maranda wilburn

Thankyou for taking the time to listen to, consider and include our statements, questions and comments in your Pacwest silicon smelter EIS.

I have many concerns with the proposed silicon smelter, all of which are inter-related.
The location. Why wasn't there an EIS statement done before the Washington governor shook hands and gave special treatment to a Canadian company who they coaxed over the border with promises of cheap electricity. The proposed smelter would sit in Washington so close to the Idaho border, you could throw a rock from their property line to the Idaho state line. Too bad for Idaho, Montana, Wyoming and anything downwind which is south east. The people who live in the rural areas and towns surrounding the proposed smelter are some of the poorest in the state. The people have adapted to living off the land by farming, gardening, hunting, fishing, cutting and burning their own firewood. It's a way of life up here.

Both wet and dry deposition of sulfur dioxide will have devastating effects on the surrounding areas. Health of human life, wild life, landscapes and forests ecosystems. We are in an area with minimal to zero buffers in the natural environment for acids. In forested mountains where atmospheric acids can accumulate, acid fog bathes trees in acid for extended periods. Stripping them of their nutrients, making them more susceptible to the highly invasive bark beetle. When sulfuric acid meets granite or quartzite it alters the chemistry of the rock. creating gypsum, A flaky unstable mineral. Not to mention there are repositories down wind that could leach heavy metals from the clay into the surrounding lakes and streams.

The emissions would acidify the soils, the water and the air. The emissions would drastically degrade the air quality and visibility for anything hundreds of miles downwind. I am wondering if that might be conflicting with the regulations of the Wilderness Act of 1964 regional haze rule and the reasonable progress goal demonstration?

An official website of the United States government.

Close

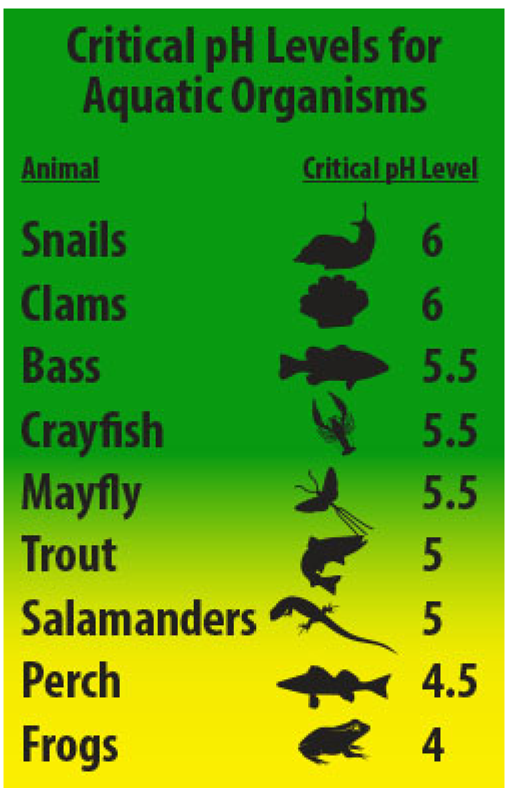
We've made some changes to EPA.gov. If the information you are looking for is not here, you may be able to find it on the EPA Web Archive or the January 19, 2017 Web Snapshot.

Effects of Acid Rain

On this Page:

- Effects of Acid Rain on Ecosystems
- Effects of Acid Rain on Materials
- Other Effects of SO_2 and NO_X
    - Visibility
    - Human Health

The Effects of Acid Rain on Ecosystems



This figure illustrates the pH level at which key organisms may be lost as their environment becomes more acidic. Not all fish, shellfish, or the insects that they eat can tolerate the same amount of acid.

An ecosystem is a community of plants, animals and other organisms along with their environment including the air, water and soil. Everything in an ecosystem is connected. If something harms one part of an ecosystem – one species of plant or animal, the soil or the water – it can have an impact on everything else.

Effects of Acid Rain on Fish and Wildlife

The ecological effects of acid rain are most clearly seen in aquatic environments, such as streams, lakes, and marshes where it can be harmful to fish and other wildlife. As it flows through the soil, acidic rain water can leach aluminum from soil clay particles and then flow into streams and lakes. The more acid that is introduced to the ecosystem, the more aluminum is released.

Some types of plants and animals are able to tolerate acidic waters and moderate amounts of aluminum. Others, however, are acid-sensitive and will be lost as the pH declines. Generally, the young of most species are more sensitive to environmental conditions than adults. At pH 5, most fish eggs cannot hatch. At lower pH levels, some adult fish die. Some acidic lakes have no fish. Even if a species of fish or animal can tolerate moderately acidic water, the animals or plants it eats might not. For example, frogs have a critical pH around 4, but the mayflies they eat are more sensitive and may not survive pH below 5.5.

Effects of Acid Rain on Plants and Trees

Dead or dying trees are a common sight in areas effected by acid rain. Acid rain leaches aluminum from the soil. That aluminum may be harmful to plants as well as animals. Acid rain also removes minerals and nutrients from the soil that trees need to grow.

At high elevations, acidic fog and clouds might strip nutrients from trees' foliage, leaving them with brown or dead leaves and needles. The trees are then less able to absorb sunlight, which makes them weak and less able to withstand freezing temperatures.

Buffering Capacity

Many forests, streams, and lakes that experience acid rain don't suffer effects because the soil in those areas can ***buffer*** the acid rain by neutralizing the acidity in the rainwater flowing through it. This capacity depends on the thickness and composition of the soil and the type of bedrock underneath it. In areas such as mountainous parts of the Northeast United States, the soil is thin and lacks the ability to adequately neutralize the acid in the rain water. As a result, these areas are particularly vulnerable and the acid and aluminum can accumulate in the soil, streams, or lakes.

Episodic Acidification

Melting snow and heavy rain downpours can result in what is known as episodic acidification. Lakes that do not normally have a high level of acidity may temporarily experience effects of acid rain when the melting snow or downpour brings greater amounts of acidic deposition and the soil can't buffer it. This short duration of higher acidity (i.e., lower pH) can result in a short-term stress on the ecosystem where a variety of organisms or species may be injured or killed.

Nitrogen Pollution

It's not just the acidity of acid rain that can cause problems. Acid rain also contains nitrogen, and this can have an impact on some ecosystems. For example, nitrogen pollution in our coastal waters is partially responsible for declining fish and shellfish populations in some areas. In addition to agriculture and wastewater, much of the nitrogen produced by human activity that reaches coastal waters comes from the atmosphere.

- Learn more about Nitrogen Pollution
- EPA's Chesapeake Bay Program Office

Effects of Acid Rain on Materials

Not all acidic deposition is ***wet***. Sometimes dust particles can become acidic as well, and this is called ***dry deposition***. When acid rain and dry acidic particles fall to earth, the nitric and sulfuric acid that make the particles acidic can land on statues, buildings, and other manmade structures, and damage their surfaces. The acidic particles corrode metal and cause paint and stone to deteriorate more quickly. They also dirty the surfaces of buildings and other structures such as monuments.

The consequences of this damage can be costly:

- damaged materials that need to be repaired or replaced,
- increased maintenance costs, and
- loss of detail on stone and metal statues, monuments and tombstones.

Other Effects of SO_2 and NO_X

Visibility

In the atmosphere, SO_2 and NO_X gases can be transformed into sulfate and nitrate particles, while some NO_X can also react with other pollutants to form ozone. These particles and ozone make the air hazy and difficult to see through. This affects our enjoyment of national parks that we visit for the scenic view such as Shenandoah and the Great Smoky Mountains.

- Learn more about Visibility and Regional Haze

Human Health

Walking in acid rain, or even swimming in a lake affected by acid rain, is no more dangerous to humans than walking in normal rain or swimming in non-acidic lakes. However, when the pollutants that cause acid rain —SO_2 and NO_X, as well as sulfate and nitrate particles— are in the air, they can be harmful to humans.

SO_2 and NO_X react in the atmosphere to form fine sulfate and nitrate particles that people can inhale into their lungs. Many scientific studies have shown a relationship between these particles and effects on heart function, such as heart attacks resulting in death for people with increased heart disease risk, and effects on lung function, such as breathing difficulties for people with asthma.

Learn more about:

- Sulfur Dioxide
- Nitrogen Oxides
- Particulate Matter (PM)
- Asthma

In addition, NO_X emissions also contribute to ground level ozone, which is also harmful to human health.

- Learn more about Ground Level Ozone

LAST UPDATED ON JUNE 1, 2017

State of Idaho Department of Environmental Quality

Regional Haze Plan

10/8/10

Idaho Regional Haze State Implementation Plan

Addressing Regional Haze Requirements for Idaho Mandatory Federal Class I Areas

October 8, 2010

Idaho Department of Environmental Quality

1410 North Hilton

Boise, Idaho 83706

This page intentionally left blank for correct double-sided printing.

Photos taken by Dan Meeker and Mike Edwards

Cover: Thompson Peak in the Idaho Sawtooth Wilderness Area

Title page: Thompson Peak early in the morning as the crew heads out to ski Resurrection Chute.

Previous page: Four unknown skiers from Ketchum following Dan Meeker's boot pack trail up un-named chute just left of Resurrection Chute on Thompson Peak. Who would have guest a Wednesday in the middle of February, 5-miles from any road, the Sawtooth Wilderness Area would be crowded.

Table of Contents

Table of Figures

Table of Tables

Idaho Regional Haze Reference Materials -

Applicable Western Regional Air Partnership (WRAP) Reports and Documents and Related Websites

WRAP Website:

http://www.wrapair.org/index.html

WRAP Technical Support System

http://vista.cira.colostate.edu/tss/

WRAP Fire Emissions Tracking System

http://wrapfets.org/

Causes of Haze Assessment

http://www.coha.dri.edu/

Interagency Monitoring of Protected Visual Environments

http://vista.cira.colostate.edu/improve/

Available on CD-ROM, or at the WRAP website:

Other Reference

1. Grand Canyon Visibility Transport Commission Final Report - *Recommendations for Improving Western Vistas*, June *1996.*
2. EPA's Regional Haze Rule and Preamble - *Regional Haze Regulations* (64 Federal Register 35714), July 1, 1999.
3. Introduction to Visibility, William C. Malm, Colorado State University, May 1999

Acknowledgements

Major assistance in preparing this implementation plan was provided by the Western Regional Air Partnership (WRAP) and its forums and committees, who provided Oregon and other western states with much of the policy and technical support information needed to meet the requirements of Section 308 of the Regional Haze Rule. Special thanks to the following staff:

- Pat Cummins, WRAP Co-Director
- Tom Moore, TOC Staff Support/Technical Coordinator
- Lee Alter, IOC Staff Support
- Don Arkell, State Caucus Coordinator/Visibility Program Coordinator with WESTAR
- Bob Lebens, WESTAR

Principal Author: Mike Edwards, DEQ Air Quality Division

Principal Contributors: Mary Anderson, DEQ Air Quality Division
Chris Ramsdell, DEQ Air Quality Division
Rick Hardy, DEQ Technical Services
Yayi Dong,, DEQ Techincial Services
Wei Zhang, DEQ Technical Services
Sara Strachan, DEQ Technical Services
Zach Klotovich, DEQ Technical Services
Carol Zundel, DEQ Air Quality Permitting
Cheryl Robinson, DEQ Air Quality Permitting
Morrie Lewis, DEQ Air Quality Permitting
Lisa Hansen, DEQ Tech Editor

And a special thanks to Brian Finneran with the Oregon Department of Environmental Quality who graciously allowed Idaho to follow the Oregon Regional Haze SIP layout and structure.

Executive Summary

In 1977, Congress designated all wilderness areas with more than 5,000 acres and all national parks with more than 6,000 acres, subject to the visibility protection requirements in the Clean Air Act. These national parks and wilderness areas receive special visibility protection as "mandatory federal Class I areas." A national regional haze rule has been adopted that requires states to improve visibility over the next 60 years in 156 national parks and wilderness areas across the country.

Idaho has five mandatory Class I federal areas (Class I areas): Craters of the Moon National Monument, Hells Canyon Wilderness Area, Sawtooth Wilderness Area, Selway-Bitterroot Wilderness Area, and Yellowstone National Park. Idaho shares Hells Canyon Wilderness Area, Selway-Bitterroot Wilderness Area, and Yellowstone National Park with neighboring states. It has been determined that for any shared Class I areas, the state with the largest percent of acreage is responsible for setting the required reasonable progress goals while the other states will address their portion of the visibility impairment through the required long term strategies and the consultation process. Idaho will be responsible for setting the reasonable progress goals for Craters of the Moon National Monument, Sawtooth Wilderness and Selway-Bitterroot Wilderness.

Each state is responsible for developing a Regional Haze State Implementation Plan (SIP) that will provide a comprehensive analysis of natural and man-made sources of haze impacting each Class I area. The SIP will contain 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 are to address industrial source BART (Best Available Retrofit Technology) requirements and demonstrate "reasonable progress" in improving visibility by 2018 for each Class I area in the state.

The BART requirements address certain larger industrial sources that began operation before the 1977 Prevention of Significant Deterioration Rules was adopted. Through the BART process two facilities (Amalgamated Sugar Company in Nampa and Monsanto/P4) were identified as subject to BART and will be required to install control technologies within the next 5-years.

The demonstration of "reasonable progress" requires setting goals for the 20% worst visibility days and 20% best visibility days in each Class I area, based on an evaluation of how BART and other regional haze strategies will reduce emissions and improve or protect visibility. The following table lists Idaho's Reasonable Progress Goals.

Idaho Class I Area	20% Worst Days		20% Best Days	
	Baseline Condition [deciviews]	2018 Reasonable Progress Goal [deciviews]	Baseline Condition [deciviews]	2018 Reasonable Progress Goal [deciviews]
Craters of the Moon National Monument	14	13.06	4.31	3.886
Sawtooth Wilderness	13.78	13.22	3.99	3.78
Selway-Bitterroot Wilderness Area	13.41	12.94	2.58	2.48

The document is divided into the following sections:

- Chapters 1-5 provide a basic overview of the regional haze basic planning elements, consultation through the Western Regional Air Partnership, monitoring and other technical tools relied upon to develop the plan, and an introduction to Idaho's Class I areas.
- Chapters 6 through 9 provide information on Idaho's emissions inventory, the pollutants causing visibility impairment in Idaho and surrounding states, and establishes baseline, natural conditions and uniform rate of progress for each of Idaho's Class I areas.
- Chapter 10 covers Idaho's Best Available Retrofit Technology (BART) process and the determinations on the two BART subject facilities.
- Chapters 11 and 12 establish reasonable progress goals and long term strategies for Idaho.
- Chapter 13 covers the formal consultation process and future Regional Haze Plan requirements.

Chapter 1. Introduction

1.1 Purpose of this Document

This Regional Haze State Implementation Plan (SIP) has been prepared to meet the requirements of the federal Regional Haze Rule, (40 CFR, Part 51, Section 308). It contains strategies and elements related to each requirement of this rule. The appendices at the end of this to this plan provide additional information related to the strategies, including citations of new Idaho Administrative Rules associated with this plan, reference material prepared by the Western Regional Air Partnership (WRAP), and other pertinent information.

1.2 Mandatory Federal Class I Areas Addressed in this Plan

The Regional Haze Rule (40 CFR 51.308) requires the responsible states to address visibility protection for regional haze in Idaho's mandatory federal Class I Areas. These areas are listed in Section 1.2.

1.3 Definitions and Abbreviations Contained for this Plan

This plan contains terms, phrases, and abbreviations or acronyms that have formal definitions under 40 CFR 51.301 and 40 CFR 51.308, and other terms specific to the programs set forth in this plan. The definitions, which prevail over other interpretations as to the meaning and intent of this implementation plan, are contained in Appendix A.

1.4 Overview of Visibility and Regional Haze

Good visibility is essential to the enjoyment of everyday life and the 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. This 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 in national parks and wilderness areas. The pollutants that create this haze are sulfates, nitrates, organic carbon, elemental carbon, and soil dust. Human-caused haze sources include industry, motor vehicles, agricultural and forestry burning, and windblown dust from farming practices and from roads.

A national regional haze rule has been adopted that requires states to improve visibility over the next 60 years 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. As can be seen on the following map of all Class I areas in the United States (Figure 1-1), most of them are in the West.

Figure 1-1 Map of Class I Areas. NPS – National Park Service; FWS – Fish and Wildlife Service; FS – Forest Service

1.5 Idaho's Mandatory Federal Class I Areas

Idaho has five mandatory Class I federal areas (Class I areas): Craters of the Moon National Monument, Hells Canyon Wilderness Area, Sawtooth Wilderness Area, Selway-Bitterroot Wilderness Area, and Yellowstone National Park. Idaho shares Hells Canyon Wilderness Area, Selway-Bitterroot Wilderness Area, and Yellowstone National Park with neighboring states. It has been determined that for any of these Class I areas, the state with the largest percent of acreage is responsible for setting the required reasonable progress goals (see Chapter 11) while the other states will address their apportionment of the visibility impairment through the required long term strategies (Chapter 12) and the consultation process. Idaho will be responsible for setting the reasonable progress goals for Selway-Bitterroot. Oregon will be responsible for Hells Canyon and Wyoming will set the goals for Yellowstone National Park. For each of these five Class I areas, its total acreage, Idaho acreage, and managing agency are listed in Table 1-1. A full description of each Class I area in Idaho is provided in Chapter 3 of this report.

Table 1-1 Idaho Class I Areas

Class I Area	Acreage	Acreage in Idaho	Managing Agency
Craters of the Moon National Monument	43,243	43,243	USDI-NPS*
Hells Canyon Wilderness Area	192,700	83,800	USDA-FS*
Sawtooth Wilderness Area	216,383	216,383	USDA-FS
Selway-Bitterroot Wilderness Area	1,240,700	988,770	USDA-FS
Yellowstone National Park	2,219,737	31,488	USDI-NPS

* USDI-NPS – U.S. Department of the Interior, National Park Service; USDA-FS – U.S. Department of Agriculture, Forest Service

1.6 History of the 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 Class I area. These became known as EPA's "Phase I" visibility rules. At that time, EPA deferred writing rules to address regional haze, because they lacked the monitoring, modeling, and scientific information needed to understand the nature of long-range transport and formation of regional haze.

In 1990 amendments to the Clean Air Act, Congress established the requirements to address regional haze. They gave EPA the authority to establish visibility transport commissions and to promulgate regulations to address regional haze. The 1990 amendments also established a visibility transport commission to investigate and report on regional haze visibility impairment in Grand Canyon National Park and nearby Class I areas. A summary of the Grand Canyon Visibility Transport Commission's work is provided in Chapter 1.7.

1.7 Summary of the Regional Haze Rule

To address the problem of regional haze and to meet the national goal of reducing man-made visibility impairment in all Class I areas, 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 a regional haze state implementation plan (SIP), that focus on improving the haziest days (the worst 20%) and protecting the clearest days (the best 20%), through the year 2064. Each SIP will provide a comprehensive analysis of natural and man-made sources of haze in each Class I area and will contain 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 are to address BART (Best Available Retrofit Technology) and demonstrate "reasonable progress" in improving visibility by 2018 for each Class I area in the state. The BART requirements address certain larger industrial sources that began operation before the 1977 Prevention of Significant Deterioration Rules were adopted (see section 1.8 below). Chapter 10 of this Plan describes the BART review and evaluation in detail. The demonstration of "reasonable progress" requires setting goals for the 20% worst and best days in each Class I area, based on an evaluation of how BART and other regional haze strategies will reduce emissions and improve or protect visibility. Chapter 11 of this Plan describes the Reasonable Progress Demonstration in detail.

