58.01.01.107) and establishes the baseline dates and the maximum allowable increases in pollutant concentrations.

2.2.2 Federal Mobile Source Regulations

The Federal Motor Vehicle Control Program has already produced large emissions reductions in NO_x, SO_x, volatile organic compounds (VOCs), and particulate matter. The Federal Tier II vehicle emissions and fuel standards reduced the sulfur content of diesel fuel from 500 to 15 parts per million (ppm) (Ultra Low Sulfur Diesel) in 2006. The reduction in sulfur content allowed diesel engines to be fitted with diesel oxidation chambers to reduce particulates. In 2007, non-road diesel was required to meet a maximum sulfur content of 500 ppm, and this was further reduced to 15 ppm in 2010. Additional programs include the following:

- For on-road sources
  - Tier 2 vehicle emission standards and federal low-sulfur gasoline
  - National low-emission vehicle standards
  - Heavy-duty diesel standards
- Federal non-road measures
  - Lawn and garden equipment
  - Tier 2 heavy-duty diesel equipment
  - Locomotive engine standards
  - Compression ignition standards for vehicles and equipment
  - Recreational marine engine standards

2.2.3 Programs to Meet NAAQS

Idaho currently has four geographical areas classified as nonattainment or maintenance areas.

2.2.3.1 Northern Ada County Carbon Monoxide Limited Maintenance Plan and PM_{10} Maintenance Plan

Northern Ada County was first designated nonattainment for carbon monoxide (CO) under the provisions of the 1977 Clean Air Act amendments. The latest northern Ada County CO limited maintenance plan was approved on October 28, 2002, and contained the following control measures:

- Local ordinances that ban residential woodstoves and open burning during inversion conditions
- Voluntary transit control measures to increase ridership of alternative transportation
- Ada County vehicle inspection and maintenance plan
- A voluntary oxygenated fuel with a tax incentive that reduced the tax by 2.5% per gallon if the fuel contained 10% by volume ethanol

- Replacement of diesel commuter buses with compressed natural gas buses by City of Boise

On October 27, 2003, EPA rescinded the March 12, 1999, finding (64 FR 12257) that the PM_{10} standards promulgated on July 1, 1987, (52 FR 24634) and the accompanying designation and classification for PM_{10} no longer applied. This action restored the applicability of the current PM_{10} standards for northern Ada County/Boise, which reverted the area to moderate nonattainment. Simultaneously, EPA took final action to approve the PM_{10} maintenance plan for the Ada County/Boise area as a SIP revision and redesignated the area to attainment for PM_{10}.

The maintenance plan takes credit for several control measures that are contained in the northern Ada County CO maintenance plan. Because of the woodstove ordinances, vehicle inspection and maintenance program, and controls from the permitting program, the plan was able to demonstrate attainment and maintenance of the PM_{10} NAAQS.

These two plans reduce both carbon and particulate emissions in the surrounding CIAs. The closest CIAs are Sawtooth Wilderness, Craters of the Moon National Monument, Eagle Cap Wilderness (Oregon), and Hells Canyon Wilderness.

2.2.3.2 Portneuf Valley (Pocatello) PM_{10} Maintenance Plan

On July 13, 2006, EPA approved a PM_{10} maintenance plan submitted by Idaho and redesignated the area back to attainment of the PM_{10} NAAQS (71 FR 39574). The plan contains several voluntary and enforceable control measures, including the following:

- A residential woodstove education program and local ordinances that require all new stoves to be EPA certified
- A voluntary woodstove buyout program
- A road-sanding program that reduced sanding materials between 15 and 35%; in addition, all of the communities within the maintenance area use regenerative air street sweepers to clean up sanding material as soon as possible
- A consent order requiring Reasonable Available Control Technology controls on the only major industrial source
- A SIP requirement that transportation adheres to a motor vehicle emissions budget

Reductions from these control measures affect visibility at Craters of the Moon National Monument, Yellowstone National Park, and other nearby CIAs.

2.2.3.3 Sandpoint PM_{10} Nonattainment

Idaho is currently in the process of developing a revised PM_{10} plan for Sandpoint that will be submitted for EPA approval. The Sandpoint PM_{10} plan is very similar to other Idaho SIPs and includes the following:

- A residential woodstove program that includes both education and local ordinances that only allow the sale of new stoves that are EPA-certified
- A woodstove program that bought out 150 uncertified wood stoves
- A voluntary woodstove curtailment program with a message on urgency of the curtailment based on concentration levels

- A local ordinance that sets specific standards for the amount of "fines" (dust in the sand) in the anti-skid material applied to roads as a means to reduce fugitive dust
- A street sweeping program in Sandpoint to remove road-sanding material as soon as possible

2.2.3.4 Cache Valley $PM_{2.5}$ 24-hour Nonattainment

On November 13, 2009, (74 FR 58688) EPA designated the Cache Valley of Idaho and Utah as nonattainment for the 2006 $PM_{2.5}$ 24-hour NAAQS. In December 2014, the Idaho Department of Environmental Quality (DEQ) submitted a SIP that included the following control measures:

- Reduced the amount of road sanding material and increased the amount of liquid deicer
- Implemented residential woodstove combustion control ordinances by the cities and Franklin County to control burning during air quality alerts
- Instituted the DEQ Air Quality Index program for the Idaho side of the Cache Valley as an education and information tool for the public
- Provided incentives to replace outdated woodstoves with energy and emission efficient EPA-certified woodstoves

2.2.4 Measures to Mitigate the Impacts of Construction Activities

Per 40 CFR 51.308(d)(3)(v)(B), states must consider measures to mitigate the impacts of construction activities. Fugitive and windblown dust are the major source of particulate matter associated with construction activities. IDAPA 58.01.01.651 and 652 address control of fugitive dust from activities such as construction by requiring all reasonable precautions be taken to prevent particulate matter from becoming airborne. In determining what is reasonable, the rule specifically identifies activities and "the proximity to mandatory Class I Federal Areas" as a factor to be considered. The types of precautions listed in the rule include using water or chemicals, applying dust suppressants, using control equipment, covering truck loads, paving roads, and promptly removing materials.

2.2.5 Best Available Retrofit Technologies (BART)

When developing the original regional haze SIP, two Idaho facilities were identified as being subject to BART. The first facility, P4 Production (formerly Monsanto) had recently undergone a Best Available Control Technology (BACT) review and installed a lime-concentrated dual-alkali (LCDA) scrubber to control SO_x emissions in 2005. The review of the control technologies determined the LCDA scrubber met the BART requirements and there were no technically feasible emission controls for NO_x. Considering the 2002 SO_x emissions from all point sources in the state were roughly 18,000 tons per year (tpy), the 11,000 tpy reduction from the LCDA scrubbers was substantial.

For the second facility—Amalgamated Sugar, also known as TASCO—it was originally determined that flue gas desulfurization and low NO_x burners with over-fire air on the BART-eligible Riley Boiler were the appropriate control technologies. This measure was approved as part of the regional haze SIP approval on May 22, 2012 (77 FR 30248). Following the EPA approval, TASCO requested a BART alternative, which included putting low NO_x burners on the Riley and both B&W boilers or switching to natural gas and permanent shutdown of their pulp

dryers. The BART alternative changes equated to a 651.6 pound per hour reduction in NO_x and PM_{10} over the previous BART determination. EPA approved the BART alternative on April 28, 2014 (79 FR 23278).

2.2.6 Agricultural and Forestry Smoke Management Techniques

Idaho continues to run the crop residue and burning program. The program was in its infancy at the time of the RH Plan submittal and through education has grown into a robust program. Through education and outreach the program compliance rate has greatly improved. DEQ has hired a meteorologist that is now directly involved with the burn decisions.

Improvements in the prescribed burning (forestry) program have also occurred. DEQ is still working closely with the Idaho/Montana Airshed group and more involved in the day to day burn decisions. DEQ's smoke manager and meteorologist are actively involved in the day to day burn decisions.

Both programs have made improvements through cooperative agreements with the Idaho Department of Lands. All of their burn permits now contain specific language requiring the burners to comply with Idaho open burning rules. For more information on specific language see Appendix A.

2.3 Emission Inventory

Idaho has made substantial reductions in anthropogenic sources of both SO_x and NO_x. These reductions are primarily attributed to the BART controls and the Tier II reductions in sulfur content of fuels and NO_x vehicle emission standards. These and other controls have led to a 62% reduction in SO_x and 41% reduction in NO_x (Table 2; Figure 6). The remainder of this section provides a summary of the emission reductions achieved throughout the state and satisfies section 40 CFR 51.308.(g)(2). This section also tracks the change in emissions over a 5 year period for pollutants contributing to visibility impairment from all sources and activities and satisfies the RHR 40 CFR 51.308(4).

Information for the emission inventory trends and graphs came from the WRAP Technical Support System, Emissions and Source Apportionment website at *http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx*. These emissions data are also available in Appendix B of this report.

Table 2. 2002–2011 Idaho emissions trends (in tons per year) and percent change.

Idaho Emission Trends Tons/year														
Year	SOx	% Δ	NOx	% Δ	Organic Carbon	% Δ	Elemental Carbon	% Δ	Fine PM	% Δ	Course PM	% Δ	Ammonia	% Δ
2002	39,163		174,186		58,304		13,743		19,492		113,127		79,282	
2008	20,554	**-48%**	111,253	**-36%**	36,771	-37%	8,195	-40%	31,573	62%	160,003	41%	116,252	47%
2011	14,904	**-62%**	102,779	**-41%**	48,194	-17%	9,820	-29%	55,979	187%	486,330	330%	70,592	-11%

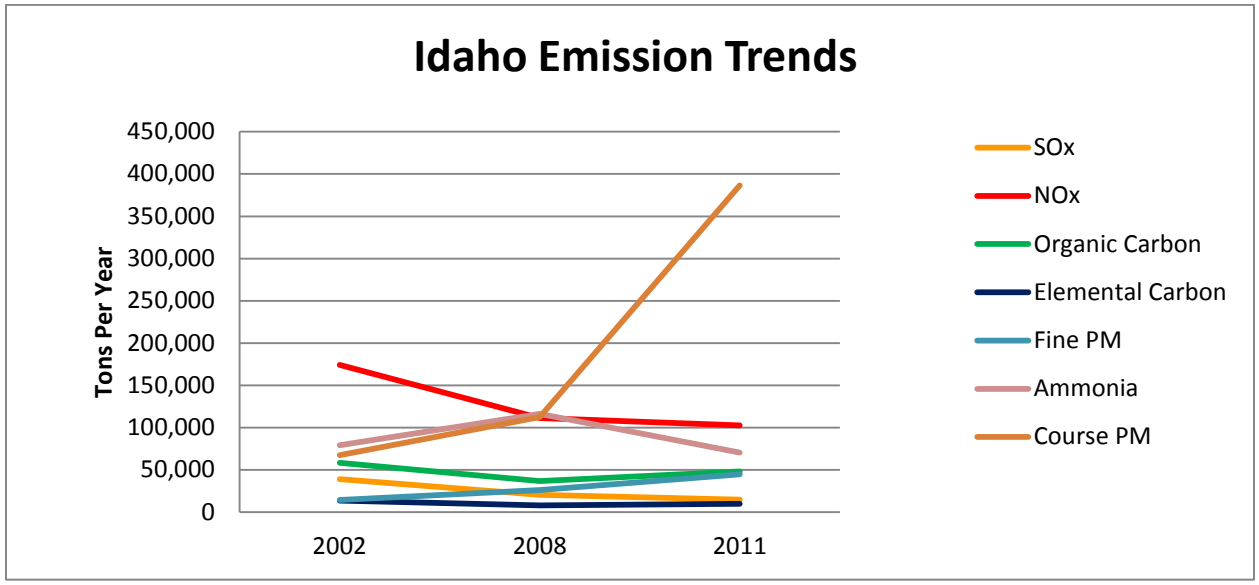

Figure 6. Idaho emission trends for light-impairing pollutants.

Emissions increased over this time period (2002–2011) for fine and course particulate matter. The primary contributor for the increases was a major change to the fugitive road dust calculations between 2008 and 2011. In reality Idaho Department of transportation and all of the Highway Districts within nonattainment/maintenance areas have been using more mag chloride and less road sand on icy roads.

As the following figures portray, natural fire is a major contributor to all the pollutants. Several of the pollutants, such as elemental and organic carbon, are largely driven by natural fire during big fire years. This report focuses on Idaho's control strategies toward RPGs using National Emission Inventory (NEI) data from the years 2002–2011. The emissions data from the 2014 NEI is not yet available. The monitoring data beyond 2011 show even greater impacts of natural fire at some of the CIAs. This information is available on the WRAP Technical Support System website at *http://vista.cira.colostate.edu/tss/*.

Figure 7 shows the reductions in SOx associated with point source and off-road.

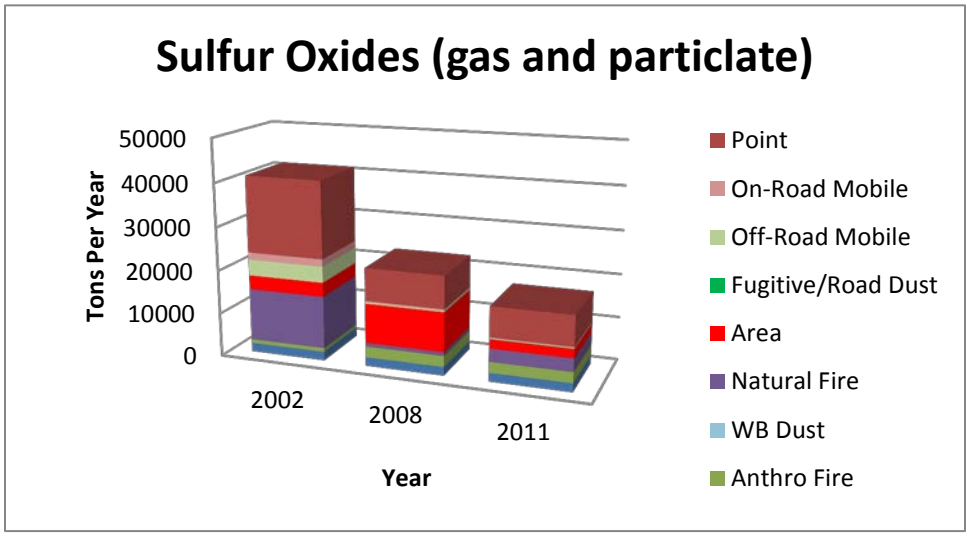

Figure 7. Idaho sources of sulfur oxides (SO_x).

Figure 8 shows major NO_x reductions from area source and off-road mobile. The years 2008 and 2011 were also relatively low wildfire years, so reductions in NO_x occurred during this time period.

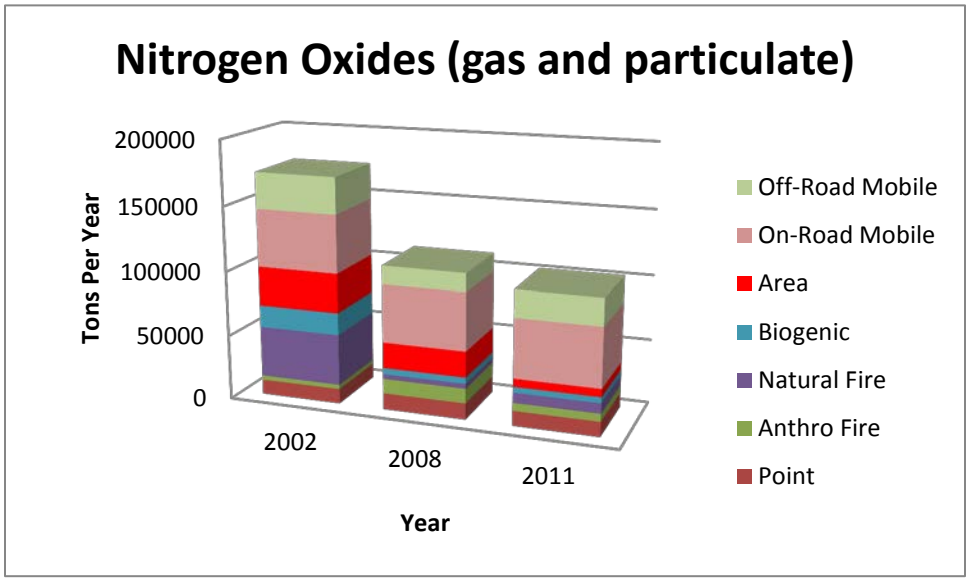

Figure 8. Idaho sources of nitrogen oxides (NO_x).