Additional information on the Regional Haze Rule can be found on the Department's website, at http://www.deq.idaho.gov/air/prog_issues/pollutants/haze_overview.cfm

1.8 Other Programs that Address Visibility Impairment

The 1977 Clean Air Act Amendments established Prevention of Significant Deterioration (PSD) requirements, which included protecting visibility in national parks, national wilderness areas, national monuments, and national seashores. The PSD program includes -specific (Class I, II, and III) increments or limits on the maximum allowable increase in air pollutants (particulate matter or sulfur dioxide). PSD also includes preconstruction permit review for new or modifying major sources that allows for careful consideration of control technology, consultation with federal land managers (FLMs) on visibility impacts, and public participation in permitting decisions.

1.9 Best Available Retrofit Technology

Under Section 169A(b), Congress established new requirements on major stationary sources that were in operation within a 15-year period prior to enactment of the 1977 amendments to which visibility impairment in a mandatory Class I federal area can be reasonably attributed. These sources may be required to install “best available retrofit technology” (BART) as determined by the State. In determining BART, the State must take into consideration the costs of compliance, the energy and non-air quality environmental impacts of compliance, any existing pollution control technology in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the installation of BART technology.

1.10 The Grand Canyon Visibility Transport Commission

The 1990 Clean Air Act Amendments created the Grand Canyon Visibility Transport Commission (GCVTC). The GCVTC was given the charge to assess the currently available scientific information pertaining to adverse impacts on visibility from potential growth in the region, identify clean air corridors, and recommend long-range strategies for addressing regional haze for Class I areas on the Colorado Plateau. The GCVTC completed significant technical analyses and developed recommendations to improve visibility in the 16 mandatory federal Class I areas on the Colorado Plateau. These 16 Class I areas are as follows: Arches National Park, Black Canyon of the Gunnison Wilderness, Bryce Canyon National Park, Canyonlands National Park, Capital Reef National Park, Flat Tops Wilderness, Grand Canyon National Park, Maroon Bells Wilderness, Mesa Verde National Park, Mt. Baldy Wilderness, Petrified Forest National Park, San Pedro Parks Wilderness, Sycamore Canyon Wilderness, Weminuche Wilderness, West Elk Wilderness, and Zion National Park.

The GCVTC found that visibility impairment on the Colorado Plateau was caused by a wide variety of sources and pollutants. A comprehensive strategy was needed to address all of the causes of regional haze. The GCVTC submitted a set of recommendations to EPA in a report dated June 1996 for consideration in rule development. These recommendations were grouped into the following nine categories:

Air Pollution Prevention Air pollution prevention and reduction of per capita pollution was a high priority for the GCVTC. The GCVTC recommended policies based on energy conservation, increased energy efficiency, and promotion of the use of renewable resources for energy production.

Clean Air Corridors Clean air corridors are geographic areas that act as a source of clean air to the 16 Class I areas of the Colorado Plateau. For these areas, the GCVTC primarily recommended careful tracking of emissions increases that may affect air quality in these corridors and ultimately in the 16 Class I areas.

Stationary Sources For stationary sources, the GCVTC recommended closely monitoring the impacts of current requirements under the Clean Air Act and ongoing studies. It also recommended regional targets for sulfur dioxide emissions from stationary sources, starting in 2000. If these targets are exceeded, the GCVTC recommends that a regional cap and market-based emission trading program be implemented.

Areas In And Near Parks The GCVTC's research and modeling showed that a host of sources adjacent to parks and wilderness areas, including large urban areas, have significant visibility impacts. However, the GCVTC lacked sufficient data regarding the visibility impacts of emissions from some areas in and near parks and wilderness areas. In general, the models used by the GCVTC were not readily applicable to such areas. Pending further studies of these areas, the GCVTC recommended that local, state, tribal, federal, and private parties cooperatively develop strategies, expand data collection, and improve modeling for reducing or preventing visibility impairment in areas within and adjacent to parks and wilderness areas.

Mobile Sources The GCVTC recognized, in 1996, that mobile source emissions were projected to decrease through about 2005 due to improved control technologies. The GCVTC recommended capping emissions at the lowest level achieved and establishing a regional emissions budget., The commission also endorsed national strategies aimed at further reducing tailpipe emissions.,

Road Dust The GCVTC's technical assessment indicated that road dust is a large contributor to visibility impairment on the Colorado Plateau and that it therefore requires urgent attention. However, due to considerable skepticism regarding the modeled contribution of road dust to visibility impairment, the GCVTC recommended further study in order to resolve the uncertainties regarding both near-field and distant effects of road dust, prior to taking remedial action. Since this emissions source is potentially such a significant contributor, the GCVTC felt that it deserved high priority attention and, if warranted, additional emissions management actions.

Emissions from Mexico Mexican sources are also shown to be significant contributors, particularly of sulfur dioxide emissions. However, data gaps and jurisdictional issues made this a difficult issue for the GCVTC to address directly. The GCVTC recommendations called for continued bi-national collaboration to work on this problem, as well as additional efforts to complete emissions inventories and increase monitoring capacities. The GCVTC recommended that these matters should receive high priority for regional and national action.

Fire The GCVTC recognized that fire plays a significant role in visibility on the Plateau. In fact, land managers propose aggressive prescribed fire programs aimed at correcting the buildup of biomass due to decades of fire suppression. Therefore, prescribed fire and wildfire levels are projected to increase significantly during the studied period.

The GCVTC recommended the implementation of programs to minimize emissions and visibility impacts from prescribed fire, as well as to educate the public.

Future Regional Coordinating Entity Finally, the GCVTC believed there was a need for an entity like the GCVTC to oversee, promote, and support many of the recommendations in their report. To support that entity, the GCVTC developed a set of recommendations addressing the future administrative, technical and funding needs of the GCVTC or a new regional entity. The GCVTC strongly urged the EPA and Congress to provide funding for these vital functions and give them a priority reflective of the national importance of the Class I areas on the Colorado Plateau.

1.11 The Western Regional Air Partnership

The GCVTC recognized the need for a long-term organization to address the policy and perform technical studies needed to address regional haze. The Western Regional Air Partnership (WRAP) was formed in September 1997 as the successor organization to the GCVTC. The WRAP is made up of western states, tribes, and federal agencies. The 13 states are Alaska, Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. The WRAP's charter allows it to address any air quality issue of interest to WRAP members, though most current work is focused on developing the policy and technical work products needed by states and tribes to develop their regional haze SIPs.

The WRAP established stakeholder-based technical and policy oversight committees to assist in managing the development of regional haze work products. Stakeholder-based working groups and forums were established to focus attention on the policy and technical work products that the states and tribes need to assist them with developing their implementation plans. Additional information about the WRAP can be found on the WRAP web site at http://www.wrapair.org.

The WRAP's Technical Support System (TSS) was the source for the majority of key technical information and data used in the this plan. WRAP staff and contractors, through consultation with the states and tribes, have developed informational tools based upon IMPROVE (Interagency Monitoring of Protected Visual Environments) monitoring data (see Chapter 4), individual state emission inventories, and source-specific inventories (see Chapter 8). This information was used to develop future projected emission inventories for the year 2018 upon which modeling was developed to demonstrate the control strategies implemented through the Regional Haze SIPs. The WRAP TSS can be found at http://vista.cira.colostate.edu/tss/.

Chapter 2. Idaho Regional Haze SIP Development and Consultation Process

The Idaho Regional Haze State Implementation Plan (SIP) was developed through a process of consultation with other States, tribes, major stakeholders, and advisory committees, and through input from public outreach. The following is a brief summary of this process. Chapter 13 contains additional information and details, including comments and responses referenced in Appendix B to this plan.

2.1 Consultation with Federal Land Managers

The Regional Haze Rule 40 CFR Section 51.308(i) requires coordination between states and federal land managers (FLMs). (The FLMs involved in this SIP process are identified in this chapter.) Idaho has provided agency contacts to the FLMs as required under 51.308(i)(1), and the FLMs were consulted in accordance with the provisions of 51.308(i)(2) during the development of this plan,.

Numerous opportunities were provided by the Western Regional Air Partnership (WRAP) for FLMs to participate fully in the development of technical documents produced by the WRAP and participating States and Tribes and included in this plan. A summary of WRAP-sponsored meetings and conference calls is provided in Appendix B to this plan. In addition, through the Idaho negotiated rule making process, Idaho provided additional opportunities for coordination and consultation with FLMs as the plan was developed. Appendix B includes details of this state-specific process.

The State of Idaho has provided opportunity for in-person consultation at least 60 days prior to holding any public hearing on the SIP. This SIP was submitted to the FLMs on June 3, 2010 for review and comment. Comments were received from the FLMs on July 23, 2010. As required by 40 CFR Section 51.308(i)(3), the FLM comments and state responses are included in Appendix I to this plan.

Under 40 CFR Sections 51.308(f-h), states are required to submit , within certain timeframes, SIP revisions and progress reports that evaluate progress toward the reasonable progress goal for each Class I area. As required by 40 CFR Section 51.308(i)(4), Idaho will continue to coordinate and consult with the FLMs during the development of these plan revisions and future progress reports, as well as during the development and implementation of programs involved in controlling light impairing pollutants in mandatory Class I areas; a full discussion of this process is contained in Chapter 13.

The consultation will be coordinated with the designated visibility protection program coordinators for the National Park Service, U.S. Fish and Wildlife Service, and the U.S. Forest Service. At a minimum, the state will meet with the FLMs on an annual basis through the Western Regional Air Partnership.

2.2 Consultation with States and Tribes

As recommended by the Grand Canyon Visibility Transport Commission the states have been working through regional planning organizations.

The successor to the GCVTC, the WRAP, is the regional planning organization in the West and is composed of 13 western states, along with tribes and federal agencies. The states are Alaska, Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. The member tribal organizations are the Campo Band of Kumeyaay Indians, Confederated Salish and Kootenai Tribes, Cortina Indian Rancheria, Hopi Tribe, Hualapai Nation of the Grand Canyon, Native Village of Shungnak, Nez Perce Tribe, Northern Cheyenne Tribe, Pueblo of Acoma, Pueblo of San Felipe, and Shoshone-Bannock Tribes of Fort Hall. Representatives of other tribes participate on WRAP forums and committees. Participation is encouraged throughout the Western states and tribes. Federal participants are the Department of the Interior (National Park Service and Fish & Wildlife Service,) the Department of Agriculture (Forest Service), and the Environmental Protection Agency.

The primary state and federal consultation has occurred through the Western Regional Air Partnership conference calls and meetings. Idaho has participated in all of the WRAP subcommittees and co-chaired the Dust Emissions Forum and the Implementation Work Group. Following is a breakdown of the various subcommittees with a brief description of the subcommittees focus.

WRAP Committees and Workgroups

Initiatives Oversight Committee

The WRAP Initiatives Oversight Committee (IOC) is responsible for establishing and overseeing the work of forums that develop policies and programs to improve and protect air quality. Following is the list of the Initiatives Oversight Committee forums.

2.2.1..1 The Air Pollution Prevention Forum

The Air Pollution Prevention Forum is tasked with developing energy conservation initiatives and programs to expand the use of renewable energy sources. They are working to find, and encourage use of, energy sources that minimize air pollution.

2.2.1..2 The Economic Analysis Forum

This forum assists with studies to evaluate the economic effects of air quality programs being developed by the WRAP to diminish haze throughout the West.

2.2.1..3 The Forum on Emissions In/Near Class 1 Areas

This forum looks at pollution sources in and near mandatory federal Class 1 areas to determine their impact on visibility in those areas. The group also will address mitigation and outreach options.

2.2.1..4 The Mobile Sources Forum

This forum addresses the impact of motor vehicles and other mobile sources of pollution. For example, the forum developed and presented a plan to the WRAP, that suggests a revision of U.S. Environmental Protection Agency rules regarding the production of low-sulfur fuel by small refineries. The forum also recommended reforms for off-road emissions and for diesel fuel engine retrofit programs.

Technical Oversight Committee

The tasks of the Technical Oversight Committee (TOC) are to identify and manage technical issues and to establish and oversee the work of forums and work groups that are developing and analyzing scientific information related to air quality planning in the West. Following is a list of the TOC forums and work groups.

2.2.1..5 The Air Quality Modeling Forum

This forum identifies, evaluates the performance of, and applies mathematical air quality models, which can be used to quantify the benefits of various air quality programs for reducing haze in the western United States.

2.2.1..6 The Ambient Monitoring and Reporting Forum

This forum oversees the collection, use, and reporting of ambient air quality and meteorological monitoring data as needed to further the WRAP's overall goals.

2.2.1..7 The Emissions Forum

This Forum is developing the first comprehensive inventory of haze-causing air emissions in the West, including a comprehensive emissions tracking and forecasting system. The forum also monitors trends in actual emissions and forecasts emissions reductions anticipated from current regulations and alternative control strategies.

2.2.1..8 Attribution of Haze Work Group

This work group is preparing guidance for states and tribes regarding both the types of pollution emitters and the regions in which pollutants contribute to visibility impairment in national parks and other Class I wilderness areas. The work group is made up of three state and three tribal representatives, along with all members of the Technical Oversight Committee and one representative each from the Initiatives Oversight Committee, the Tribal Data Development Work Group and the technical and joint forums.

2.2.1..9 The Tribal Data Development Work Group

This work group is identifying gaps in air quality data for tribal lands and working with tribes to collect that data. While some tribes have adequate staff and equipment for such an undertaking, many lack the human and technical resources to accomplish such work. This work group is providing help both by enhancing the tribes' ability to collect the necessary data and by establishing a method for standardizing and cataloging the data so it can be used for subsequent analysis.

2.2.1..10 The Implementation Work Group

The purpose of the Implementation Work Group (IWG) is to assist states and tribes in the development of their regional haze implementation plans that are required under 40 CFR 51.308 and 40 CFR 51.309(g). The work group will be comprised of state and tribal representatives so that their needs are accommodated by recognizing the variety of regulatory and statutory authorities and range of technical and policy expertise among them.

Joint Technical and Policy Forums

The Initiative Oversight Committee and the Technical Oversight Committee have joint oversight of the following forums:

The Dust Emissions Joint Forum

This forum primarily seeks to improve the methods for estimating dust emissions and how these estimates are used as inputs in air quality models. This forum examines the extent of dust impacts and strategies to reduce dust emissions. This forum has been co-chaired by an Idaho representative.

The Fire Emissions Joint Forum

The GCVTC confirmed that forest fires contribute significantly to visibility problems and that the use of prescribed fire is expected to increase as a forest management tool. The Fire Emissions Joint Forum is developing measures to reduce the effects of prescribed fires and is examining emissions from all fires, whether ignited naturally or by humans. Both public health and nuisance effects as well as visibility impacts are considered. This forum is working in coordination with federal, tribal, state, and local agencies as well as private landowners, forest managers, and the agriculture community to develop a tracking system for fire emissions and management techniques to minimize emissions. This forum has been co-chaired by an Idaho representative.

The Stationary Sources Joint Forum

The Stationary Sources Joint Forum, formerly the Market Trading Forum, developed the details of an emissions trading program to achieve cost-effective reductions in industrial sources of sulfur dioxide. This forum first set emissions milestones for sulfur-dioxide between now and 2018 and then designed a trading program to be triggered if these emissions targets are exceeded. The forum is now examining other types of industrial source emissions, such as oxides of nitrogen and particulate matter, and is assisting WRAP members in complying with the stationary source provisions of the regional haze rule.

Chapter 3. Introduction to Idaho Class I Areas

This chapter provides a description of Class I areas in Idaho. Although Idaho has numerous Wilderness Areas and Monuments, not all of them are mandatory Class I areas as designated by Congress. Only those wilderness areas and national memorial parks exceeding 5,000 acres and national parks exceeding 6,000 acres and in existence prior to August 7, 1977, are considered mandatory federal Class I areas and must be considered under the Regional Haze rule. The mandatory Class I areas in Idaho are Craters of the Moon National Monument, Hells Canyon Wilderness, Sawtooth Wilderness, Selway-Bitterroot Wilderness, and Yellowstone National Park (Figure 3-1)

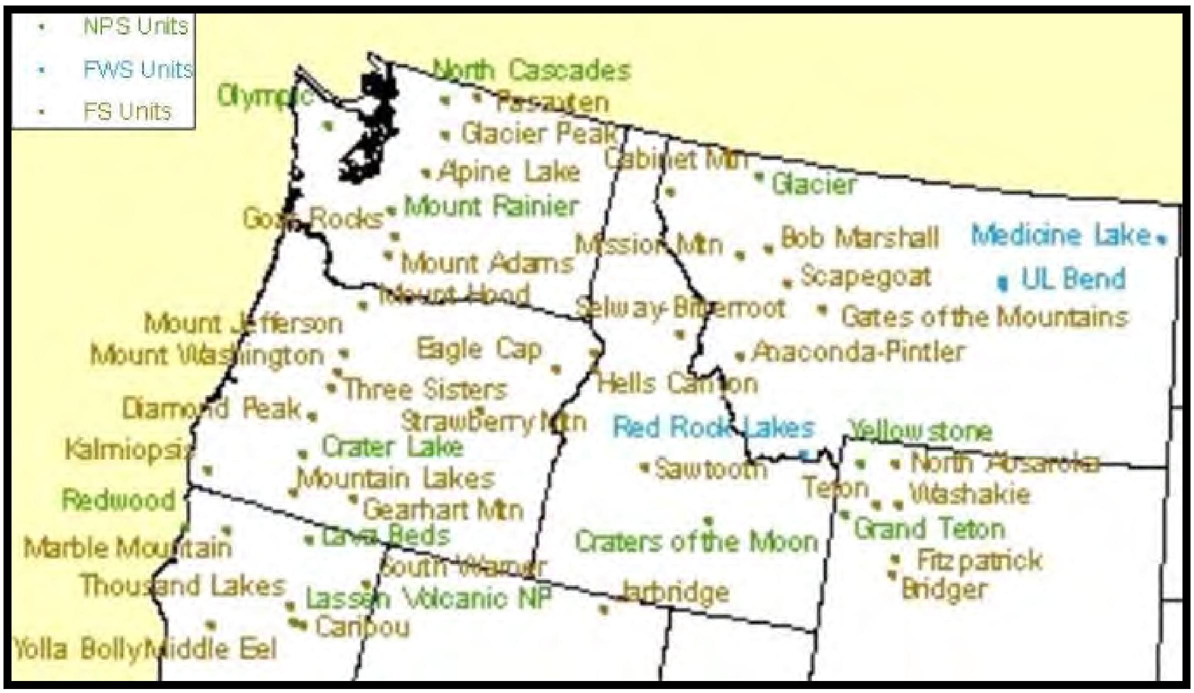


Figure 3-1. Map of Idaho's mandatory Class I areas

3.1 Craters of the Moon National Monument

Craters of the Moon National Monument is comprised of 43,243 acres on the Snake River Plain in South Central Idaho (Figure 3-2). The monument and preserve contain more than 25 volcanic cones and 60 distinct lava flows from the Craters of the Moon Lava Field ranging in age from 15,000 to 2, 000 years old.