Figure 9 shows a slight growth in area sources of primary organic aerosol and large fluctuations of natural and anthropogenic fire. Overall there has been a 17% reduction in primary organic aerosol.

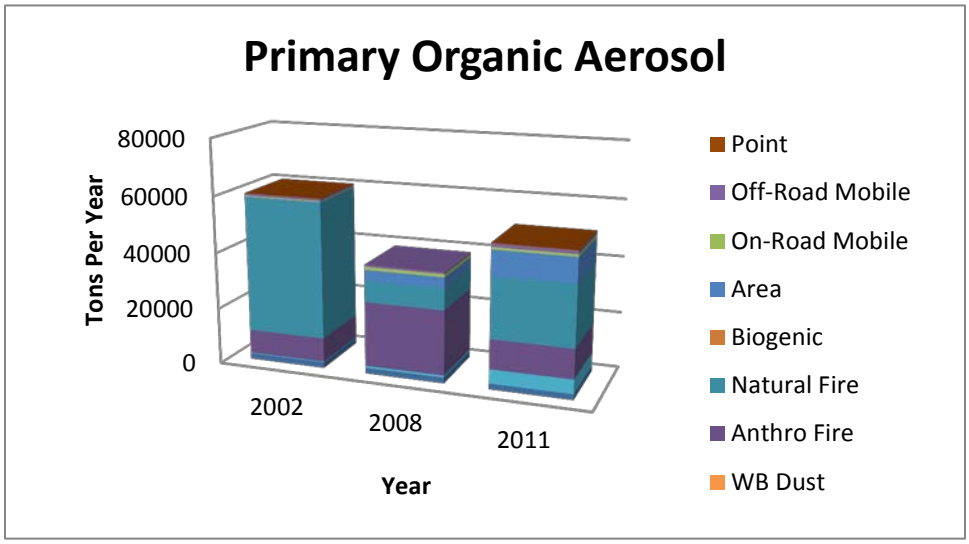

Figure 9. Idaho sources of primary organic aerosol.

Figure 10 shows a decrease in off-road mobile and a slight increase in on-road mobile sources of elemental carbon. Overall, elemental carbon is showing a decrease with major fluctuations in both natural and anthropogenic fire.

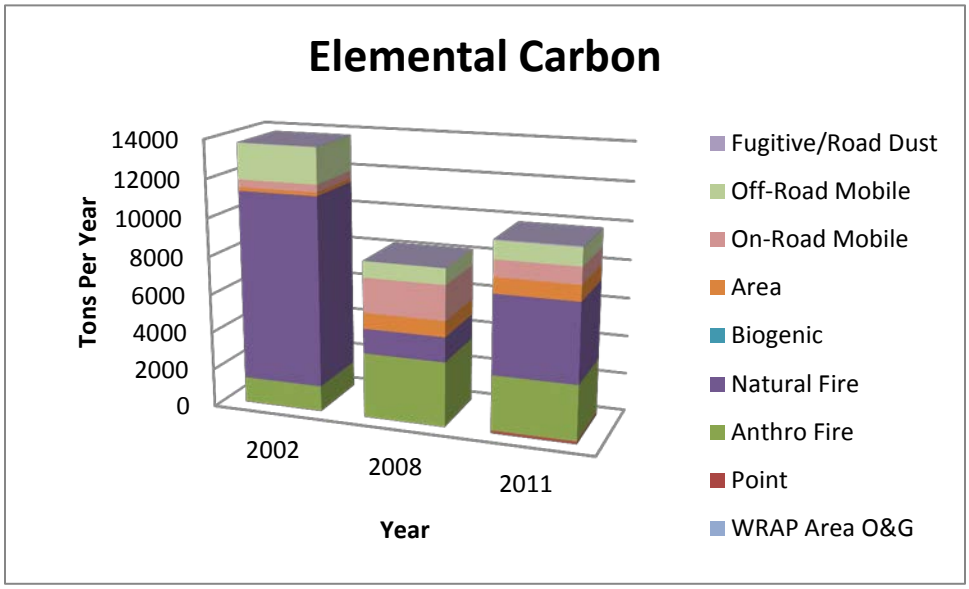

Figure 10. Idaho sources of elemental carbon.

Figure 11 shows overall growth in fine particulate matter, with a significant increase in wind-blown dust and fugitive road dust

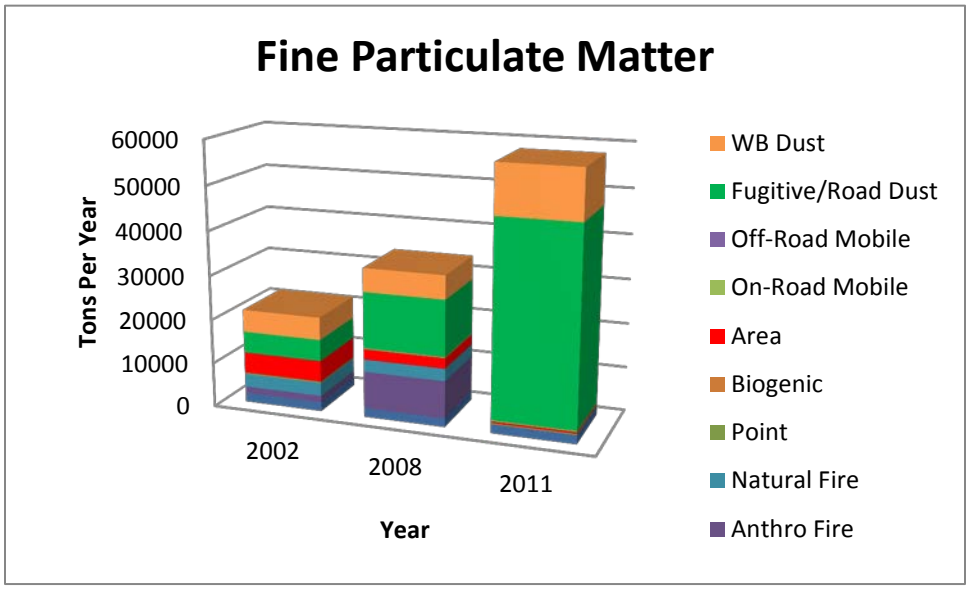

Figure 11. Idaho sources of fine particulate matter ($PM_{2.5}$).

Figure 12 shows a major increase in course particulate matter coming from wind-blown dust and fugitive road dust. However, because of the large particle size, course particulates usually deposit out of the air fairly quickly.

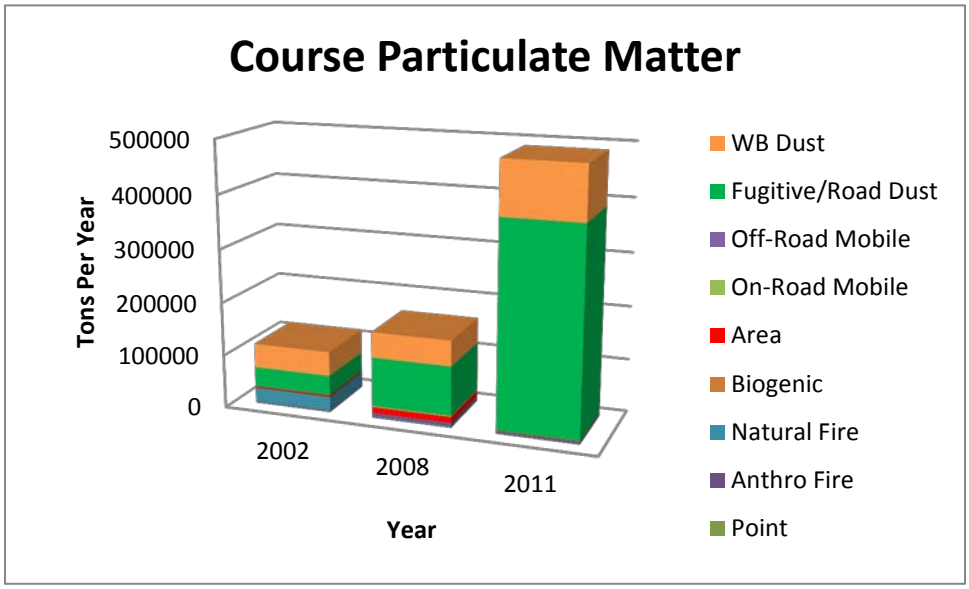

Figure 12. Idaho sources of course particulate matter (PM_{10}).

Figure 13 shows large fluctuations in ammonia emissions primarily due to area sources of emissions. One of the largest sources of ammonia emissions is confined animal feedlot operations (CAFOs). The reduction in 2011 emissions is likely due to the best management plans implemented by the state of Idaho at these CAFOs.

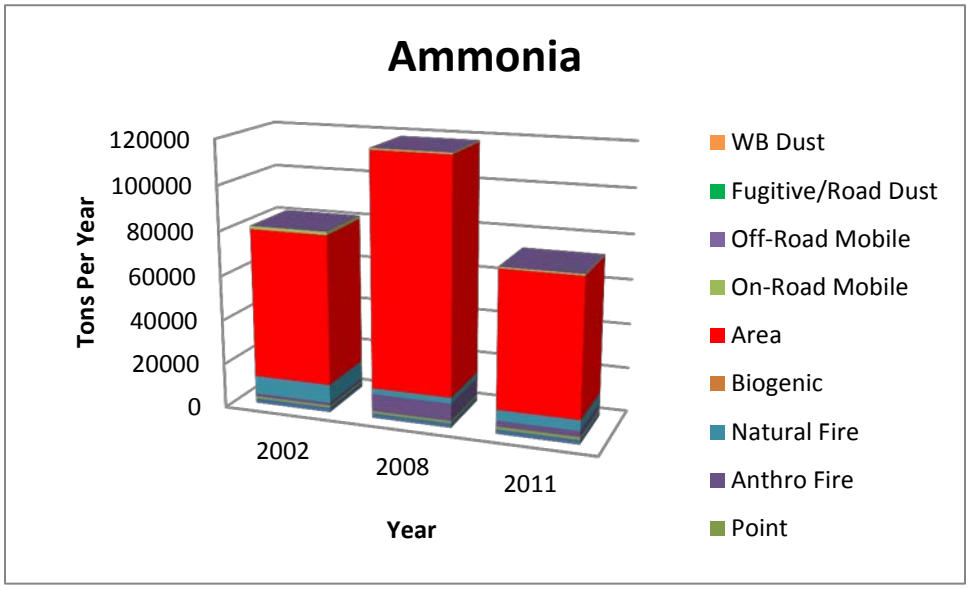

Figure 13. Idaho sources of ammonia (NH_3).

3 Visibility Progress

The RHR (40 CFR 51.308(3) requires states to assess current visibility, the change compared to baseline, and change over the past five years for both worst days and best days. For this initial progress report, the current conditions are the 2007–2011 period; the baseline period and past 5 years are the same, 2000–2004. Until emission inventory data from the 2014 NEI is available, it makes no sense to look at monitoring data for years beyond 2011 since Idaho doesn't have the ability to analyze the effectiveness of in-state and out-of-state control measures.

Table 3 compares current and baseline worst days and best days including the visibility changes as required by the RHR. Table 3 also compares worst days current conditions with the EPA-approved 2018 RPG at each monitoring site to show the percent progress achieved since the baseline, using the 2007–2011 5-year average. Visibility is improving on the best days at all monitoring sites, meeting the RHR requirement that best days should not degrade. At the Craters of the Moon (CRMO1) and Selway-Bitterroot (SULA1) monitoring sites, the current conditions already meet or exceed the 2018 RPGs. Visibility improvement at all but three of the monitoring sites indicate that 2011 progress exceeds 52% of that needed to reach the 2018 goals.

Table 3. Best , worst days, and 5-year rolling average (2007-2011) compared to 2018 RPG.

IMPROVE Monitor	Idaho Class I Areas	Best Days			Worst Days			2018 RPG (dv)	Progress to 2018 RPG by 2011
		Baseline (dv)	2007–2011 (dv)[a]	Visibility Change	Baseline (dv)	2007–2011 (dv)[a]	Visibility Change		
CRMO1	Craters of the Moon NM	4.3	3.1	1.2	14	13	1	13.06	**102%**
SWAT1	Sawtooth Wilderness	4	3.7	0.3	13.8	13.5	0.3	13.22	**52%**
SULA1	Selway-Bitterroot Wilderness	2.6	2.1	0.5	13.4	12.7	0.7	12.94	**152%**

[a] 2007–2011 best and worst value is a 5-year rolling average. For more information, see Appendix C.

In the western US, wildfire smoke can elevate worst days values at particular monitors in a single year, as well as skew subsequent 5-year averages.

Table 4. Best, worst days and 5-year rolling average (2010-2014) compared to 2018 RPG.

IMPROVE Monitor	Idaho Class I Areas	Best Days			Worst Days			2018 RPG (dv)	Progress to 2018 RPG by 2014
		Baseline (dv)	2010-2014 (dv)[a]	Visibility Change	Baseline (dv)	2010-2014 (dv)[a]	Visibility Change		
CRMO1	Craters of the Moon NM	4.3	3.0	1.3	14	14.1	-0.1	13.06	**-11%**
SWAT1	Sawtooth Wilderness	4	3.0	1.0	13.8	15.7	-1.9	13.22	**-328%**
SULA1	Selway-Bitterroot Wilderness	2.6	1.7	0.9	13.4	14.5	-1.1	12.94	**-239%**

The following section documents how heavy wildfires in 2012–2014 may keep the area from continuing to meet and exceed the RPGs even if the 2014 National Emission Inventory shows Idaho's continued reductions in anthropogenic emissions.

4 Assessment of Changes Impeding Visibility Progress

The RHR (40 CFR 51.308(g)(5))requires states to assess significant changes in anthropogenic emissions within and outside the State that have limited or impeded progress in reducing emissions and improving visibility. From 2002 to 2011, Idaho has made substantial progress toward meeting or exceeding the visibility goals established in Idaho's first regional haze plan. As the original plan identified, organic and elemental carbon are major contributors to visibility impairment in Idaho CIAs. In the base year 2002, elemental and organic carbon were contributing 37% of visibility impairment in Craters of the Moon National Monument, 85% in the Sawtooth Wilderness, and 60% in the Selway-Bitterroot Wilderness.[7] As Figure 9 and Figure 10 show, natural/wildfire is the largest contributor of organic and elemental carbon coming from Idaho emissions. Figure 14 through Figure 16 show the large and varying contribution from organic and elemental carbon from 2002 through 2014. Since the biogenic (wildfire) organic and elemental carbon dwarf the contributions from nitrate and sulfate, which are usually associated with anthropogenic sources, it is difficult to consistently meet the RPGs for western CIAs. While Idaho was able to meet and exceed the RPGs for 2002–2011, the contributions from wildfire in 2012 and 2013 may make continued progress during the following 5-year period difficult. See Appendix D for more detailed information about the contribution of each light impairing pollutant covered in the figures below.