Figure 3-2. Craters of the Moon space shuttle image

The Craters of the Moon lava field reaches southwestward from the Pioneer Mountains and is part of the Great Rift volcanic zone that continues along the Snake River Plan. The average precipitation is between 15 to 20 inches per year, which is quickly lost in the basaltic rock and re-emerges in the springs along the walls of the Snake River Canyon.

The Monument was originally designated by President Calvin Coolidge in 1924 to “preserve the unusual and weird volcanic formations.” The monument was expanded on October 23, 1970. Figure 3-3 shows the location of the Craters of the Moon totally within the boundaries of the State of Idaho.

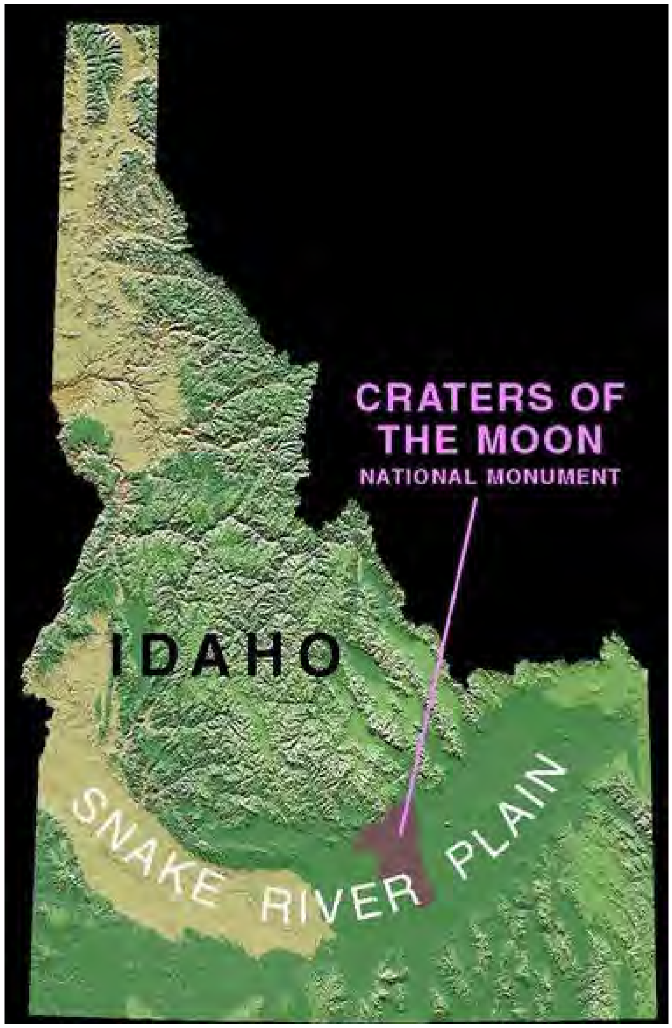


Figure 3-3. Map of Craters of the Moon National Monument

3.2 Hells Canyon Wilderness Area

Hells Canyon was designated a national wilderness in 1975 with more land added in 1984 for a total of 192,700 acres, of which 83,800 acres are in Idaho. The wilderness is divided by the Snake River as it flows between Idaho and Oregon. It contains three Wild and Scenic rivers: the Snake River in Idaho, the Rapid River in Idaho and Oregon, and the Imnaha River in Oregon. The Idaho portion of the wilderness area is characterized by sagebrush and bunch grasses at the lower elevations and deciduous bushes and Douglas fir at the higher elevations. One of the most distinguishing features is the topographic relief ranging from the top of the Peaks at 9,300’ and descending 7,000’ to the rivers below as shown in figure 3-4.

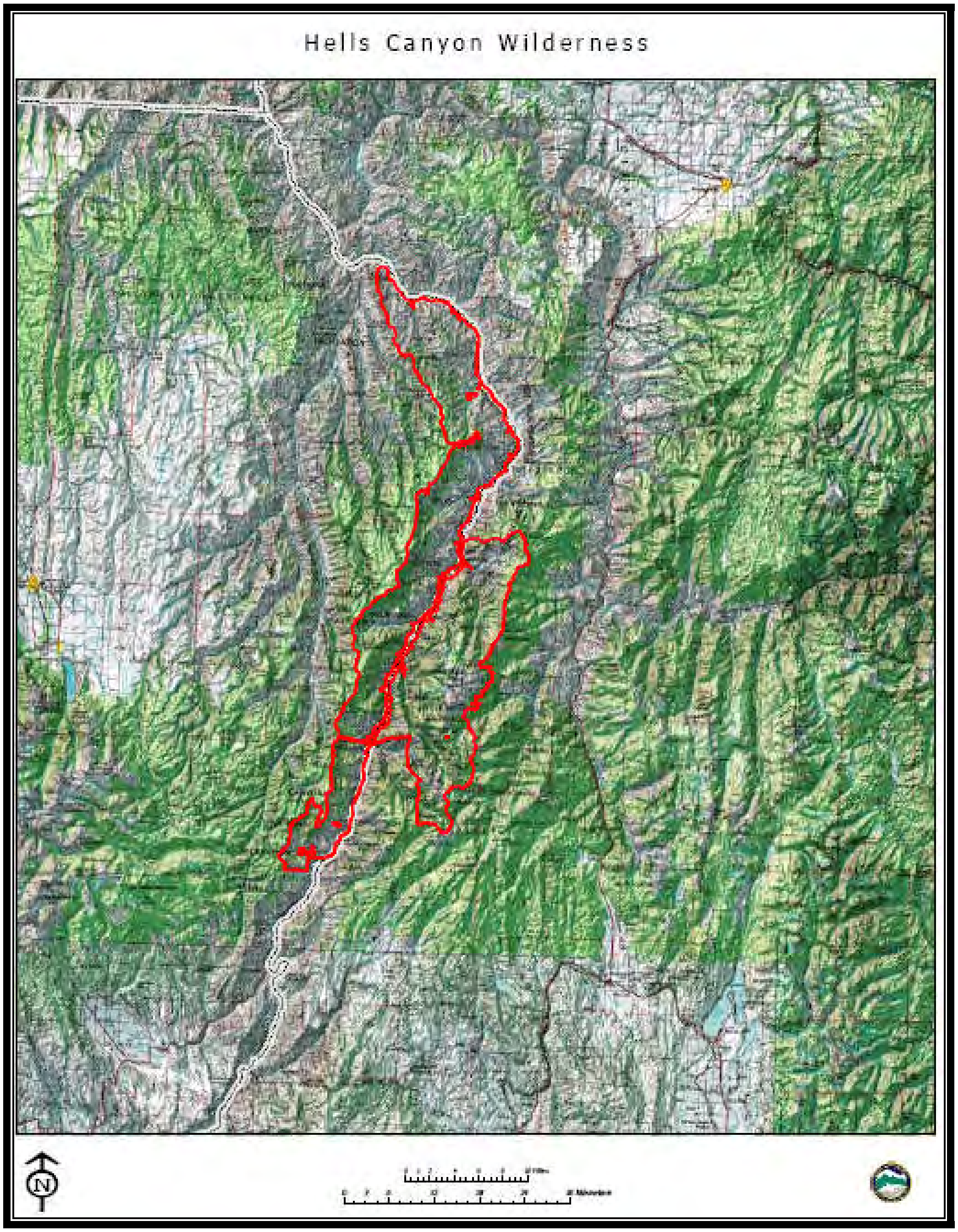


Figure 3-4. Map of Hells Canyon Wilderness

3.3 Sawtooth Wilderness Area

The Sawtooth Wilderness Area occupies 217,088 acres in the western portion of the Sawtooth National Recreation Area in central Idaho. The wilderness area consists primarily of the Sawtooth Mountains, a central headwaters source that includes headwaters of the North and Middle Forks of the Boise River, the South Fork of the Payette River, and the Salmon River. The terrain consists of steep craggy peaks and deep valleys. Elevations range from ~6,000 feet where the Payette South Fork and Boise Middle Fork exit the wilderness on the west side, to 10,776 feet at the summit of Thompson Peak. It includes approximately 40 peaks with elevations of 10,000 feet or higher. The Sawtooth Wilderness Area, also entirely contained within Idaho, is shown in Figure 3-5.

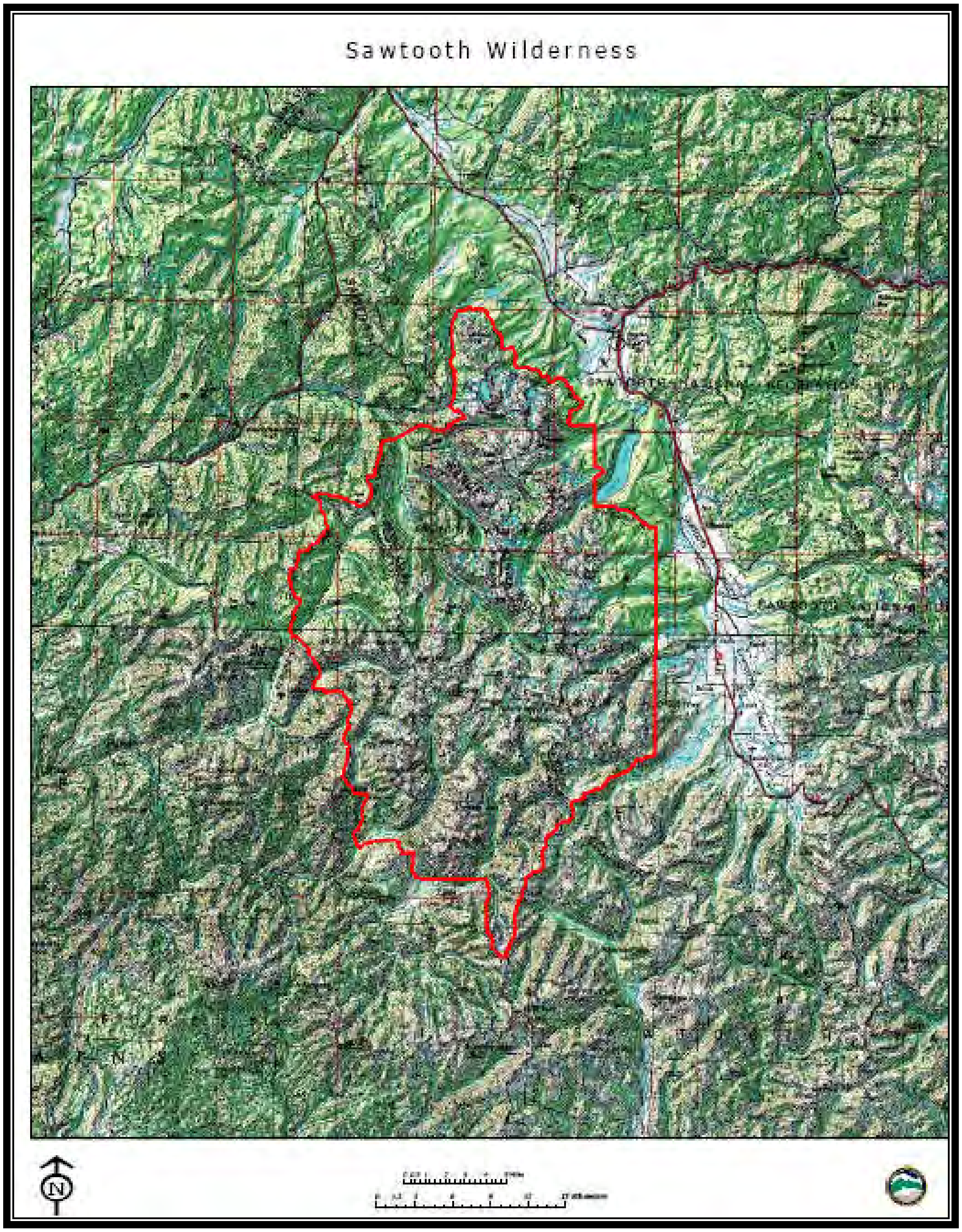


Figure 3-5. Map of Sawtooth Wilderness

3.4 Selway-Bitterroot Wilderness Area

Established in 1964, the Selway-Bitterroot Wilderness Area spans four national forests and covers 1,240,700 acres. Idaho contains the largest portion of this wilderness at 988, 700 acres with the remaining portion in Montana. It is the third-largest wilderness in the lower 48 states and supports large populations of bear, bighorn sheep, and elk.

It is characterized by rough mountainous areas with dense forests below the peaks. This wilderness also contains more than 100 mountain lakes and is home of the Wild and Scenic Selway River. The Selway-Bitterroot Wilderness is shown in Figure 3-6, with the Idaho-Montana border shown as a dashed white line.

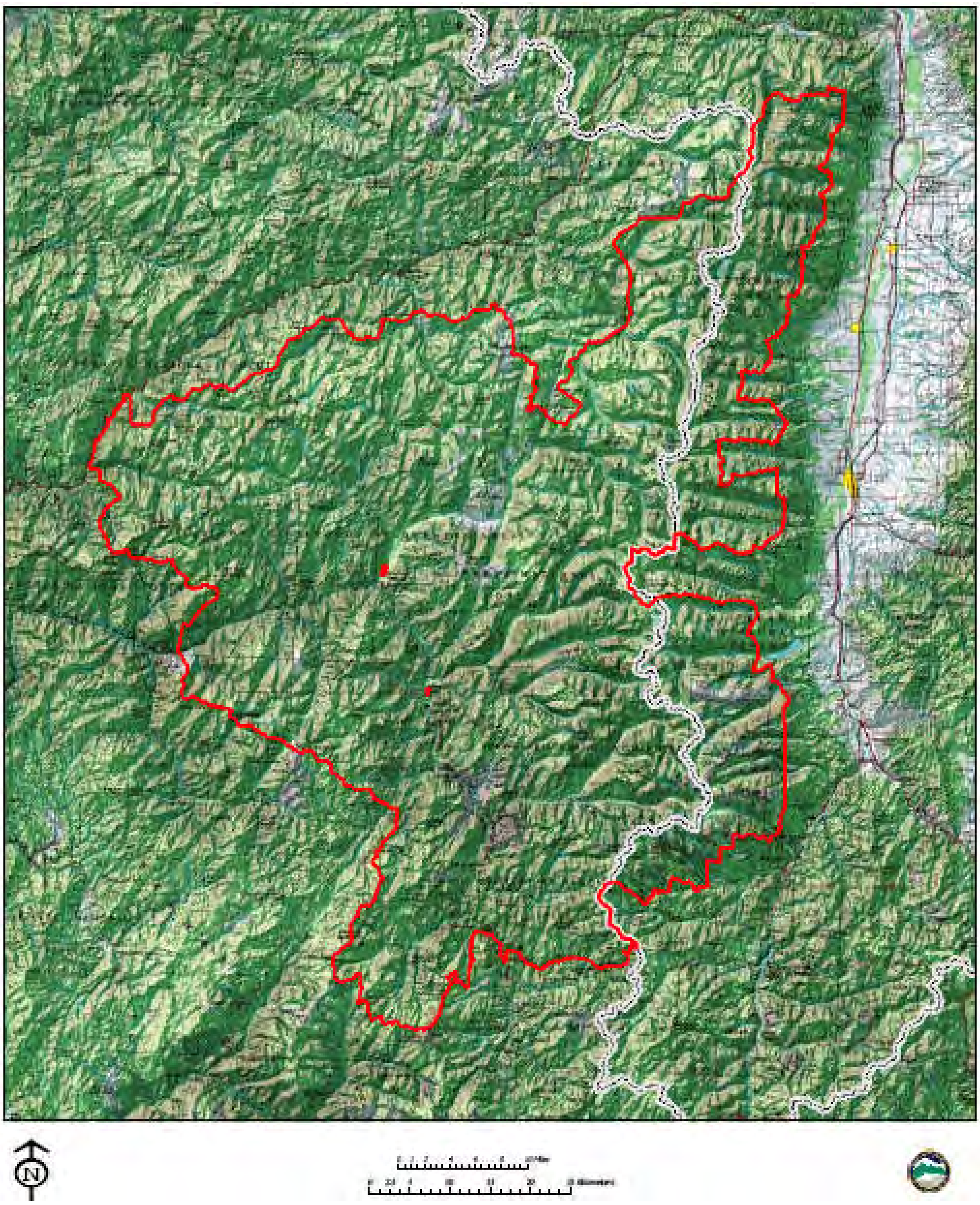


Figure 3-6. Map of Selway-Bitterroot Wilderness

3.5 Yellowstone National Park

In 1872, Congress established Yellowstone as the first national park in the world. A new concept was born and with it a new way to preserve and protect the most unique environments for the benefit and enjoyment of future generations.

Yellowstone contains half of the earth's geothermal features and the most diverse and intact collection of geysers, hot springs, mud pots, and fumaroles in the world. Its more than 300 geysers make up two thirds of all those found on earth.

Yellowstone is home to the largest concentration of mammals in the lower 48 states. Sixty-seven different types of mammals live there, including grizzly bear, black bear, gray wolf, wolverine, lynx, elk, bison, moose, and numerous types of small mammals. Bison are the largest mammals in Yellowstone National Park. Yellowstone is the only place in the lower 48 states where a population of wild bison has persisted since prehistoric times, although fewer than 50 native bison remained in 1902. Bears may be seen in Yellowstone from March through November. Yellowstone is one of the only areas south of Canada that still has a large grizzly bear (Ursus arctos) population.

Yellowstone National Park occupies 2,221,766 acres, mostly in northwestern Wyoming, overlapping into Montana and Idaho. Its terrain has been characterized as broad dissected plateau interrupted by several mountain ranges. The greatest relief is along the northern and eastern borders. Elevations range from 5,314 feet where the Yellowstone River exits the park on the north boundary, to 9,840 feet and higher at mountain summits on the eastern and northern boundary. The highest elevation is 11,358 feet at the summit of Eagle Peak on the southeastern Park boundary. Yellowstone National Park is shown in Figure 3-7.

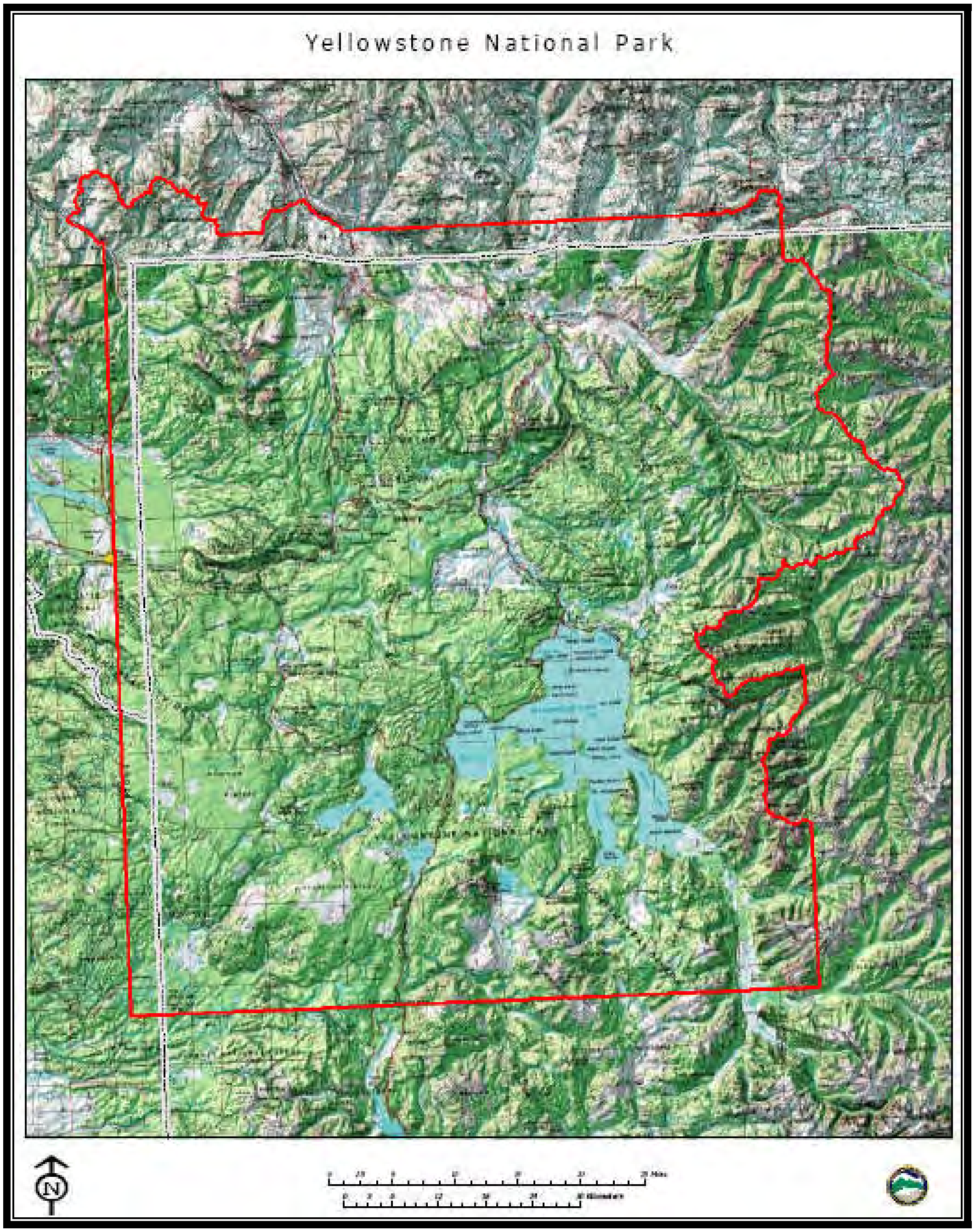


Figure 3-7. Map of Yellowstone National Park

Chapter 4. Technical Information and Data Relied Upon in This Plan

This chapter describes the information relied upon by the Idaho Department of Environmental Quality (DEQ) in developing this regional haze plan. The first part of this chapter describes the Western Regional Air Partnership (WRAP) organization and its work products relied upon by DEQ. The second part describes the IMPROVE monitoring network (see section 4.2 for information about the IMPROVE network) and data it collects that are used by states throughout the country to measure visibility in Class I areas.

4.1 The WRAP and Technical Support

As described in Section 1.7 of this plan, the WRAP is a voluntary organization of federal agencies and western states and tribes. It was formed in 1997 as the successor to the Grand Canyon Visibility Transport Commission.

The WRAP has a technical support system (TSS) with the primary purpose of providing key summary analytical results and methods documentation for the technical elements required under the Regional Haze Rule. The required technical elements support the preparation, completion, evaluation, and implementation of the regional haze implementation plans to improve visibility in Class I areas. The TSS provides technical results prepared using a regional approach, including summaries and analysis of the comprehensive datasets used to identify the sources and regions contributing to regional haze in the WRAP region.

The secondary purpose of the TSS is to be the one-stop-shop for access, visualization, analysis, and retrieval of the technical data and regional analytical results prepared by WRAP forums and work groups to support regional haze planning in the West. The TSS specifically summarizes results and consolidates information about air quality monitoring, meteorological and receptor modeling data analyses, emissions inventories and models, and gridded air quality/visibility regional modeling simulations. These copious and diverse data are integrated for application to air quality planning purposes by prioritizing and refining key information and results into explanatory tools.

4.2 IMPROVE Monitoring

4.2.1 Background on IMPROVE monitoring

In the mid-1980s, a program known as Interagency Monitoring of Protected Visual Environments (IMPROVE) was established to measure visibility impairment in mandatory federal Class I areas throughout the United States. IMPROVE monitoring sites are operated and maintained through a formal cooperative relationship between EPA, the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the U.S. 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 Class I areas; identifying the chemical species and emissions sources responsible for existing human-made visibility impairment; and documenting long-term trends for assessing progress towards the national visibility goals in supporting the requirements of the Regional Haze Rule by providing regional haze monitoring, where practical, for all visibility-protected federal Class I areas.

The sampling equipment at IMPROVE monitoring sites consists of four separate modules for measuring regional haze..

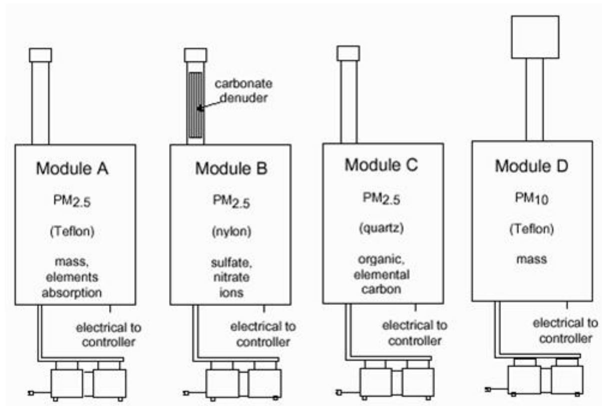


Figure 4-1 IMPROVE Sampler Modules

The data collected at the IMPROVE monitoring sites are used by land managers, industry planners, scientists, public interest groups, and air quality regulators to better understand and protect the visual air quality resource in Class I areas. Most importantly, the IMPROVE program scientifically documents the visual air quality of mandatory Class I federal areas as required by the Regional Haze Rule.

4.2.2 Measures of Visibility Impairment

The states can use IMPROVE monitoring data to calculate visibility impairment in terms of either reconstructed light extinction or haze index, both of which are described in the following paragraphs.

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 three days at the IMPROVE monitors located in or near each Class I area.

There are five primary pollutants involved in visibility impairment: nitrates, sulfates, organic mass carbon, elemental carbon (also known as light-absorbing carbon), and soil. (See Figure 4-2.) These pollutants have different effects on light, depending on the size of the pollutant particle. Smaller particles of 2.5 microns or less in size impair light more efficiently than pollutants 1.0 microns or greater in size.

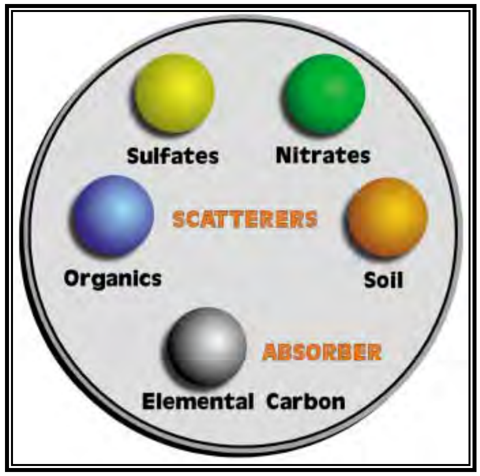


Figure 4-2. Five primary pollutants that impair visibility (Malm 1999)

To understand how these pollutants affect light, it is important to first understand light waves that are visible to the human eye. Light can be thought of as waves very similar to waves in water or sound waves. 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, there are three primary colors: blue, green, and red light. 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 4-3 shows the relationship between wavelengths and colors.

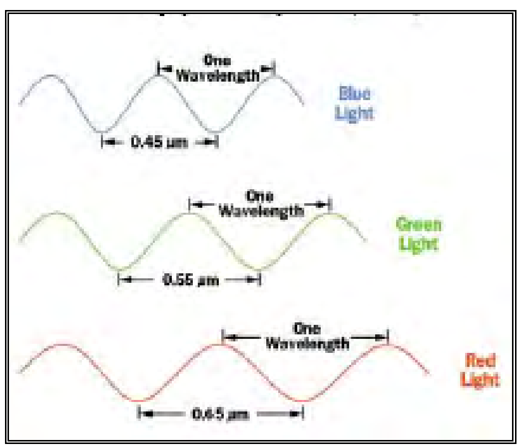


Figure 4-3 Wavelengths of light visible to humans (Malm 1999)

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 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.

Light scattering can occur in four ways: 1) light can be refracted and bent inward as it passes through particles in the air; 2) light can be refracted and turned away from particles in the air; 3) light waves can undergo a wave shift, during which one light wave is disrupted and gets out of sync with the surrounding waves, causing the disrupted light wave to change the direction of the other surrounding light waves; or 4) particles in the air can capture the energy contained in light waves and absorb the light waves. Particles that are greater than 10 microns in size have a tendency to scatter light forward. Molecules in gaseous form (the smallest size fraction) in the atmosphere have a tendency to bounce equal amounts of light forward and backward, with smaller amounts emanating vertically from the light source. This type of light scattering is known as Rayleigh scattering1.

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 equation2:

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

Where:

B_{ext} is the light-extinction coefficient or reconstructed light extinction;

f(RH) is the relative humidity at the particular Class I area at the time of year the measurement is made;

Sulfate is the mass of ammonium sulfate collected from the IMPROVE sampler;

Nitrate is the mass of ammonium nitrate collected from the IMPROVE sampler;

OMC is the mass of organic carbon collected from the IMPROVE sampler;

LAC is the mass of elemental carbon collected from the IMPROVE sampler;

Fine soil is the corrected mass of aluminum, silicon, calcium, iron, and titanium collected from the IMPROVE sampler;

CM is the mass of coarse particulates, which is the difference between particles 10 microns (PM_{10}) and particles 2.5 microns ($PM_{2.5}$).

The constant for Rayleigh scattering is 10.

1 The information and figures in Section 4.2.2 were taken from "Introduction to Visibility" (May 1999) by William Malm of the Air Resources Division of the National Park Service, available at the Web site of the Cooperative Institute for Research in the Atmosphere at Colorado State University.. For a full understanding of light impairment, see this document athttp://vista.cira.colostate.edu/improve/Education/IntroToVisinstr.htm.

2 The light extinction equation above 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 listed above and search for "revised IMROVE equation."

Reconstructed light extinction (b_{ext}) is the sum of the six particle components (sulfate, nitrate, organic carbon, elemental carbon, fine soil, and coarse mass) and Rayleigh scattering. The unit of measurement for b_{ext} is inverse megameters (1/Mm or Mm^{-1}).

4.3 Idaho IMPROVE Monitoring Network

Idaho is fortunate to have an IMPROVE monitoring site located in or very near each of Idaho's Class I areas. There are five IMPROVE monitoring sites relied upon for tracking visibility impacts and trends in Idaho (see Table 4-1 for details).

Table 4-1 The Idaho IMPROVE Monitoring Network

Class I Area	Site Code	Sponsor	Elevation MSL[a]	Start Date
Craters of the Moon National Monument	CRMO1	NPS[b]	1,817 m (5,961 ft)	5/13/1992
Hells Canyon Wilderness	HECA1	USFS[c]	655 m (2,148 ft)	8/1/2000
Sawtooth Wilderness	SAW1	USFS	1,990 m (6,529 ft)	1/26/1994
Selway-Bitterroot Wilderness	SULA1	USFS	1,895 m (6,217 ft)	8/10/1994
Yellowstone National Park	Yell2	NPS	2,425 m (4130 ft)	7/10/1996

[a] Elevation above mean sea level
[b] National Park Service
[c] U.S. Forest Service

4.3.1 Craters of the Moon National Monument IMPROVE site

The Craters of the Moon IMPROVE site shown in Figure 4-4, is located near the Craters of the Moon National Monument Visitor Center. Site elevation is 1,817 m (5,960 ft).

Figure 4-4 Craters of the Moon IMPROVE monitoring site

4.3.2 Hells Canyon Wilderness Area IMPROVE site

The IMPROVE site shown in figure 4-5, which collects data from the Hells Canyon Wilderness, is 15 km (10 mi) south of the southernmost wilderness boundary. Site elevation is 625 m (2,050 ft). It is near a hilltop west of Oxbow Dam on the Snake River, about 350 ft above river level, downstream from the dam.

Figure 4-5 Hells Canyon Wilderness IMPROVE monitoring site

4.3.3 Sawtooth Wilderness Area IMPROVE site

The IMPROVE site shown in figure 4-6, which collects data from the Sawtooth Wilderness, is located in the Stanley Basin 4 km outside of the northeastern wilderness boundary, at the U.S. Forest Service Stanley Warehouse, elevation 1,980 m (6,494 ft). It is 60 to 80 m (approximately 200 ft) lower in elevation than the wilderness boundary.

Figure 4-6 Sawtooth Wilderness Area IMPROVE monitoring site

4.3.4 Selway-Bitterroot Wilderness Areas IMPROVE site

The IMPROVE site shown in Figure 4-7, which collects data from the Selway-Bitterroot Wilderness Area (and also the Anaconda-Pintler Wilderness Area), is located near the town of Sula, Montana in the valley of the East Fork of the Bitterroot River. The site is 20 km east of the eastern Selway-Bitterroot Wilderness boundary and 17 km west of the western Anaconda-Pintler Wilderness boundary. The IMPROVE site is near the top of Sula Peak at an elevation of 1,903 m (6,242 ft).

Figure 4-7 Selway-Bitterroot Monitoring Site

4.3.5 Yellowstone National Park IMPROVE site

The IMPROVE site shown in Figure 4-8, which collects data from Yellowstone National Park (and also Grand Teton National Park, Teton Wilderness Area, and Red Rocks Lake Wilderness Area). It is located close to the north shore of Yellowstone Lake in the center of Yellowstone National Park. The site elevation is 2,425 m (7,954 ft), 67 m (220 ft) above the lake elevation of 2,358 m (7,733 ft).

Figure 4-8 Yellowstone National Park Monitoring Site

4.4 Idaho's Commitments for Supporting the IMPROVE Monitoring Network for Regional Haze Monitoring

Idaho commits to continue utilizing the IMPROVE monitoring data to track any visibility improvements over time in order to determine if reasonable progress is being made. Idaho commits to continue developing updated emission inventories sufficient to allow for the tracking of any changes in emissions level that are attributable to adopted haze reduction strategies. These monitoring and emissions data will be available for electronic processing in future modeling or other emission tracking processes. Information collected from the monitoring system and emission inventory work will be made available to the public on a periodic basis.

Idaho will depend on the IMPROVE monitoring program to collect and report aerosol monitoring data for reasonable progress tracking as specified in the Regional Haze Rule (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 program during the 2000-04 RHR baseline period. Technical analyses and reasonable progress goals in RHR plans are based on data from these sites. The state must be notified of and agree to any changes in the IMPROVE program 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 reasonable progress goals is the responsibility of EPA; therefore, has no plans to provide resources for these sites.

Idaho depends on six IMPROVE program-operated monitoring sites, which are shown on the WRAP's TSS Web site (http://vista.cira.colostate.edu/TSS/Tools/AOI.aspx) as of October 25, 2007 to track changes in visibility and determine whether it constitutes "reasonable progress" as required by the Regional Haze Rule. Idaho will depend on the routine timely reporting of monitoring data by the IMPROVE program, for the sites needed for tracking reasonable progress, to the Visibility Information Exchange Web System (VIEWS) and TSS. The state notes that the resources to ensure data reporting from these long-term tracking monitoring sites is the responsibility of EPA, and the state of Idaho has no plans to provide resources for this effort.

Idaho has prepared and commits to updating statewide emissions inventories periodically. The updates will be used for state tracking of emission changes, trends, and input into WRAP's evaluation of whether reasonable progress goals are being achieved and other regional analyses. The inventories will be updated every three years on the same schedule as the triennial reporting required by EPA's Consolidated Emissions Reporting Rule. Chapter 8 of this plan summarizes the emissions by pollutant and source category.

Idaho will continue to use the WRAP-sponsored Emissions Data Management System and Fire Emissions Tracking System to store and access emissions data. The state will also depend upon and participate in additional periodic collective emissions inventory efforts by the WRAP. Further, the state will continue to depend on and use the capabilities of the WRAP-sponsored Regional Modeling Center (RMC) 5 to simulate the air quality impacts of emissions for haze planning purposes. The state notes that the means to ensure data preparation, storage, and analysis by the state and WRAP require adequate ongoing resources, which are the responsibility of EPA.

Idaho will track data related to haze plan implementation, as required by the Regional Haze Rule, for sources for which the state has regulatory authority. Idaho will also depend on the IMPROVE program for monitoring data and on WRAP-sponsored collection and analysis efforts and data support systems for emissions inventory data.

Chapter 5. Basic Plan Elements

In order to better understand the information presented in the document, this chapter describes the basic plan elements and key concepts contained in the Idaho Regional Haze Plan.

5.1 Natural Sources of Visibility Impairment

Natural sources of visibility impairment include anything not directly attributed to human-caused emissions of visibility-impairing pollutants. Natural events (e.g., windblown dust, wildfire, volcanic activity, biogenic emissions) also introduce pollutants that contribute to haze in the atmosphere. Natural visibility conditions are not constant; they vary with changing natural processes throughout the year. Specific natural events can lead to high short-term concentrations of visibility-impairing particulate matter and its precursors. Therefore, natural visibility conditions, for the purpose of the Idaho regional haze program, are represented by a long-term average of conditions expected to occur in the absence of emissions normally attributed to human activities. Natural visibility conditions reflect contemporary vegetated landscape, land-use patterns, and meteorological/climatic conditions. Natural visibility is expressed as an average deciview level for the 20% of days with the best visibility and 20% of days with the worst visibility at each Class I area for the baseline period of 2000-2004.

Natural sources contribute to visibility impairment but natural emissions cannot be realistically controlled or prevented by the states and therefore are beyond the scope of this planning document. Current methods of analysis of monitoring data from the IMPROVE program (see Chapter 4) do not provide a distinction between natural and anthropogenic emissions.

5.2 Human-Caused Sources of Visibility Impairment

Human-caused (anthropogenic) sources of visibility impairment include anything directly attributable to human-caused activities that produce emissions of visibility-impairing pollutants. Some examples include transportation, agriculture activities, mining operations, and fuel combustion. Anthropogenic visibility conditions are not constant; they vary with changing human activities throughout the year. Following are the two categories of anthropogenic emissions:

> 1) “State Origin Anthropogenic” (SOA) emissions are anthropogenic emissions that are generated or originate within the boundaries of a State.
>
> 2) International Origin Anthropogenic (IOA) emissions include those that are generated outside of the United States of America but are transported into a State.

Although anthropogenic sources contribute to visibility impairment, IOA emissions cannot be regulated, controlled, or prevented by the states and therefore are beyond the scope of this planning document. Any reductions in IOA emissions would likely fall under the purview of the U.S. EPA through international diplomatic activities.