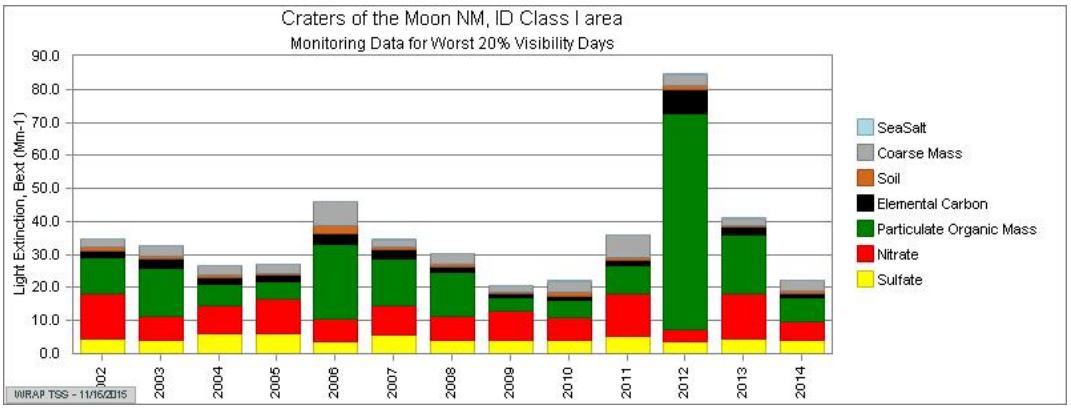

Figure 14. Craters of the Moon 2002–2014 worst days by pollutant.

[7] Idaho Department of Environmental Quality, *State of Idaho Department of Environmental Quality Regional Haze Plan*, page 236-237, October 2010, available at: *www.deq.idaho.gov/air-quality/air-pollutants/haze.*

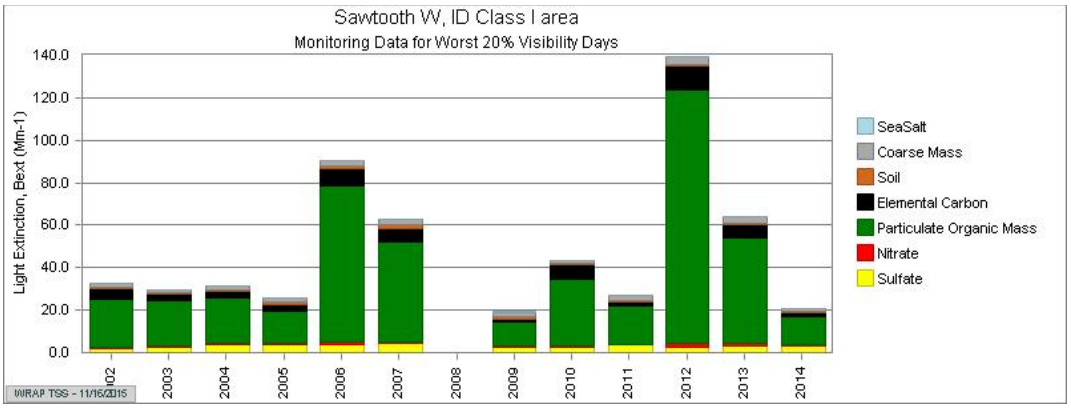

Figure 15. Sawtooth Wilderness 2002–2014 worst days by pollutant.

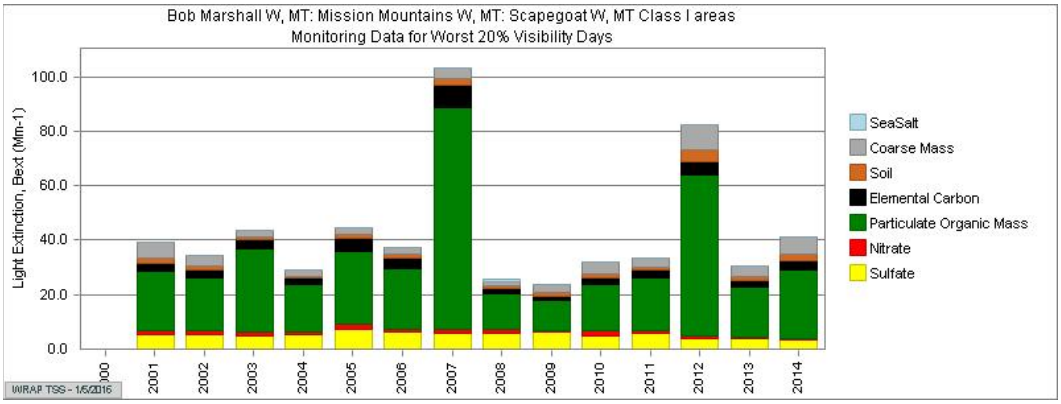

Figure 16. Selway-Bitterroot Wilderness 2002–2014 worst days by pollutant.

In any given year, there are huge fluctuations in the acres burned by wildfire. Idaho may have a year with minimal wildfire but the upwind states may experience a big wildfire season. Figure 17 shows how much fluctuation has occurred from 2004 through 2014. When both Idaho and the upwind states have big wildfire seasons, the impacts on visibility are so large they overshadow the emission reductions Idaho has made on anthropogenic sources. Figures 14 through 16 do show higher levels of ammonia nitrate at Craters of the Moon than Sawtooth Wilderness and Selway-Bitterroot. Agricultural emissions in the Snake River Valley are a potential anthropogenic source category contributing to ammonia nitrate at Crates of the Moon.

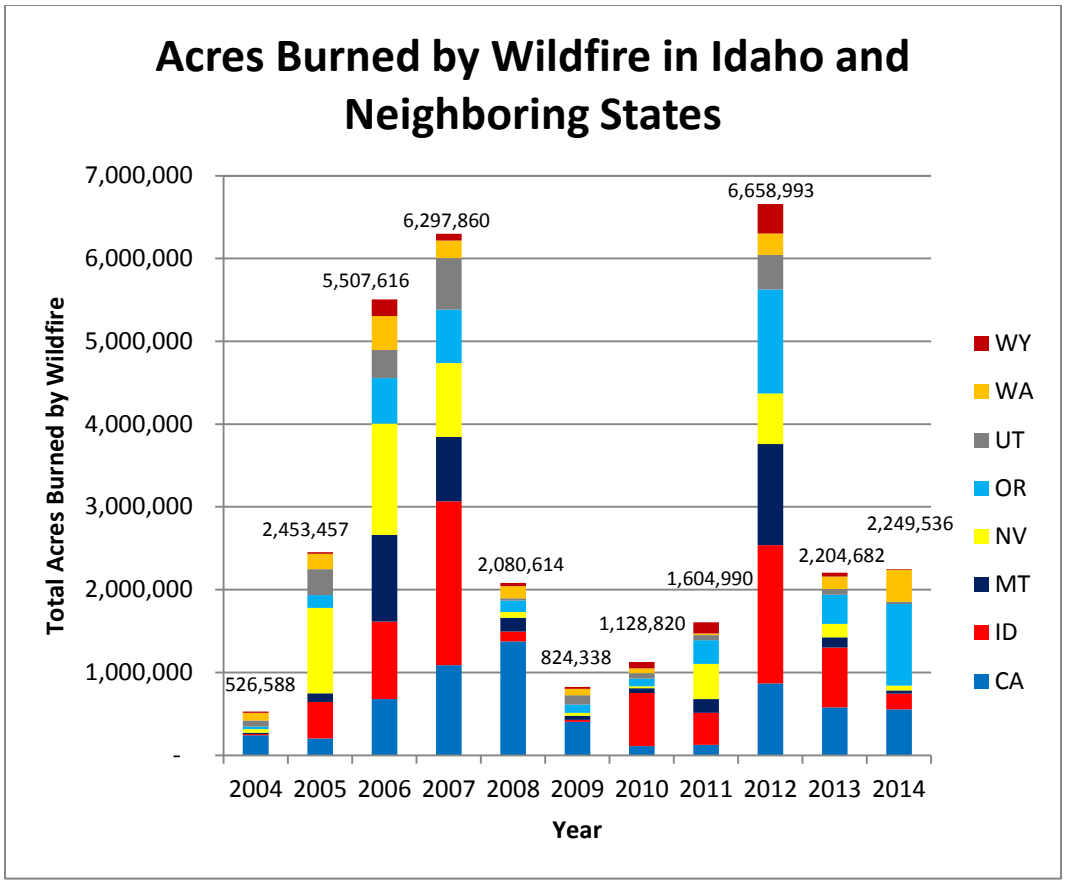

Figure 17. Total acres burned by wildfire by state, 2004–2014.