5.3 Deciview and Other Measures of Visibility

Each IMPROVE monitor collects particulate concentration data that are converted into reconstructed light extinction through a complex calculation using the IMPROVE equation (see Technical Support Documents for any Class I area). Reconstructed light extinction (denoted as b_{ext}) is expressed in units of inverse megameters (1/Mm or Mm^{-1}); However, the Regional Haze Rule requires the 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 one-deciview change in the haze index is likely humanly perceptible under ideal conditions regardless of background visibility conditions. The relationships among extinction (Mm-1), haze index (dv) and visual range (mi) are indicated by Figure 5-1.

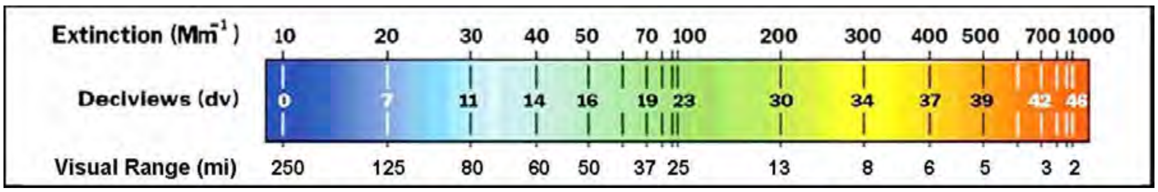


Figure 5-1. Relationships Among Various Measures of Visibility

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

5.4 Baseline and Current Conditions

The Regional Haze Rule requires the calculation of baseline conditions for each Class I area. For each area, te baseline conditions is defined as the five-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 this first regional haze SIP, the baseline conditions are the reference point against which visibility improvement is tracked. For subsequent regional haze (RH) SIP updates (in the year 2018 and every 10 years thereafter), baseline conditions will be 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 five years of monitored data available. This value will be revised at the time of each periodic SIP revision, and will be used to illustrate:

(1) The amount of progress made since the last SIP revision.

(2) The amount of progress made from the baseline period.

5.5 Natural Conditions

The natural condition for each Class I area is defined as the level of visibility (in deciviews) for the most-impaired (20% worst) days and the least-impaired (20 % best) days that would exist if there were no manmade impairment. Since no visibility monitoring data exists from the pre-manmade impairment period, the EPA developed guidance on how to estimate natural conditions (the EPA document *Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule*). Generally, for each Class I area in the western United States, the natural condition for the worst days is determined by adding two standard deviations to the annual average of IMPROVE monitoring data. Similarly, the natural condition for the best days is determined by subtracting two standard deviations from the annual average of the IMPROVE monitoring data.

5.6 Reasonable Progress Goals

For each Class I area, the State must establish goals (measured in deciviews) that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals (RPGs) are interim goals that represent incremental visibility improvement over time for the most-impaired (20% worst) days and no degradation in visibility for the least-impaired (20% best) days. The State has flexibility in establishing different RPGs for each Class I area.

In establishing the RPG, the State must consider four factors:

1 the costs of compliance,

2 the time necessary for compliance,

3 the energy and non-air quality environmental impacts of compliance, and

4 the remaining useful life of any potentially affected sources.

States must demonstrate how these factors were taken into consideration in selecting the goal for each Class I area.

5.7 Uniform Rate of Progress

The uniform rate of progress (URP) is the calculation of the slope of the line between baseline visibility conditions and natural visibility conditions over the 60-year period. In this initial SIP submittal, the first benchmark is the deciview level that should be achieved in 2018, at the end of the first planning period, indicated in blue below (Figure 5-2).

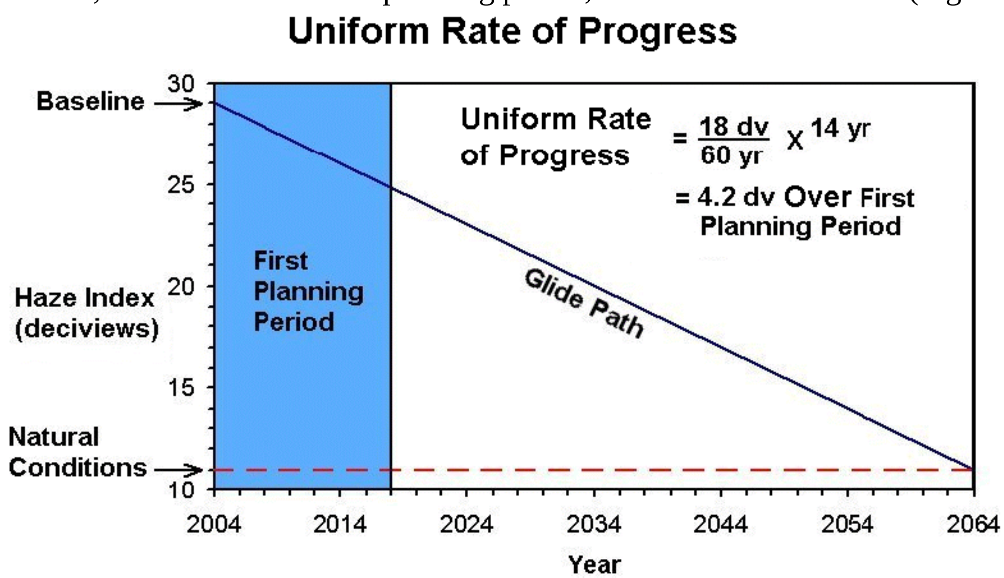


Figure 5-2. Example of How Uniform Rate of Progress is Determined

To calculate the uniform rate of progress:

- Compare baseline conditions to natural conditions. The difference between these two represents the amount of progress needed to reach natural visibility conditions. In this example, the State has determined that the baseline for the 20% worst days for the Class I area is 29 dv and estimated that natural background is 11 dv, a difference of 18 dv.
- Calculate the annual average visibility improvement needed to reach natural conditions by 2064 by dividing the total amount of improvement needed by 60 years (the period between 2004 and 2064). In this example, this value is 0.3 dv/yr.
- Multiply the annual average visibility improvement needed by the number of years in the first planning period (the period from 2004 until 2018). In this example, this value is 4.2 dv. This is the uniform rate of progress that would be needed during the first planning period to attain natural visibility conditions by 2064.

The URP is not a presumptive target. When establishing RPGs, the State may determine RPGs at greater, lesser, or equivalent visibility improvement than the URP would dictate. In cases where the RPG results in less improvement in 2018 than the URP, the State must use the statutorily mandated four factors listed above to demonstrate why the URP is not achievable.

For the 20% worst days, the URP is expressed in deciviews per year (i.e., slope of the glide path) as determined by the following equation:

URP = [Baseline Condition - Natural Condition] / 60 years

The 2018 Progress Goal (i.e., the amount of reduction necessary for the first planning period) is determined by multiplying the URP by the number of years in the first planning period.

2018 Progress Goal = [Uniform ROP] x [14 years]

The 14 years comprising the first planning period includes the four years between the baseline and the SIP submittal date plus the standard 10-year planning period.

5.8 Long-Term Strategy

The Regional Haze Rule also requires States to submit a long-term strategy that includes enforceable measures to achieve reasonable progress goals. The long-term strategy must identify all anthropogenic sources inside the State that are affecting Class I areas both inside and outside the State. The first long-term strategy will cover 10 to 15 years, with reassessment and revision of those goals and strategies in 2018 and every 10 years thereafter. In developing the long term strategy, the State can take into account emission reductions due to ongoing air pollution control programs (such as implementation of programs to meet the national ambient air quality standards for particulate matter). It may be possible to demonstrate reasonable progress based on these emission reductions alone, particularly for the first period of the long-term strategy. The following additional factors must be considered in developing the long-term strategy:

- Measures to mitigate the impact of construction activities;
- Emission limitations and schedules for compliance to achieve the RPG;
- Source retirement and replacement schedules;
- Smoke management techniques for agricultural and forestry burning, including plans to reduce smoke impacts;
- Enforceability of emission limitations and control measures; and

- The anticipated net affect on visibility due to projected changes in point, area, and mobile source emissions over the period addressed of the long term strategy.

5.9 BART

The RPGs, the long-term strategy, and BART are the three main elements of a Regional Haze Plan. Best Available Retrofit Technology (BART) requirements apply to certain older industrial facilities that began operating before national rules were adopted in 1977 to prevent new facilities from causing visibility impairment. BART applies to facilities built between 1962 and 1977, having potential emissions greater than 250 tons per year, and which fall into one of 26 specific source categories. These facilities must be evaluated to see how much they contribute to regional haze and if retrofitting with controls are feasible.

In determining BART controls, the State can take into account several factors, including the existing control technology in place at the source, the costs of compliance, energy and nonair environmental impacts of compliance, remaining useful life of the source, and the degree of visibility improvement that is reasonably anticipated from the use of such technology.

Chapter 6. Baseline and Natural Visibility Conditions and Uniform Rate of Progress

6.1 Baseline and Natural Condition background

This chapter describes the Baseline and Natural Conditions as required by 40 CFR 51.308(d)(2)(i) and 40 CFR 51 308(d)(2)(iii). When analyzing present and future visibility conditions, there are three key concepts to take into consideration. These concepts include the baseline conditions, the natural conditions, and the reasonable progress goal (RPG) and uniform rate of progress (URP).

In determining the baseline conditions, IMPROVE monitoring data is used to determine the 20% least impaired days (20% best) and the 20% most impaired days (20% worst). Baseline conditions are established for both the best and worst days. IMPROVE monitoring data segregated into the 20% best and worst days for the years 2000 through 2004 are averaged to establish the baseline or starting point for regional haze improvement. Baseline conditions are presented in the metric of deciviews. These requirements are laid out in 40 CFR 51.308(d)(2) under baseline conditions.

In defining natural visibility for each of the Class I areas, Idaho is using the default conditions as described in natural visibility background as defined in *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program*, EPA-45/B-03-0005, September 2003. The report draws on information from numerous sources and identifies estimates for the natural levels of sulfates, organic carbon, elemental carbon, nitrate, fine particles, and coarse particles for the eastern and western regions of the United States.

The same average annual natural background conditions based upon concentration levels are assumed for all western Class I areas. Although each Class I area in the West is considered to have the same natural concentrations of visibility-impairing constituents, the natural conditions vary slightly due to different humidity levels and altitudes of the Class I areas. The frequency distributions of daily calculated deciviews for western Class I areas has been shown to follow a normal distribution curve. Natural background for the 20% worst days is estimated by assuming that fine particle concentrations for natural background are normally distributed and the 90th percentile of the annual distribution represents natural background visibility on the 20% worst days.

The line between the baseline conditions and the project natural conditions represents the glide slope for analyzing progress on visibility improvements for a given Regional Haze SIP planning period. To calculate the total improvement needed by the end date of 2064, the natural conditions are subtracted from the baseline. To identify the annual improvement that follows the glide slope, the total needed improvement is divided by the 60-year life span of Regional Haze Rule which will end in 2064. The uniform rate of progress (URP) is the annual improvement rate times the number of years in the period under each Regional Haze SIP. Most SIPs will cover a 10-year planning period with the exception of the first SIP which covers a 14-year span (2004-2018) (See Chapter 5 Figure 5-2). The URP is used as an indicator to determine whether the rate of improvement, if maintained steadily, will reach the end goal in 2064. The Regional Haze Rule, 40 CFR 51.308(d)(1)(ii), requires the state to provide an assessment of the number of years it will take to reach natural conditions if the rate of is slower than the URP.

To illustrate this concept, Table 6-1 takes a closer look at the Craters of the Moon Class I area. The IMROVE data showing the average 20% best and 20% worst days, with the exception of 2000 since monitoring data wasn't available for that year.

Table 6-1. Base Year 20% Best and Worst Days for Craters of the Moon National Monument

Year	Most Impaired Days	Least Impaired Days
2000	na	na
2001	14.3	4.8
2002	14.9	4.9
2003	14.0	3.3
2004	12.8	4.3
Baseline Average Deciview	**14.00**	**4.31**

Table 6-2 is a summary of baseline visibility, natural conditions, and the URP glide path covering the first planning period ending in 2018.

Table 6-2. 20% Best and Worst Days Baseline, Natural Conditions, and Uniform Progress Goal for Idaho Class I Areas

Idaho Class I Area	20% Worst Days				20% Best Days
	2000-04 Baseline [deciview]	2018 URP Goal [deciview]	2018 Reduction Needed [deciview]	2064 Natural Conditions [deciview]	2000-04 Baseline [deciview]
Caters of the Moon National Monument	14.00	12.49	1.51	7.53	4.31
Hells Canyon Wilderness Area	18.55	16.17	2.38	8.32	5.5
Sawtooth Wilderness Area	13.78	12.06	1.72	6.42	4.0
Selway-Bitterroot Wilderness Area	13.4	12.02	1.39	7.4	2.6
Yellowstone National Park	11.76	10.52	1.24	6.4	2.6

The following sections in this chapter show the URP for each Class I Area, grouped by the IMPROVE monitoring site that represents each area. Idaho is fortunate in having an IMPROVE monitoring site for each Class I area.

Although the Regional Haze rule only requires states to identify the baseline and natural conditions in deciviews, it is helpful to understand the individual contributors to visibility impairment and the difference between their contributions on the 20% best and 20% worst days. This will assist in understanding the contributions and begin to link to sources which will be investigated and analyzed in determining long term strategies and assist in setting reasonable progress goals.

6.2 Baseline, Natural Conditions for Craters of the Moon

Craters of the Moon National Monument has its own IMPROVE monitoring site located within the Monument. Figure 6-1 shows the URP for the Craters of the Moon National Monument on the 20% worst days and the baseline for the 20% best days. Based on IMPROVE monitoring data, the baseline is 14dv for the 20% worst days with a natural condition of 7.53dv. The baseline for the 20% best days is 4.31dv. The first planning period would need a 1.51dv improvement in order to reach 12.49dv by the year 2018. Overall, a reduction of 6.47dv will be needed to reach natural conditions in the year 2064.

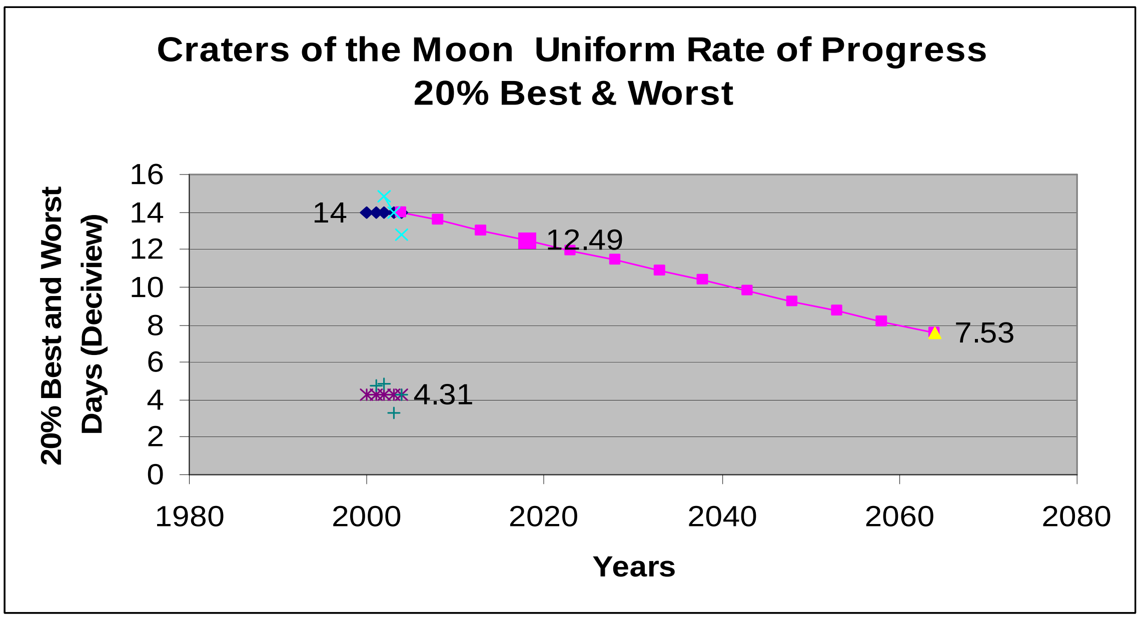


Figure 6-1. Craters of the Moon National Monument, Uniform Rate of Progress

6.3 Hells Canyon Wilderness Area

Hells Canyon Wilderness Area has an IMPROVE monitoring site located within the wilderness area near Oxbow Dam. Figure 6-2 shows the URP for the Hells Canyon Wilderness for the 20% days and the baseline for the 20% best days. Based on IMPROVE monitoring data, baseline is 18.55dv with a natural condition of 8.32dv. The baseline for the 20% best days is 5.52dv. The first planning period would need a 2.38dv improvement in order reach the uniform rate of progress of 16.17dv by the year 2018. Overall, a reduction of 10.23dv will be needed to reach natural conditions by 2064. Figure 6-3 digitally adjusted to shows the difference in visibility at Hells Canyon Wilderness between baseline and natural conditions.

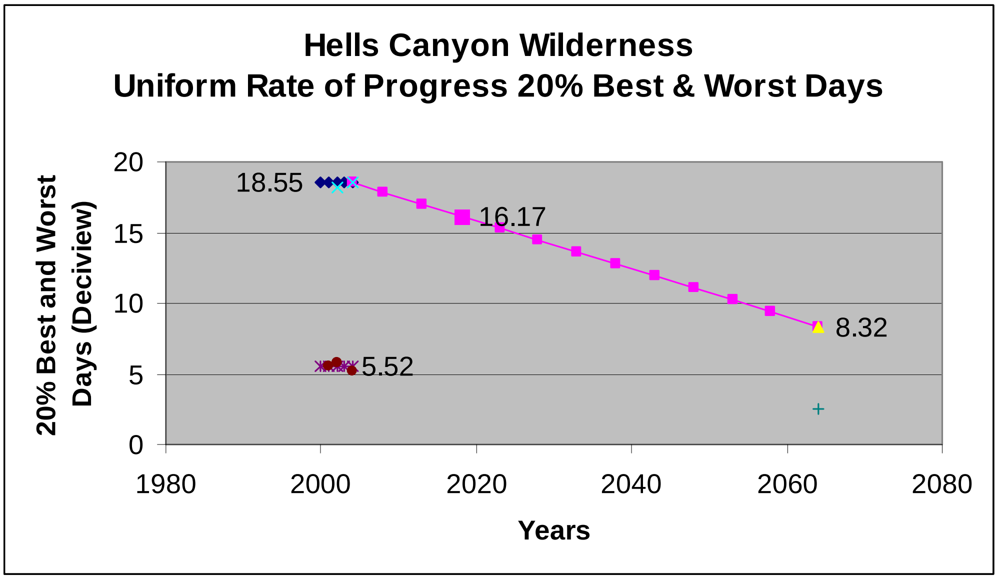


Figure 6-2 Hells Canyon Wilderness Uniform Rate of Progress

Figure 6-3 Hells Canyon Wilderness Photo of Baseline vs. Natural Condition

6.4 Sawtooth Wilderness

The Sawtooth Wilderness shown in Figure 6-5 has its own IMPROVE monitoring site located within the wilderness. Figure 6-4 shows the uniform rate of progress for the Sawtooth Wilderness on the 20% worst days and the baseline for the 20% best days. Based on IMPROVE monitoring data, the baseline is 13.78 dv for the 20% worst days with a natural condition of 6.42dv. The baseline for the 20% best days is 3.99 dv. The first planning period would need a 1.72dv improvement in order to reach the 12.06 dv improvement by the year 2018. Overall, a reduction of 7.36dv will be needed to reach natural conditions in the year 2064. Figure 6-5 shows the difference in visibility at Sawtooth Wilderness between baseline and natural conditions.

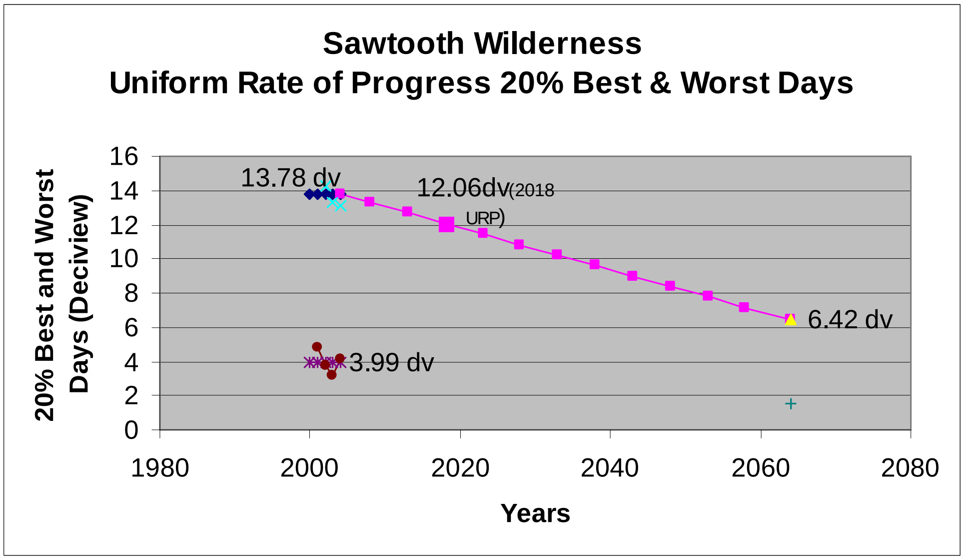


Figure 6-4 Sawtooth Wilderness Uniform Rate of Progress

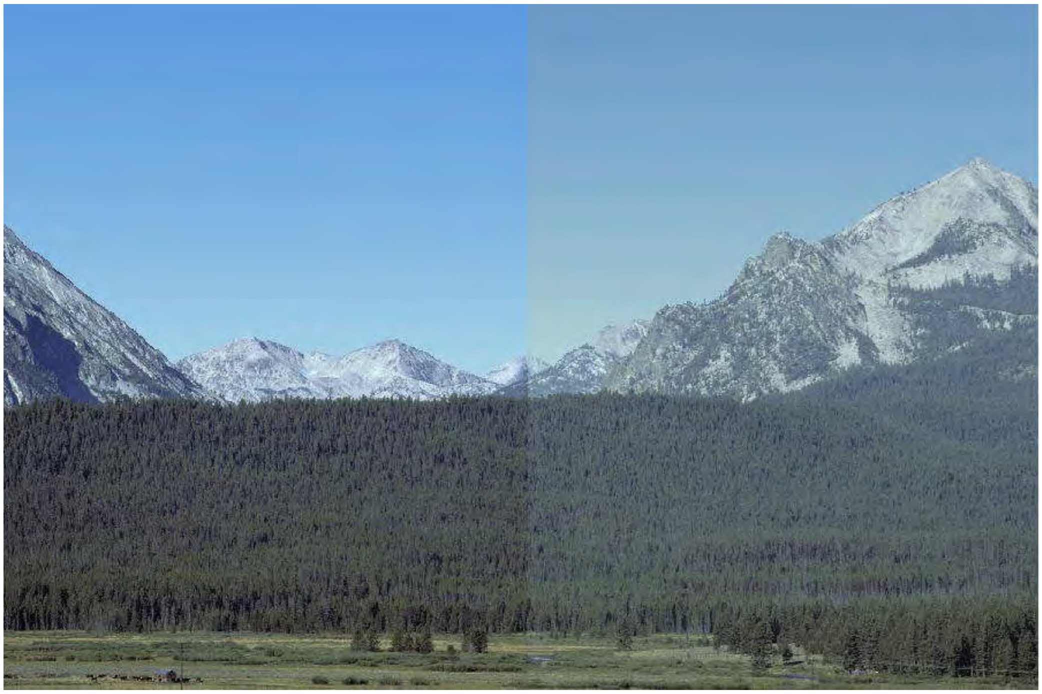


Figure 6-5 Sawtooth Wilderness Photo– Baseline vs. Natural

6.5 Selway-Bitterroot Wilderness Area

The IMPROVE site representing the Selway Bitterroot and Anaconda-Pintler Wilderness Areas is located 20km east of the Wilderness near the town of Sula Montana in the valley of the East Fork of the Bitterroot River. Figure 6-6 shows the uniform rate of progress for the Sawtooth Wilderness on the 20% worst days and the baseline for the 20% best days. Based on IMPROVE monitoring data, the baseline is 13.41dv for the 20% worst days with a natural condition of 7.43dv. The baseline for the 20% best days is 2.58 dv. The first planning period would need a 1.39dv improvement in order to reach the 12.02dv improvement by the year 2018. Overall, a reduction of 7.36dv will be needed to reach natural conditions in the year 2064. Figure 6-7 shows the difference in visibility at Selway Wilderness between baseline and natural conditions.

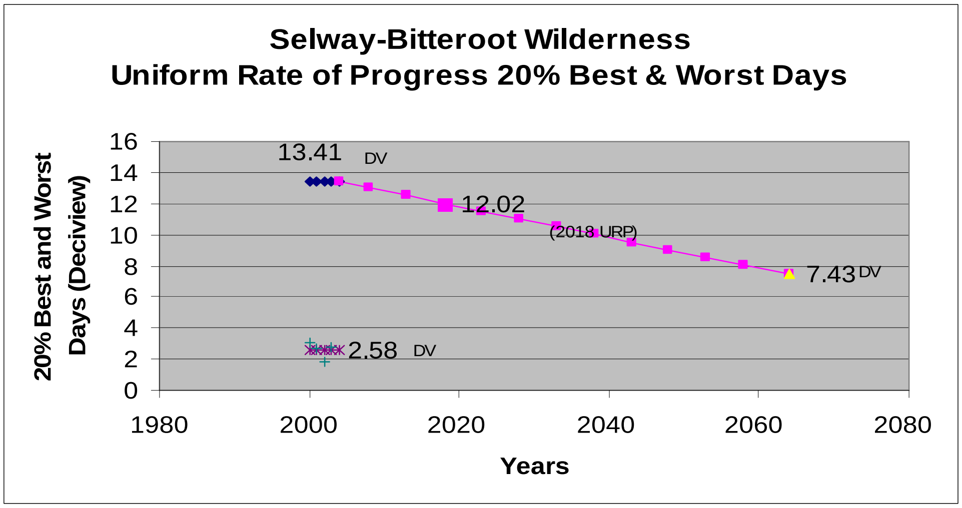


Figure 6-6 Selway-Bitterroot Wilderness Uniform Rate of Progress

Figure 6-7 Selway Wilderness Photo of Natural Conditions vs. baseline

6.6 Yellowstone National Park

The IMPROVE monitoring site representing Yellowstone National Park is located close to the north shore of Yellowstone Lake in the center of the National Park. Figure 6-8 shows the uniform rate of progress for Yellowstone National Park on the 20% worst days and the baseline for the 20% best days. Based on IMPROVE monitoring data, the baseline is 11.76dv for the 20% worst days with a natural condition of 6.4dv. The baseline for the 20% best days is 2.58 dv. The first planning period would need a 1.24dv improvement in order to reach the 10.52dv improvement by the year 2018. Overall, a reduction of 5.32dv will be needed to reach natural conditions in the year 2064.

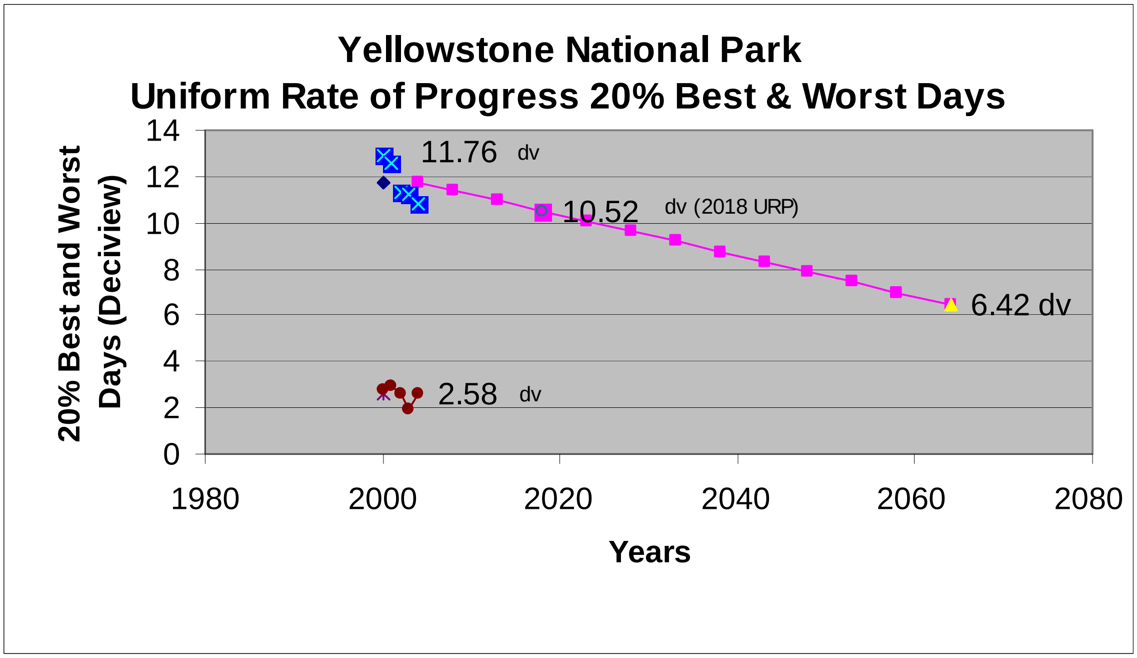


Figure 6-8 Yellowstone National Park Uniform Rate of Progress

Chapter 7. Pollutants Causing Visibility Impairment in Idaho Class I areas

7.1 Overview

This Chapter will look at the pollutants causing visibility impairment in each of the Class I areas in Idaho. As mentioned in Chapter 4, there are several light-impairing pollutants, each with a different impact on visibility. Some pollutants such as elemental carbon absorb light while other pollutants cause light to bounce or refract. Light that the human eye can see is composed of red, green, and blue, with each color having a different wave length. The size of the pollution particle can have a dramatic effect on length of the light waves. For a full discussion on how different pollutants cause visibility impairment please refer back to Chapter 5.

The primary focus of this chapter is to identify what pollutants are causing visibility impairment and the seasonal variance in pollutant concentrations. It is important to look at both the concentration levels (expressed in micrograms per meter [ug/m$^{3]}$) and the visibility impairment (expressed in inverse megameters [Mm^{-1}] or deciview [dv]). The distinction between concentrations and visibility impairment is important for each pollutant because reducing concentration levels of the various pollutants can result in very different effects on visibility improvement. Reductions in the concentrations of ammonium nitrate and ammonium sulfate will have greater impact on visibility than equal reductions in the concentration of coarse matter. As described in chapter 5, this is the result of different pollutants and different particle sizes having different effects on light impairment.

It is important to look at the seasonal nature of pollutant levels because it can help trace pollutants back to source activities that may be causing the pollution. As an example, organic mass carbon is typically higher in the summer months due to wildfire. If organic carbon is relatively high outside the summer months, there may be sources other than wildfire contributing to visibility impairment from organic carbon.

The Regional Haze Rule requires that reasonable progress goals be established for each Class I area (see Chapter 3 and 6 for a full description of each Class I area). The reasonable progress goals "must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period." This chapter will look at both the 20% best (least impaired) and 20% worst (most impaired) visibility days for each Class I area. As part of establishing reasonable progress goals, states are to take into consideration the uniform rate of progress (URP) from the baseline to the natural conditions based on a 60-year period starting in 2004 and ending in 2064. Graphs depicting the uniform rate of progress are included in this section but will be further discussed in chapter 11 as part of establishing reasonable progress goals. Although the reasonable progress goals are to be established in deciviews (dv), for simplicity this chapter will primarily use inverse megameters and not provide the mathematical conversion to deciviews.

This chapter begins with a look at all of Idaho's Class I areas collectively and then each Class I area separately. The IMPROVE monitoring sites discussed in chapter 4 are the sources of the data used. Throughout this chapter and the remainder of the document, the colors identified in Table 7-1 will be used to represent the corresponding pollutants in graphs and tables. Throughout the remainder of this document the particulate aerosols of ammonium sulfate and ammonium nitrate will be referred to as sulfate and nitrate.

Table 7-1 Color Key for Visibility Impairing Pollutants

	Pollutant	Abbreviation	IMPROVE Abbreviation
(yellow)	Ammonium Sulfate	SO4	ammSO3f_bext
(red)	Ammonium Nitrate	NO3	ammNO4f_bext
(green)	Organic Mass Carbon	OMC	omcf_btext
(dark gray)	Elemental Carbon	EC	ecf_btext
(brown)	Fine Soil	Soil	soilf_bext
(light gray)	Coarse Matter	CM	cm_btext
(cyan)	Sea Salt	Sea Salt	Seasalt_btext

Figure 7-1 summarizes the baseline distribution of pollutants at each Class I area in Idaho. The aerosol distribution for each Class I area was averaged over the five-year base period of 2000-2004 to identify the baseline level of pollutants for the 20% worst days as monitored at IMPROVE monitoring sites.

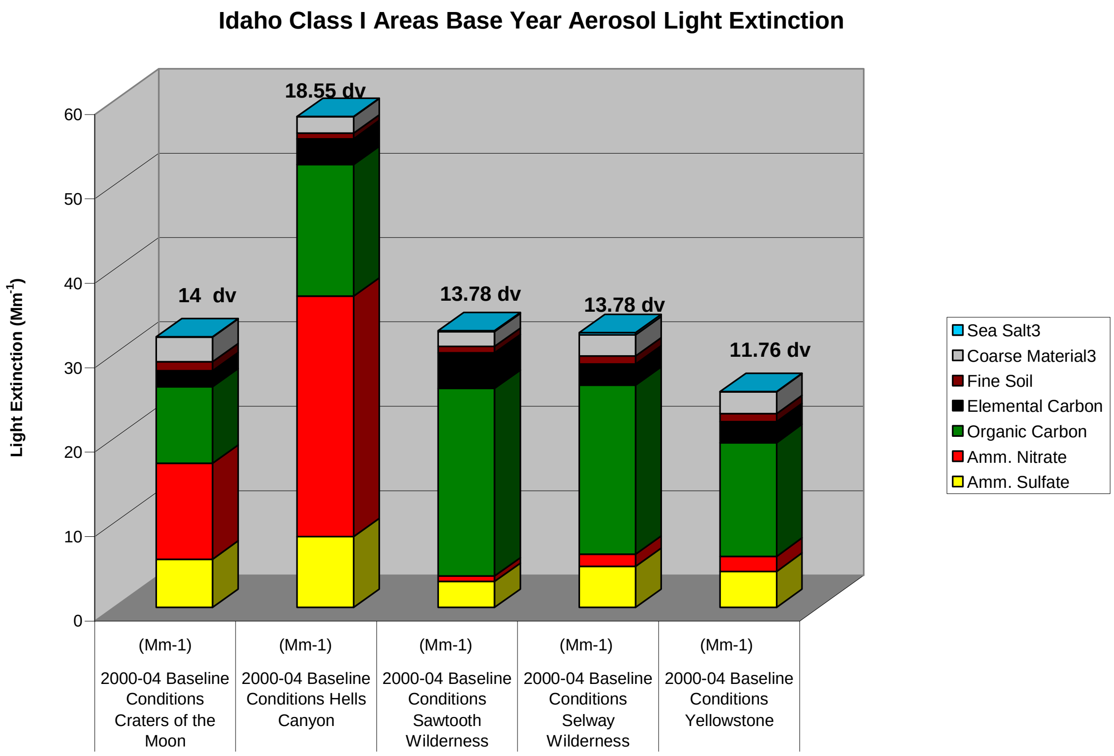


Figure 7-1. Idaho Class I Areas Baseline Aerosol Light Extinction

7.2 Craters of the Moon National Monument

The baseline for Craters of the Moon National Monument is 32.04Mm-1 (Figure 7-1). Along with determining the baseline, it is important to determine whether the aerosol distribution for the year 2002 is representative of the aerosol distribution for the five-year baseline period of 2000-2004. This is important because the emission inventory used to develop the modeling was based on 2002 data. Figure 7-2 shows the greatest contributor to visibility impairment on the 20% worst days at Craters of the Moon in 2002 was NOx at 39% followed by organic mass carbon at 31% and sulfate at 13%.

7.2.1 Craters of the Moon Visibility Impairment 20% Worst Days

Figure 7-2 shows the relative amounts of individual components of the aerosol distribution for the 20% worst days at Craters of the Moon in 2002, based on IMPROVE data.

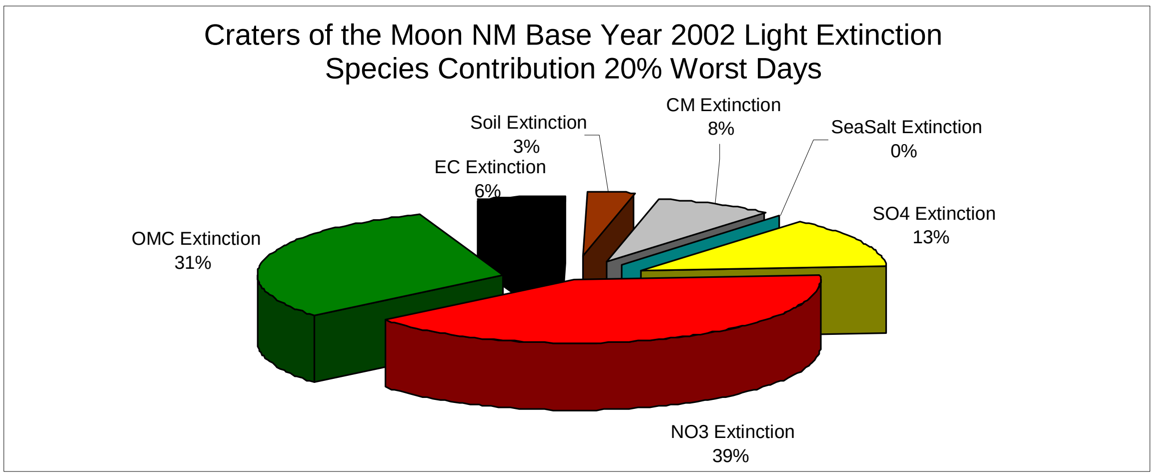


Figure 7-2. Craters of the Moon 2002 Light Extinction on the 20% Worst Days, Individual Components

Figure 7-3 shows that the annual concentrations of the light-impairing pollutants for 2002 don't appear to be out of proportion with their concentrations in other base years. It's also important to look at the actual visibility impairment and not just pollution concentrations because each pollutant has a different light-impairing ability.