Moderate Resolution Imaging Spectroradiometer (MODIS) satellite images provide an excellent perspective on how in-state and out-of-state wildfires impact Idaho CIAs. The satellite data in Figure 18 show wildfires on August 27, 2012, that impaired visibility in the Sawtooth and Selway-Bitterroot Wilderness areas.

Figure 18. MODIS satellite imagery on August 27, 2012.

MODIS satellite images taken a month later in September show a very different picture (Figure 19). The fires in Idaho had died down, but fires in Wenatchee, Washington, caused visibility impacts to Idaho CIAs.

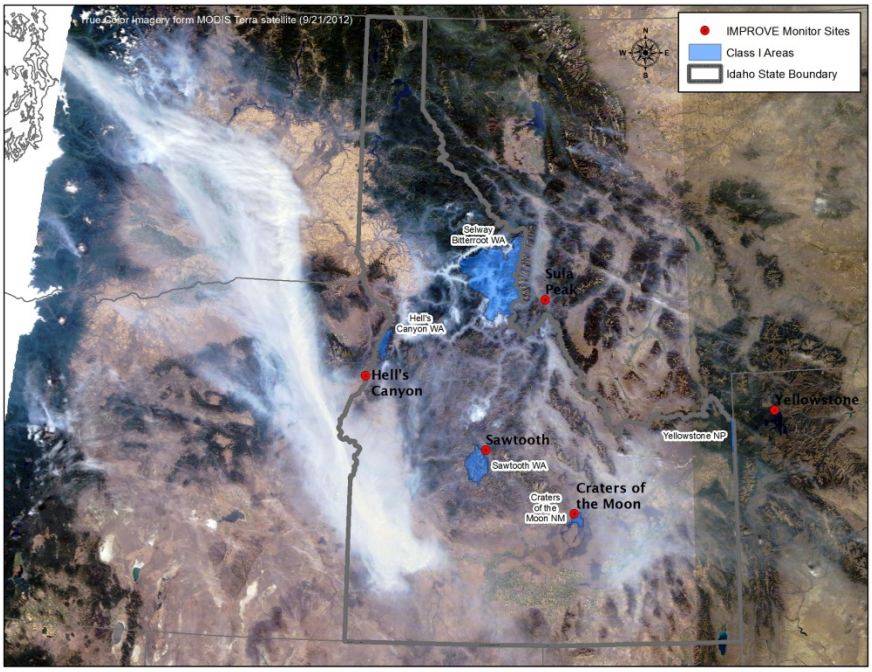

Figure 19. MODIS satellite imagery on September 21, 2012.

Wildfire smoke can travel long distances as seen in Figure 20 and Figure 21, which show wildfires in California impacting Idaho CIAs.

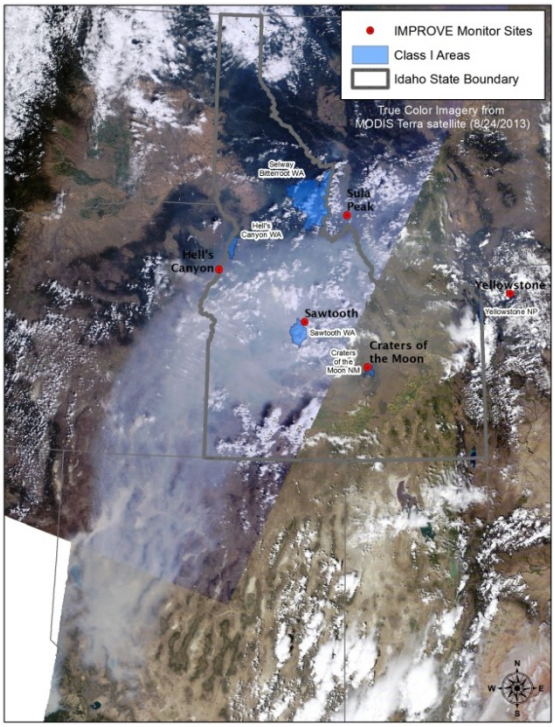

Figure 20. MODIS satellite imagery August 24, 2013.

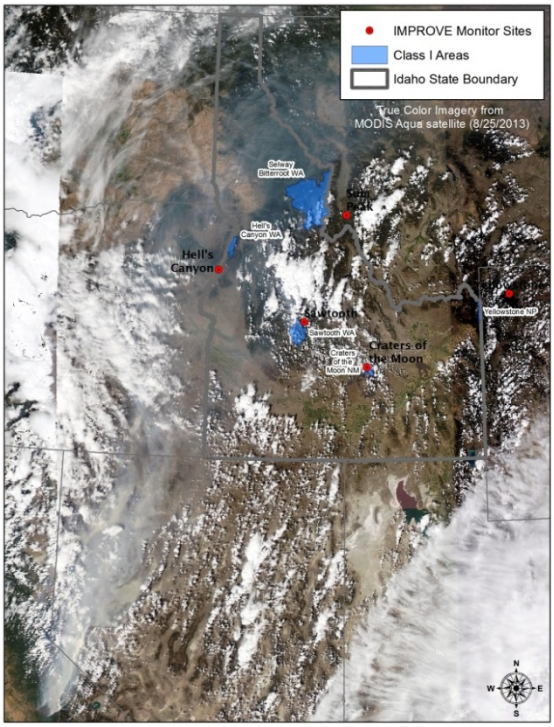

Figure 21. MODIS satellite imagery August 25, 2013.

5 Assessment of Current Control Strategy

The RHR (40 CFR 51.308(6)) requires an assessment of whether the current implementation plan elements and strategies are sufficient to enable the State or other States with CIA to meet all established RPG. The control strategy in Idaho's regional haze plan is sufficient for meeting Idaho's 2018 RPGs. The recent IMPROVE data year, 2011, shows that all sites are making substantial progress and at or very near the 2018 RPGs. In addition, Idaho continues to strengthen existing control measures to address NAAQS. Idaho is currently developing a SIP for the 12 micrograms per cubic meter annual $PM_{2.5}$ standard in the West Silver Valley, which is due in the 2016 timeframe. The BART requirements at TASCO are also scheduled to be implemented in 2016. These actions provide strong evidence that Idaho controls on anthropogenic sources are on track to meeting the 2018 RPGs throughout the state.

The control strategy is also sufficient in reducing Idaho's impact on neighboring states. The substantial progress Idaho has made on reducing SO_x and NO_x will improve the following CIAs surrounding Idaho: Hells Canyon Wilderness, Eagle Cap Wilderness, Jarbidge Wilderness, Yellowstone National Park, Bridger Wilderness, North Absaroka Wilderness, Cabinet Wilderness, Glacier National Park, Bob Marshall Wilderness, and Gates Wilderness.

6 Visibility Monitoring Strategy

The RHR (40 CFR 51.308(g)(7)) requires states to review the State's visibility monitoring strategy and any modifications to the strategy as necessary. Idaho commits to continue using the IMPROVE monitoring data to track any visibility improvements over time to determine if reasonable progress is being made. Idaho depends on the IMPROVE monitoring network to collect and report aerosol monitoring data for reasonable progress tracking as specified in the RHR. The RHR requires a long-term tracking program with an implementation period nominally set for 60 years.

The state expects the configuration of the monitors, sampling site locations, laboratory analysis methods, and data quality assurance to remain unchanged. Network operation protocols will likely not change, but if they must, they will remain directly comparable to those operated by the IMPROVE network during the 2000–2004 RHR baseline period. Technical analyses and RPGs in RHR plans are based on data from these sites. The state must be notified of and agree to any changes in the IMPROVE network affecting the RHR monitoring sites before changes are made. Further, the state understands that the resources to operate a complete and representative monitoring network to track the long-term RPGs is the responsibility of EPA; therefore, Idaho has no plans to provide resources for these sites. Should EPA be unwilling or unable to fund the IMPROVE monitoring program, Idaho would investigate other funding options with the WRAP states and FLMs to operate the IMPROVE system.