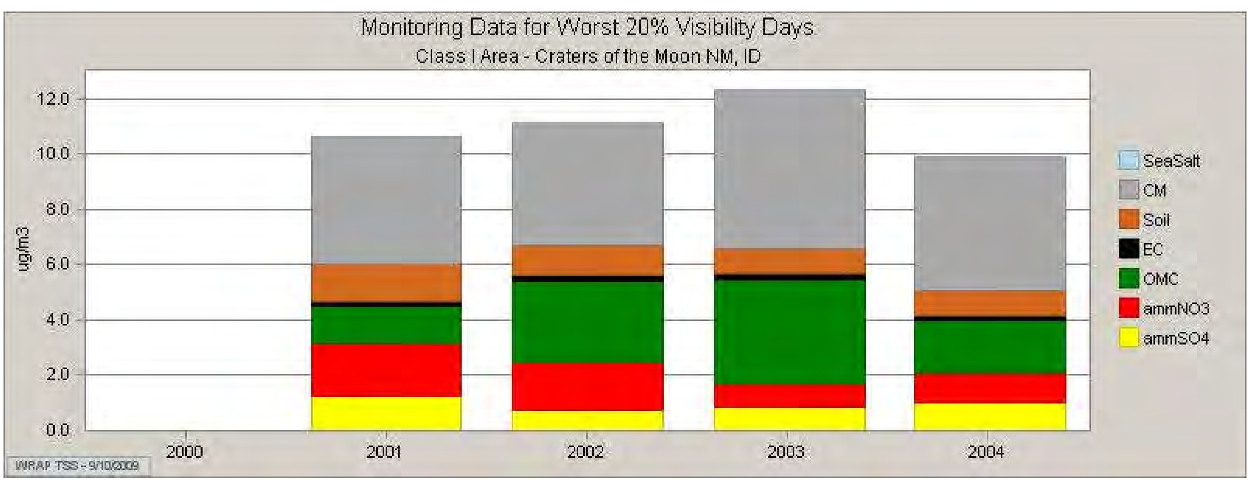


Figure 7-3. Craters of the Moon NM, Annual 2000-2004 Pollutant Species Concentrations 20% Worst Days

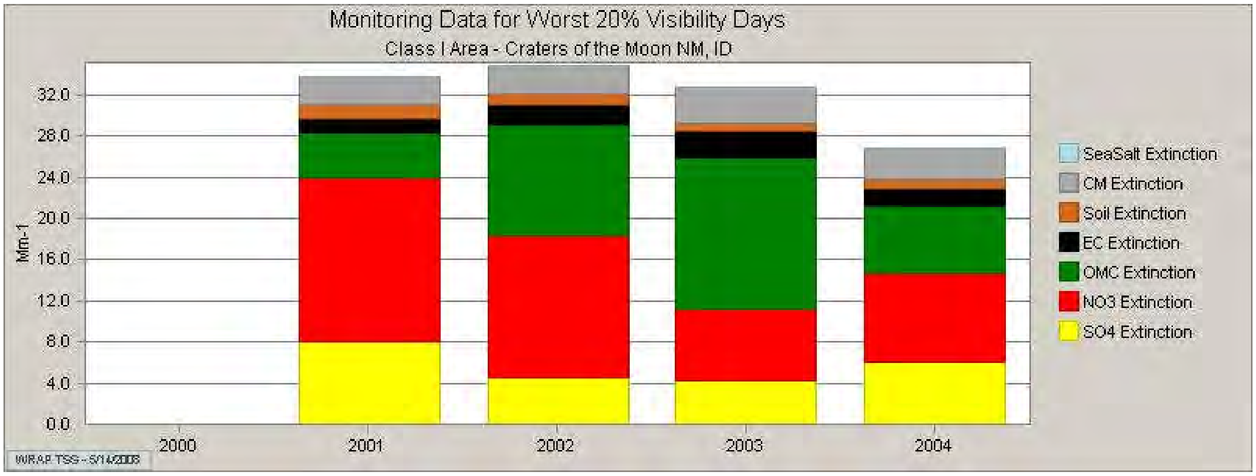


Figure 7-4. Craters of the Moon NM, Annual 2000-2004 Pollutant Species Visibility Impairment 20% Worst Days

Looking at Figures 7-3 and 7-4, it becomes obvious that both nitrate and sulfate had a greater impact on visibility impairment than coarse matter even though coarse matter concentration levels were higher. Small reductions in sulfate and nitrate will have a greater impact on visibility improvement than similar reductions in coarse matter.

Figure 7-5 separates the light-impairing constituents so that variations and trends over the five-year base period can be observed. The organic mass carbon spike in 2003 is probably attributable to wildfire activity. It also appears that sulfate and nitrate had similar trends with larger changes in nitrate. The trend lines for soil, elemental carbon, and coarse matter were rather flat and didn't seem to change much over time. Sea salt is almost negligible and the trend is relatively flat as will be seen in Idaho's other Class I areas.

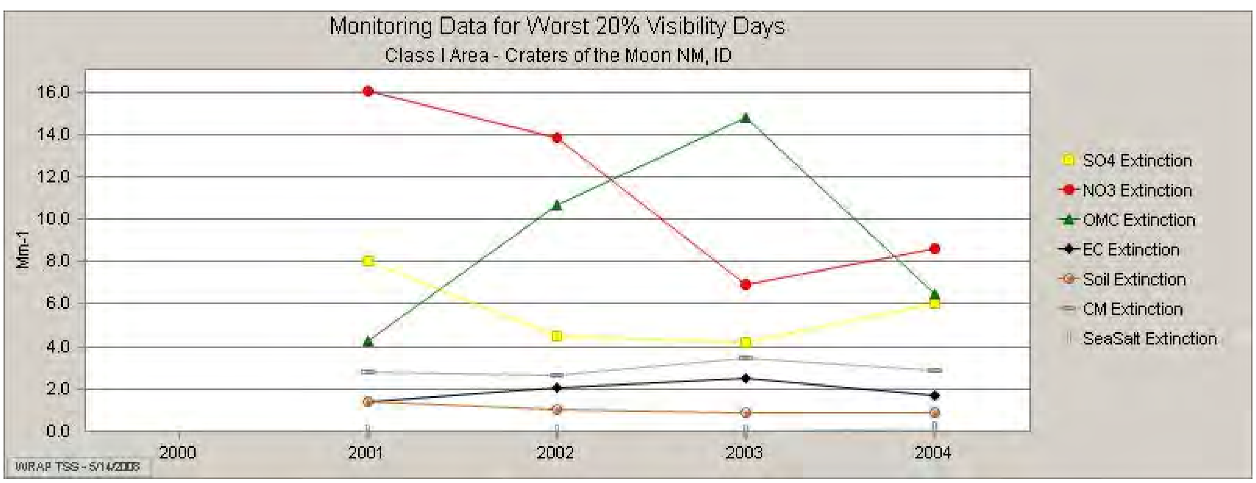


Figure 7-5. Craters of the Moon NM, Annual 2000-2004 Visibility Impairment by Pollutant Species 20% Worst days

Looking at all the IMPROVE monitored days in Figure 7-6, it appears there was a rise in visibility impairment from organic mass carbon during the summer months and from nitrate and sulfate during winter time periods.

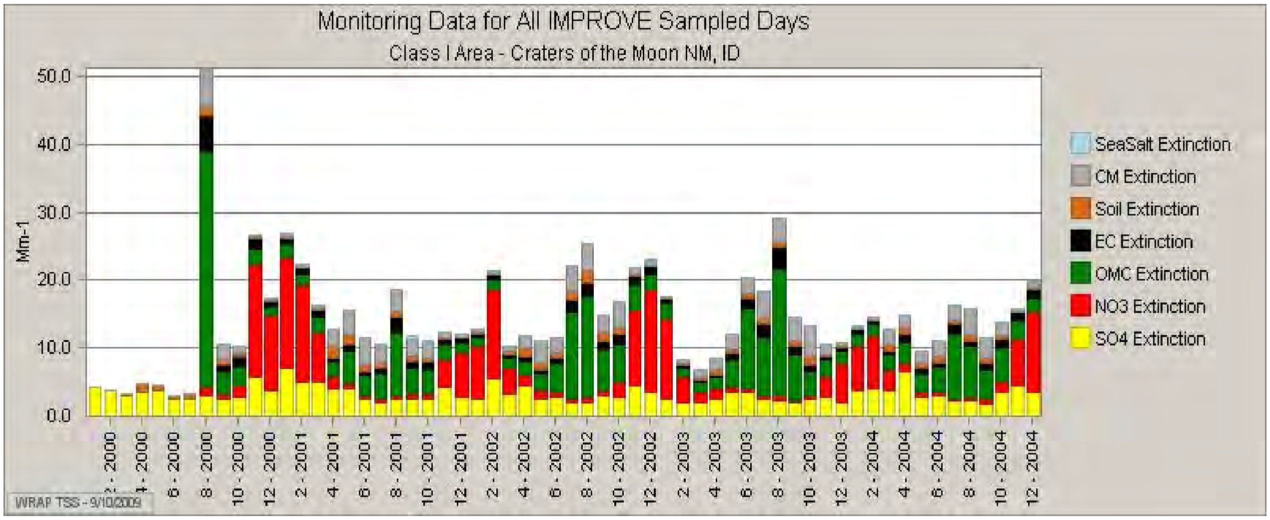


Figure 7-6. Craters of the Moon NM, 2000-2004 Pollutant Species Visibility Impairment, All IMPROVE Monitoring Days

Looking closer at the monthly impacts for just nitrate and sulfate in Figure 7-7, a distinctive pattern of increasing visibility impairment during the winter time period stands out. This observation may lead to identifying sources operating during this time period that may be contributing these two pollutants to the visibility impairment.

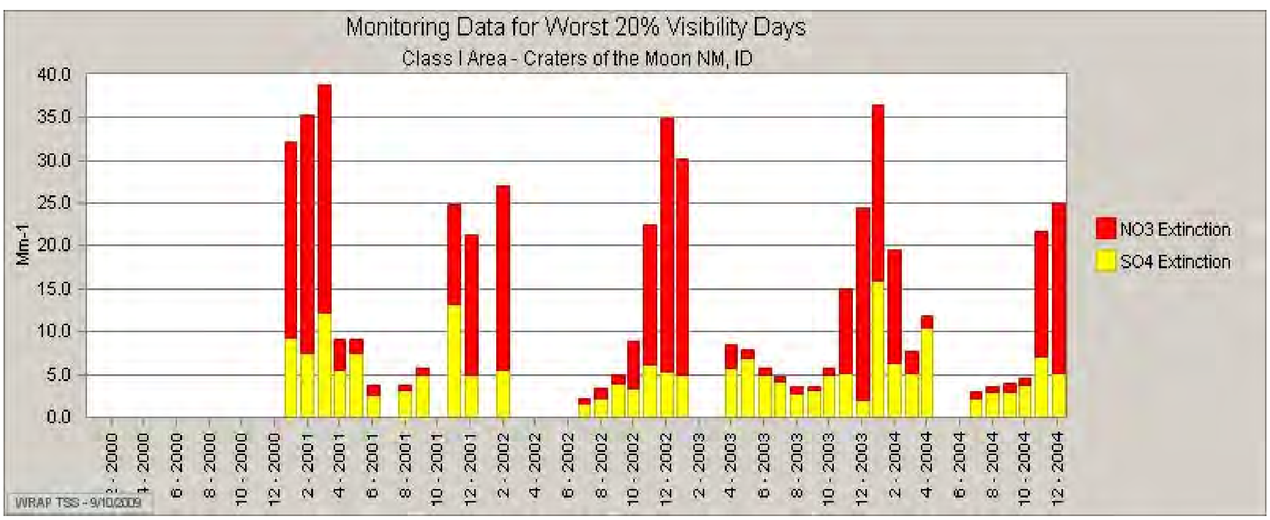


Figure 7-7. Craters of the Moon NM, Monthly 2000-2004 NO3 and SO4 Visibility Impairment 20% Worst Days

7.2.2 Craters of the Moon National Monument Visibility Impairment 20% Best Days

The Regional Haze rule requires states to improve the 20% worst days and not allow additional visibility degradation on the 20% best visibility days. With the exception of 2003, it appears the best and worst 20% days are tracking very similar as shown in Figures 7-7 and 7-8. There was a drop in organic coarse matter in 2003 for the 20% best days, as shown in Figure 7-9. Overall, it appears reductions in sulfate and nitrate would improve both the 20% worst and 20% best days.

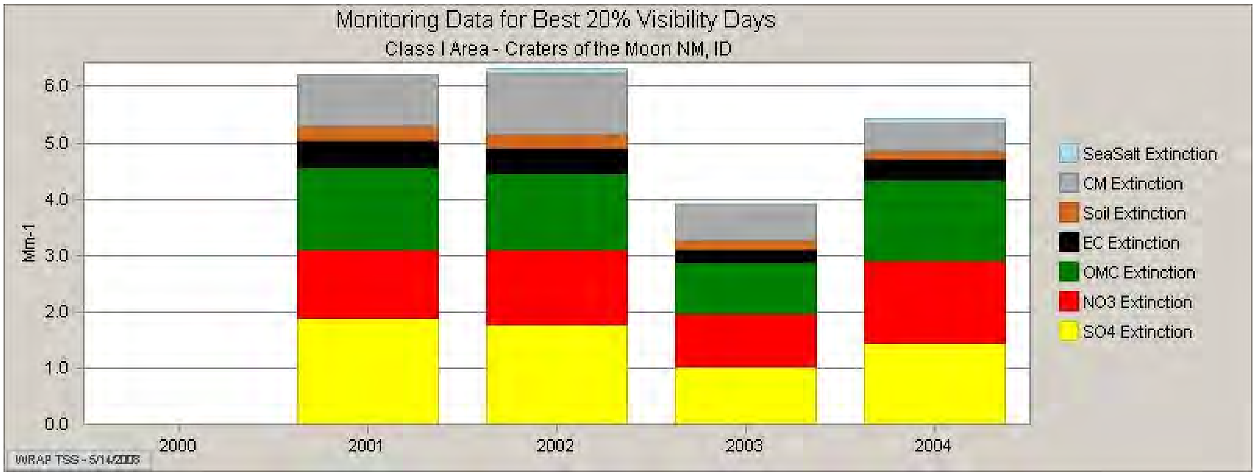


Figure 7-8. Craters of the Moon NM, Annual 2000-2004 Pollutant Species Visibility Impairment 20% Best Days

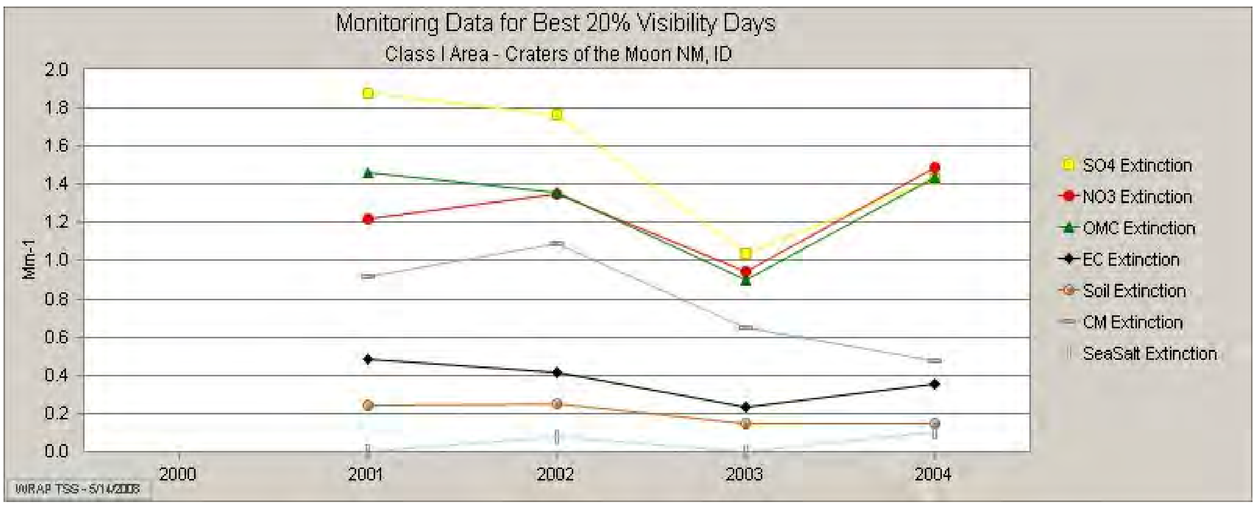


Figure 7-9. Craters of the Moon NM, Annual 2000-2004 Visibility Impairment by Pollutant Species 20% Best days

The left stack bar in figure 7-10 shows the Craters of the Moon National Monument was 32.04Mm-1 for the five-year baseline period. The lavender segment on the top of the center stack bar represents the 1.5-deciview improvement needed to meet the uniform rate of progress. The lavender section on top of the right-hand stack bar represents the 6.5-deciview improvement needed to meet the 2064 goal of natural conditions.

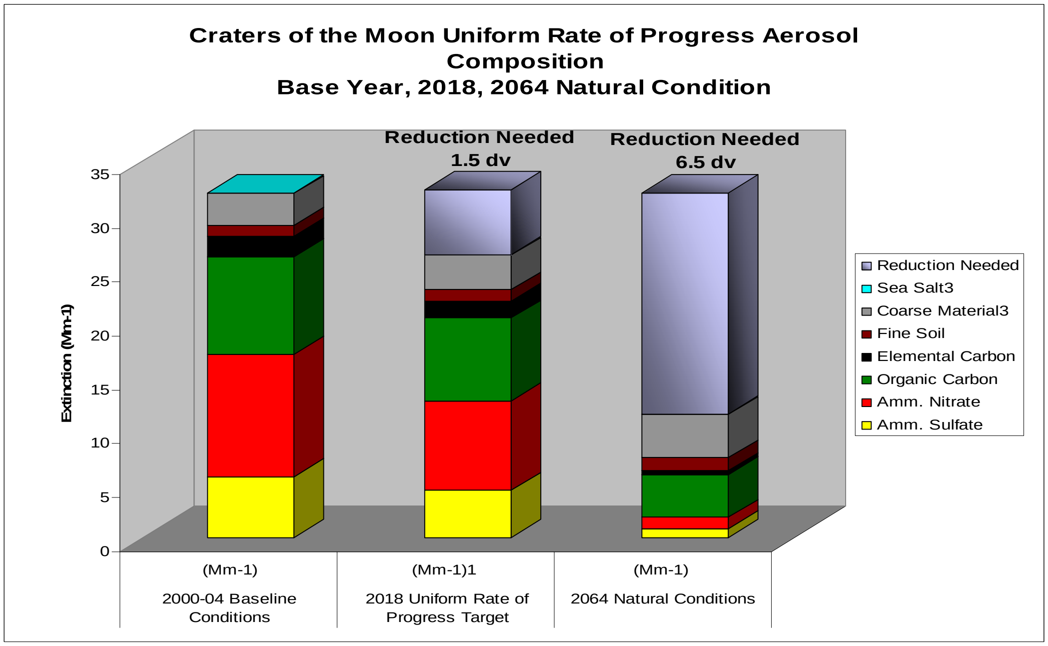


Figure 7-10. Craters of the Moon NM Aerosol Light Extinction, Baseline (2000-2004), 2018 Target, 2064 Goal

7.3 Hells Canyon Wilderness

7.3.1 Hells Canyon 20 Wilderness 20% Worst Days

Based on the 2002 20% worst days from IMPROVE monitoring data, the largest contribution of visibility impairment was from nitrate at 50% followed by organic mass carbon at 27% and sulfate at 14%, as shown in Figure 7-11. Nitrate and sulfate accounted for roughly 64% of light impairment.