7 Adequacy of Regional Haze Plan

The RHR (40 CFR 51.308(h)) requires states to determine the adequacy of their existing plan. Overall, Idaho is making adequate progress in improving visibility due to reductions in emissions

from Idaho's regional haze control strategies. The trends for worst days averages show visibility improving at every monitoring site, in the absence of very high wildfire years. Current best days are all better than those of the baseline period. As evidenced by reductions in anthropogenic source emissions in Idaho and the concurrent improvement in visibility at all of Idaho's CIA IMPROVE monitors, Idaho has determined the current strategies are sufficient for Idaho and its neighboring states to meet their 2018 RPGs and satisfies RHR 40 CFR 51.308.(h)(1). Therefore, no further substantive revision of the plan is warranted at this time in order to achieve the 2018 RPGs for visibility improvement.

8 Regional Haze Plan Commitments and Continued Consultation

DEQ staff regularly discuss mutual concerns and strategies for reducing haze through the WRAP and the Western States Air Resources Council (WESTAR). DEQ staff have participated in the WESTAR Regional Haze Subcommittee, which developed recommendations regarding continued implementation of the RHR. These recommendations were presented to EPA in August 2013. DEQ staff also consulted with the other western states regarding whether anthropogenic sources or controllable activities in Idaho affected progress toward the 2018 RPGs of these states. There is general agreement that smoke from wildfires did impact other states.

In turn, smoke from Oregon, Washington, and California wildfires impacted Idaho's CIA monitors. Idaho has determined and this report shows, absent natural wildfire smoke impacts, visibility is improving sufficiently due to reduced anthropogenic emissions, in-state and out-of-state.

DEQ staff meet with the federal land management agencies (FLMs) with CIAs in Idaho to review visibility progress, share technical and research information, and discuss policies leading to air quality improvement. This meeting occurs at the staff level throughout the year and at the annual EPA Smoke Conference held in Idaho. EPA staff work regularly with FLM staff in coordinating fires and burn decisions through the Montana/Idaho Airshed Group. Idaho provided this draft progress report to the FLMs 60 days in advance of the public notice of the hearing on the progress report for their review and comments. Appendix E will include their written comments and the responses from FLM staff.

Appendix A. Idaho Department of Lands Burn Language

The following are templates used by the Idaho Department of Lands when issuing permits or communicating with burners on who to contact for burn permits.

IDL Permit Message Templates

Crop Residue, Pasture, and CRP burning

The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber, demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** at **[RO PHONE]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Burn barrel

Prior to ignition, the Permittee shall call the **[HOTLINE]** to check if open burning is allowed in your area. The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber, demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Hand Piled Logging Slash

Prior to ignition, the Permittee shall call the **[HOTLINE]** to check if open burning is allowed in your area. The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber, demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Machine Piled Logging Slash

Prior to ignition, the Permittee shall call the **[HOTLINE]** to check if open burning is allowed in your area. The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber,

demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Prescribed Burning – broadcast

Prior to ignition, the Permittee shall call the **[HOTLINE]** to check if open burning is allowed in your area. The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber, demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Rangeland (not cultivated or seeded in the last 10 years)

Prior to ignition, the Permittee shall call the **[HOTLINE]** to check if open burning is allowed in your area. The Idaho Department of Environmental Quality (DEQ) regulates all forms of open burning on lands other than the five Indian Reservations. In accordance with DEQ's open burning rules, burning of the following materials is prohibited: plastics, garbage, tires and other rubber materials, paint, animal carcasses and animal wastes, asphaltic material, treated lumber, demolition and construction debris, trade waste, etc. All burning of crop residue requires a permit from DEQ prior to burning. For more information, please contact the **[RO]** or visit http://www.deq.idaho.gov/air-quality/burning.aspx. Failure to follow DEQ's open burning rules may result in an enforcement action, which could include financial penalties.

Appendix B. Emissions Inventory Data

This information was taken from the WRAP Technical Support System "Emissions and Source Apportionment" website and is available at *http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx*. All values are in tons per year.

Pollutant	Year	Point	Anthro Fire	Natural Fire	Biogenic	Area	On-Road Mobile	Off-Road Mobile	Fugitive/Road Dust	WB Dust
Sulfur Oxides (gas and particulate)	2002	17,613	895	12,008		3,280	1,662	3,702	4	
	2008	7,490	2,499	852		9,068	339	281	25	
	2011	6,954	2,460	3,005		2,070	198	122	95	
Nitrogen Oxides (gas and particulate)	2002	11,487	3,461	39,401	16,982	30,318	44,611	27,922	5	
	2008	12,671	11,368	3,815	4,806	19,892	44,556	14,132	13	
	2011	11,591	6,122	7,878	4,459	6,205	45,575	20,900	50	
Primary Organic Aerosol	2002	106	8,454	47,883		425	383	747	305	
	2008		22,867	7,632		3,747	1,101	652	772	
	2011	234	10,462	21,500		8,885	859	1,193	5,062	
Elemental Carbon	2002	11	1,331	9,938		192	390	1,859	22	
	2008		3,393	1,298		830	1,823	839	13	
	2011	138	2,879	4,127		821	874	928	53	
Fine Particulate Matter	2002	305	1,536	3,013		4,749			4,839	5,050
	2008		8,358	2,780		2,364	175	46	12,564	5,286
	2011	246	18	18		408	185		44,037	11,068
Coarse Particulate Matter	2002	643	1,354	25,323		2,933	238		37,185	45,451
	2008	727	4,377	1,436		11,783	1,950	41	92,114	47,574
	2011	162	2,001			1,234	411	93	382,823	99,605
Ammonia	2002	1,043	1,253	8,246		67,293	1,430	17		
	2008	1,042	7,837	2,608		104,060	689	16		
	2011	1,259	2,685	4,724		61,236	667	21		

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Appendix C. 5-Year Rolling Average Worst and Best Days.

This information was taken from the WRAP Technical Support System "Monitoring, Deciview Glide Slope Rolling Average" website and is available at *http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx*.

Craters of the Moon (CRMO1), Sawtooth (SAWT1), and Selway (SULA1) worst days.

Site	Year	dv|Base	dv|Inc	dv|NCII	dv|ProgressRolling	Method	Deciview|NIA
CRMO1	2000	14					
CRMO1	2001	14				NIA	14.3
CRMO1	2002	14				NIA	14.9
CRMO1	2003	14				NIA	14
CRMO1	2004	14	14			NIA	12.8
CRMO1	2005		13.9		13.8	NIA	12.8
CRMO1	2006		13.8		14.1	NIA	16.2
CRMO1	2007		13.7		14.1	NIA	14.5
CRMO1	2008		13.6		14	NIA	13.6
CRMO1	2009		13.5		13.6	NIA	11
CRMO1	2010		13.3		13.3	NIA	11.4
CRMO1	2011		13.2		13	NIA	14.5
CRMO1	2012		13.1		13.8	NIA	18.7
CRMO1	2013		13		14	NIA	14.6
CRMO1	2014		12.9		14.1		
CRMO1	2018		12.5				
CRMO1	2023		11.9				
CRMO1	2028		11.4				
CRMO1	2033		10.9				
CRMO1	2038		10.3				
CRMO1	2043		9.8				
CRMO1	2048		9.3				
CRMO1	2053		8.7				
CRMO1	2058		8.2				
CRMO1	2064		7.5	7.5			
SAWT1	2000	13.8					
SAWT1	2001	13.8				NIA	14.5
SAWT1	2002	13.8				NIA	14.2
SAWT1	2003	13.8				NIA	13.3
SAWT1	2004	13.8	13.8			NIA	13.1
SAWT1	2005		13.7		13.4	NIA	11.9
SAWT1	2006		13.5		14.3	NIA	19.2
SAWT1	2007		13.4		15	NIA	17.4
SAWT1	2008		13.3		15.4		
SAWT1	2009		13.2		14.8	NIA	10.6
SAWT1	2010		13		15.4	NIA	14.7

Site	Year	dv|Base	dv|Inc	dv|NCII	dv|ProgressRolling	Method	Deciview|NIA
SAWT1	2011		12.9		13.5	NIA	11.4
SAWT1	2012		12.8		15.3	NIA	24.6
SAWT1	2013		12.7		15.6	NIA	16.9
SAWT1	2014		12.6		15.7		
SAWT1	2018		12.1				
SAWT1	2023		11.5				
SAWT1	2028		10.8				
SAWT1	2033		10.2				
SAWT1	2038		9.6				
SAWT1	2043		9				
SAWT1	2048		8.4				
SAWT1	2053		7.8				
SAWT1	2058		7.2				
SAWT1	2064		6.4	6.4			
SULA1	2000	13.4					
SULA1	2001	13.4				NIA	12.6
SULA1	2002	13.4				NIA	12.1
SULA1	2003	13.4				NIA	16.9
SULA1	2004	13.4	13.4			NIA	12
SULA1	2005		13.3		13.6	NIA	14.6
SULA1	2006		13.2		13.9		
SULA1	2007		13.1		17.1	NIA	24.9
SULA1	2008		13		17.2		
SULA1	2009		12.9		17	NIA	11.6
SULA1	2010		12.8		15.4	NIA	9.8
SULA1	2011		12.7		14.9	NIA	13.6
SULA1	2012		12.6		15.3	NIA	26.4
SULA1	2013		12.5		14.9	NIA	13.2
SULA1	2014		12.4		14.9		
SULA1	2018		12				
SULA1	2023		11.5				
SULA1	2028		11				
SULA1	2033		10.5				
SULA1	2038		10				
SULA1	2043		9.5				
SULA1	2048		9				
SULA1	2053		8.5				
SULA1	2058		8				
SULA1	2064		7.4	7.4			

Craters of the Moon (CRMO1), Sawtooth (SAWT1), and Selway (SULA1) best days.

Site	Year	dv|Base	dv|NCII	dv|ProgressRolling	Method	N	Deciview|NIA
CRMO1	2000	4.3					
CRMO1	2001	4.3			NIA		4.8
CRMO1	2002	4.3			NIA		4.9
CRMO1	2003	4.3			NIA		3.3
CRMO1	2004	4.3			NIA		4.3
CRMO1	2005			4.2	NIA		3.9
CRMO1	2006			4	NIA		3.6
CRMO1	2007			3.7	NIA		3.5
CRMO1	2008			3.7	NIA		3.2
CRMO1	2009			3.4	NIA		3
CRMO1	2010			3.2	NIA		2.9
CRMO1	2011			3.1	NIA		2.9
CRMO1	2012			2.9	NIA		2.8
CRMO1	2013			3	NIA		3.8
CRMO1	2014			3			
CRMO1	2064		1.7				
SAWT1	2000	4					
SAWT1	2001	4			NIA		4.9
SAWT1	2002	4			NIA		3.8
SAWT1	2003	4			NIA		3.2
SAWT1	2004	4			NIA		4.1
SAWT1	2005			3.9	NIA		3.5
SAWT1	2006			3.7	NIA		4
SAWT1	2007			3.7	NIA		3.8
SAWT1	2008			3.9			
SAWT1	2009			3.8	NIA		3.8
SAWT1	2010			4	NIA		4.1
SAWT1	2011			3.7	NIA		3
SAWT1	2012			3.4	NIA		2.7
SAWT1	2013			3.3	NIA		2.9
SAWT1	2014			3			
SAWT1	2064		1.5				
SULA1	2000	2.6					
SULA1	2001	2.6			NIA		3.1
SULA1	2002	2.6			NIA		2.7
SULA1	2003	2.6			NIA		1.8
SULA1	2004	2.6			NIA		2.7
SULA1	2005			2.6	NIA		2.5
SULA1	2006			2.4			
SULA1	2007			2.4	NIA		2.5
SULA1	2008			2.6			

Site	Year	dv|Base	dv|NCII	dv|ProgressRolling	Method	N	Deciview|NIA
SULA1	2009			2.5	NIA		2.3
SULA1	2010			2.2	NIA		1.9
SULA1	2011			2.1	NIA		1.7
SULA1	2012			1.9	NIA		1.9
SULA1	2013			1.9	NIA		1.5
SULA1	2014			1.7			
SULA1	2064		1.1				

Appendix D. Light Extinction Data.

Light extinction monitoring data for the 20% worst days in Craters of the Moon (CRMO1), Sawtooth Wilderness (SAWT1), and Selway-Bitterroot Wilderness (SULA1). This information was taken from the WRAP Technical Support System "Total Light Extinction Time Series annual 2002-2014" website and is available at *vista.cira.colostate.edu/TSS/Results/HazePlanning*.

Site	Year	N	SO4 Extinction	NO3 Extinction	OMC Extinction	EC Extinction	Soil Extinction	CM Extinction	SeaSalt Extinction
CRMO1	2002	23	4.49	13.84	10.68	2.06	1.05	2.68	0.01
CRMO1	2003	21	4.23	6.92	14.77	2.53	0.86	3.46	0
CRMO1	2004	23	6.07	8.61	6.49	1.69	0.9	2.89	0.12
CRMO1	2005	23	6.06	10.35	5.44	1.83	0.58	2.77	0.07
CRMO1	2006	23	3.56	6.99	22.44	3.29	2.54	7.07	0.19
CRMO1	2007	23	5.46	9.2	13.93	2.7	0.85	2.3	0.07
CRMO1	2008	22	4.17	7.31	12.97	1.87	0.91	2.99	0.06
CRMO1	2009	24	4.11	8.65	4.33	0.98	0.68	1.77	0.02
CRMO1	2010	23	4.2	6.72	5.24	1.38	1.14	3.3	0.04
CRMO1	2011	21	5.17	13	8.46	1.64	0.67	6.98	0.16
CRMO1	2012	23	3.64	3.69	65.43	7.07	1.16	3.36	0.24
CRMO1	2013	20	4.43	13.84	17.69	2.47	0.44	1.93	0.32
CRMO1	2014	23	3.89	5.89	7.1	1.37	0.85	2.92	0.23
SAWT1	2002	22	2.13	0.57	22.51	4.95	0.76	1.55	0
SAWT1	2003	23	2.6	0.54	21.59	2.85	0.45	1.57	0.21
SAWT1	2004	24	4.05	0.62	20.92	3.38	0.8	1.52	0.01
SAWT1	2005	22	3.82	0.62	15.31	3.16	0.74	2.37	0.02
SAWT1	2006	20	3.8	1.03	73.8	7.93	1.08	2.95	0.02
SAWT1	2007	23	4.11	0.9	46.99	6.61	1.45	2.83	0.03
SAWT1	2009	21	2.46	0.39	11.33	1.74	0.82	1.95	0.59
SAWT1	2010	22	2.7	0.6	31.21	6.63	0.86	1.29	0.02
SAWT1	2011	21	3.51	0.55	17.66	2.19	0.62	2.6	0.04
SAWT1	2012	21	2.65	1.55	119.36	11.37	0.92	3.24	0.06
SAWT1	2013	20	3.4	1.3	49.54	5.96	0.73	3.12	0.05
SAWT1	2014	21	3.4	0.47	13.01	2.01	0.64	1.17	0.02
SULA1	2002	24	4.63	1.58	12.59	2.05	0.91	2.45	0
SULA1	2003	23	4.78	1.57	43.26	4.34	0.59	1.75	0
SULA1	2004	24	5.14	1.45	12.73	1.75	0.69	2.08	0.01
SULA1	2005	23	5.2	1.37	30.59	4.88	0.5	2.79	0.02
SULA1	2007	20	3.82	2.71	136.55	19.8	0.7	5.22	0.09
SULA1	2009	24	5.07	1.03	11.34	1.72	0.61	2.8	0.02
SULA1	2010	22	4.17	0.8	8.27	1.36	1.07	2.21	0.01
SULA1	2011	20	5.38	0.9	27.41	2.69	0.64	2.08	0.05
SULA1	2012	22	4.26	3.95	181.43	17.88	0.73	3.7	0.17
SULA1	2013	19	3.06	0.74	21.79	2.88	0.55	2.66	0.03
SULA1	2014	23	4	0.86	15.7	2.39	0.54	2.2	0.04