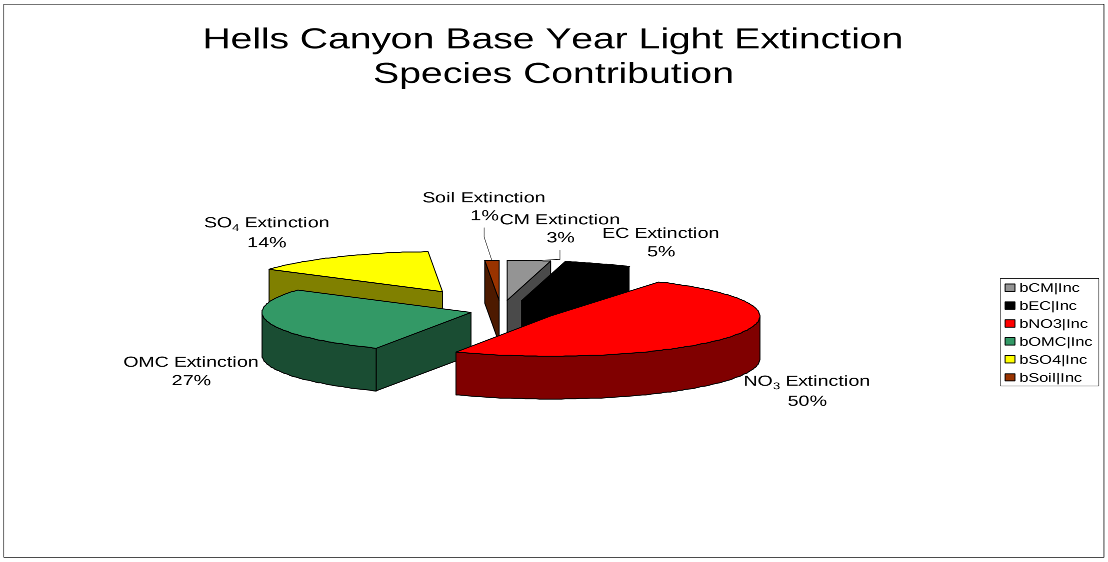


Figure 7-11. Hells Canyon Wilderness, 2002 Light Extinction 20% Worst Days

A review of Figures 7-12 and 7-13 provides additional evidence that sulfate and nitrate when combined were the largest contributors during the base years. It also appears 2002 is generally representative of the base years although nitrate was a little lower in 2002 than other base years.

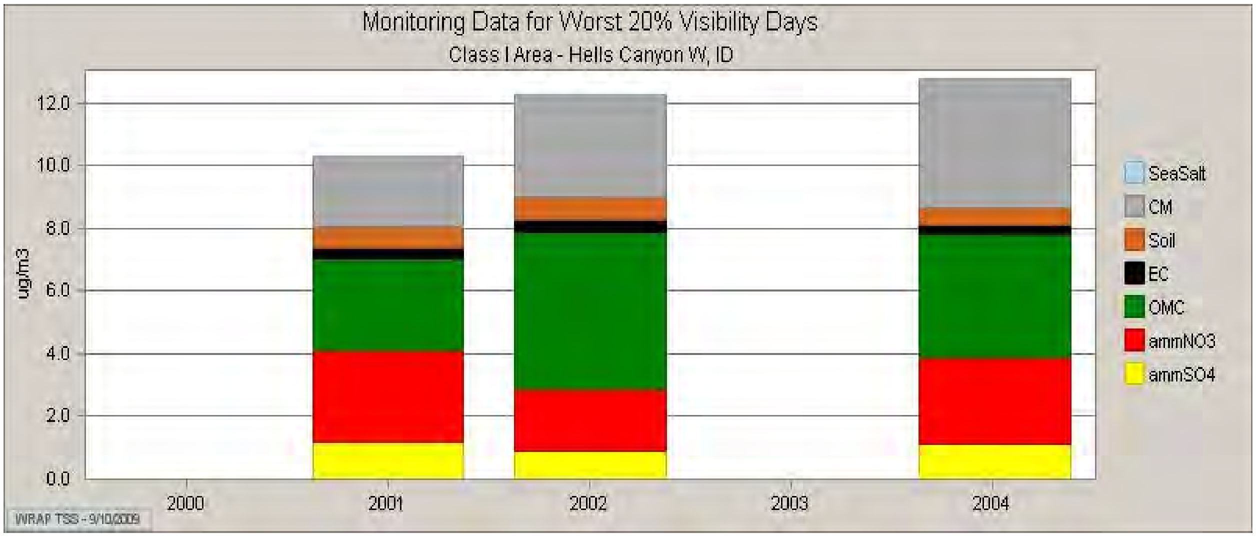


Figure 7-12. Hells Canyon Wilderness, Annual 2000-2004 Pollutant Species Concentrations 20% Worst Days

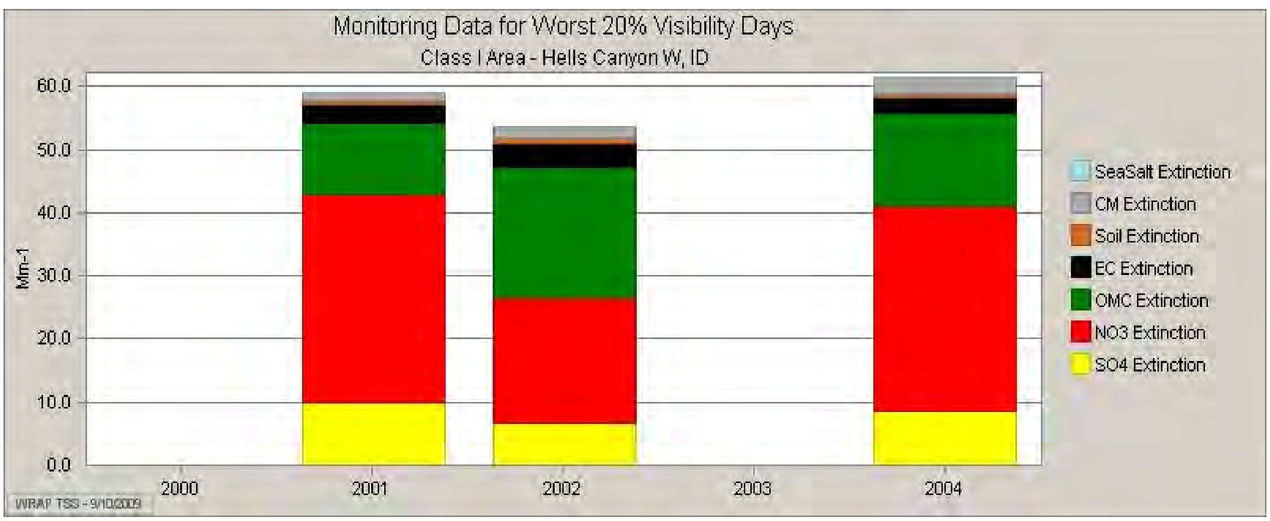


Figure 7-13. Hells Canyon NM, Annual 2000-2004 Pollutant Species Light Impairment 20% Worst Days

Looking at all of the IMPROVE sampled days as shown in Figure 7-14 it appears that nitrate and sulfate were highest in Hells Canyon during the months from November through February.

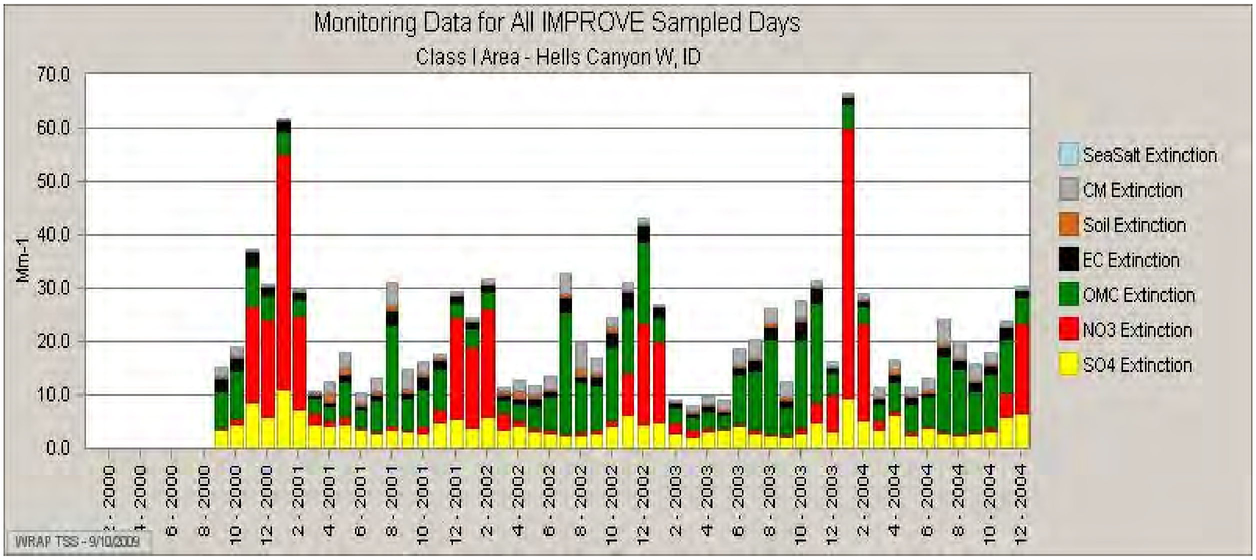


Figure 7-14. Hells Canyon Wilderness, Monthly 2000-2004 Pollutant Species Concentrations IMPROVE Sampled Days

Separating the IMPROVE monitoring days and looking only at the monthly 20% worst days as shown in Figure 7-15, the peak season for nitrate appears to have been December through January. It also appears that sulfate spikes in the winter and organic mass carbon spikes occurred during the summer months.

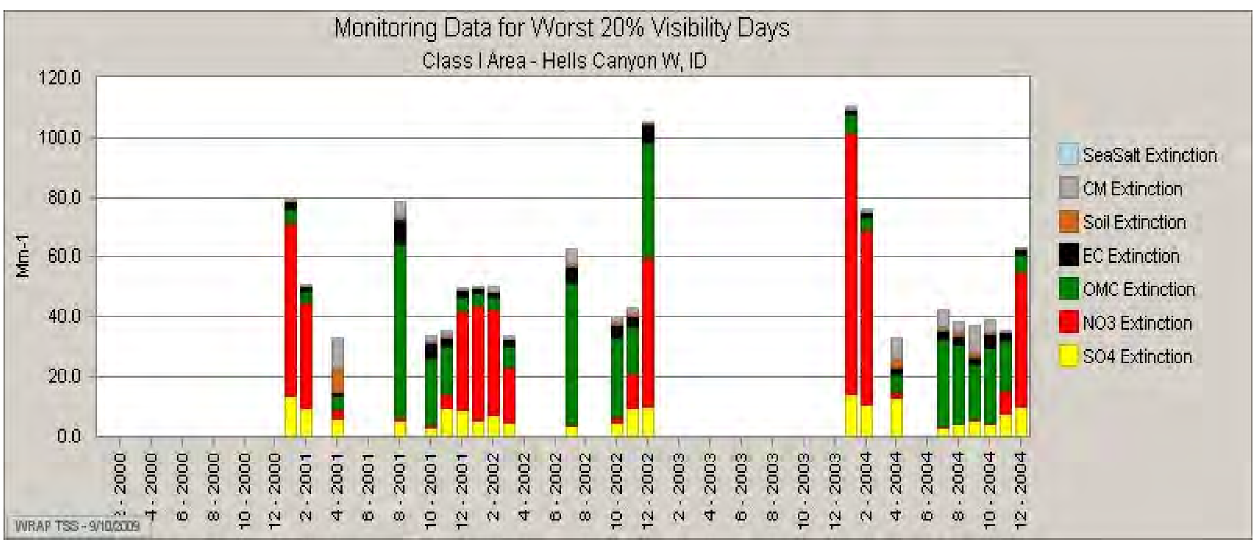


Figure 7-15. Hells Canyon Wilderness, Monthly 2000-2004 Pollutant Species Concentrations 20% Worst Days

When the 20% worst days are separated out to look at nitrate and sulfate, the pattern becomes even more apparent as shown in Figure 7-16.

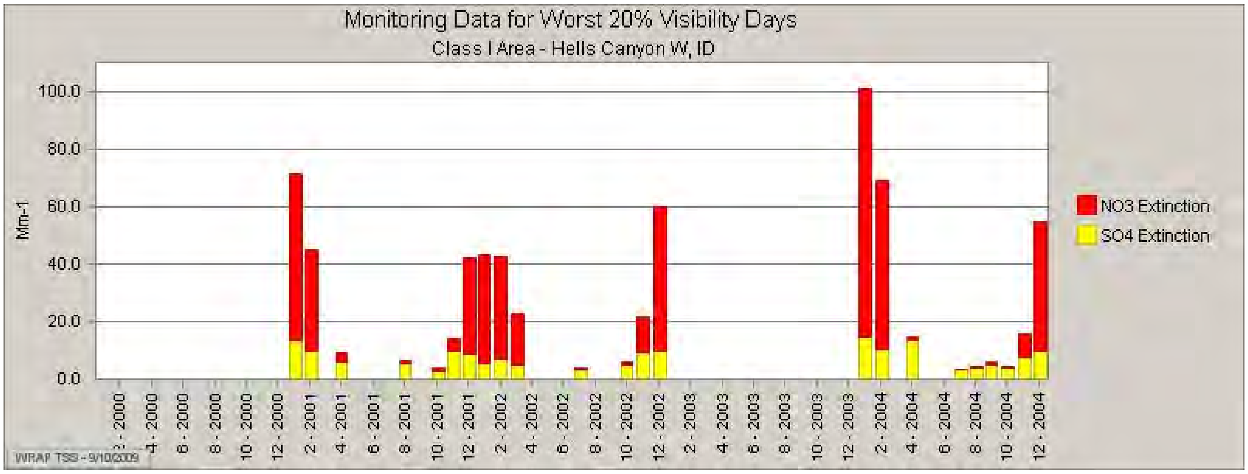


Figure 7-16. Hells Canyon Wilderness, Monthly 2000-2004 NO3 and SO4 Visibility Impairment 20% Worst Days

7.3.2 Hells Canyon Wilderness 20% Best Days

The breakout of the 2002 20% best days by pollutant species shows that compared with the 20% worst days there was a decrease in the contribution coming from nitrate and an increase coming from organic mass carbon. Both figure 7-17 and 7-18 portray this change in contributions.

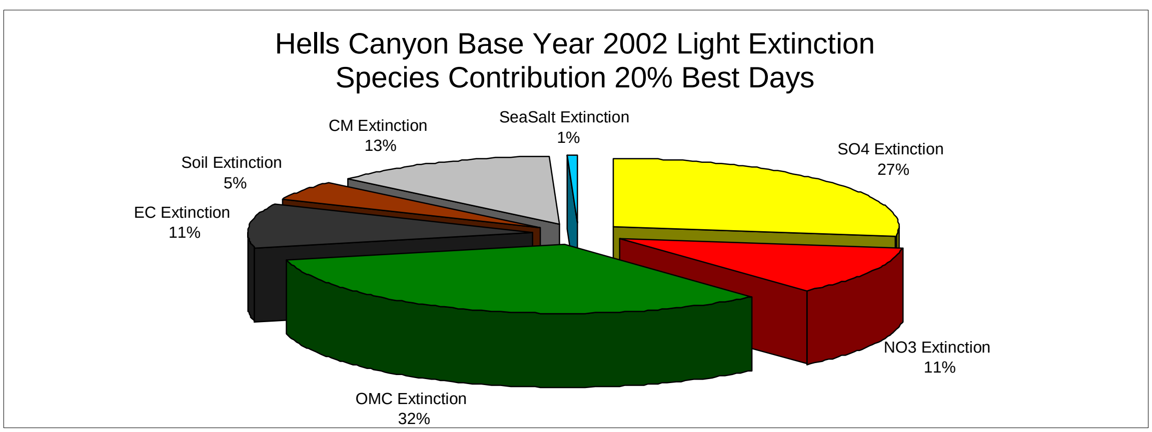


Figure 7-17. Hells Canyon Wilderness 2002 Light Extinction 20% Worst Days

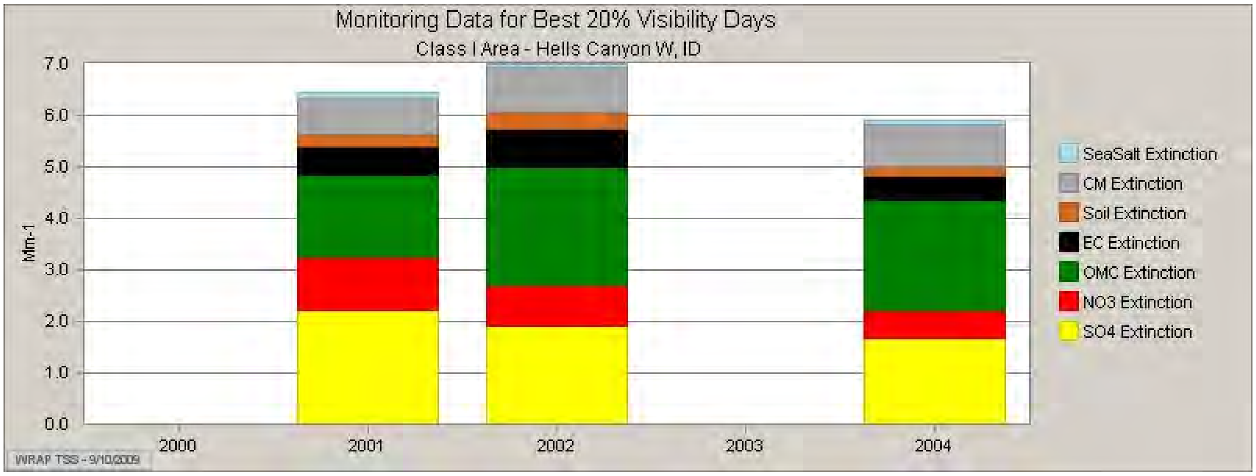


Figure 7-18. Hells Canyon Wilderness Annual 2000-2004 Pollutant Species Visibility Impairment 20% Best Days

Figure 7-19 shows Hells Canyon Wilderness had a baseline year visibility impairment of 58.14Mm-1. In order to follow the uniform rate of progress, a 2.4-deciview improvement in visibility impairing pollutants will be needed by 2018 and a 10.3 deciview improvement will be needed to reach the natural conditions goal by 2064.

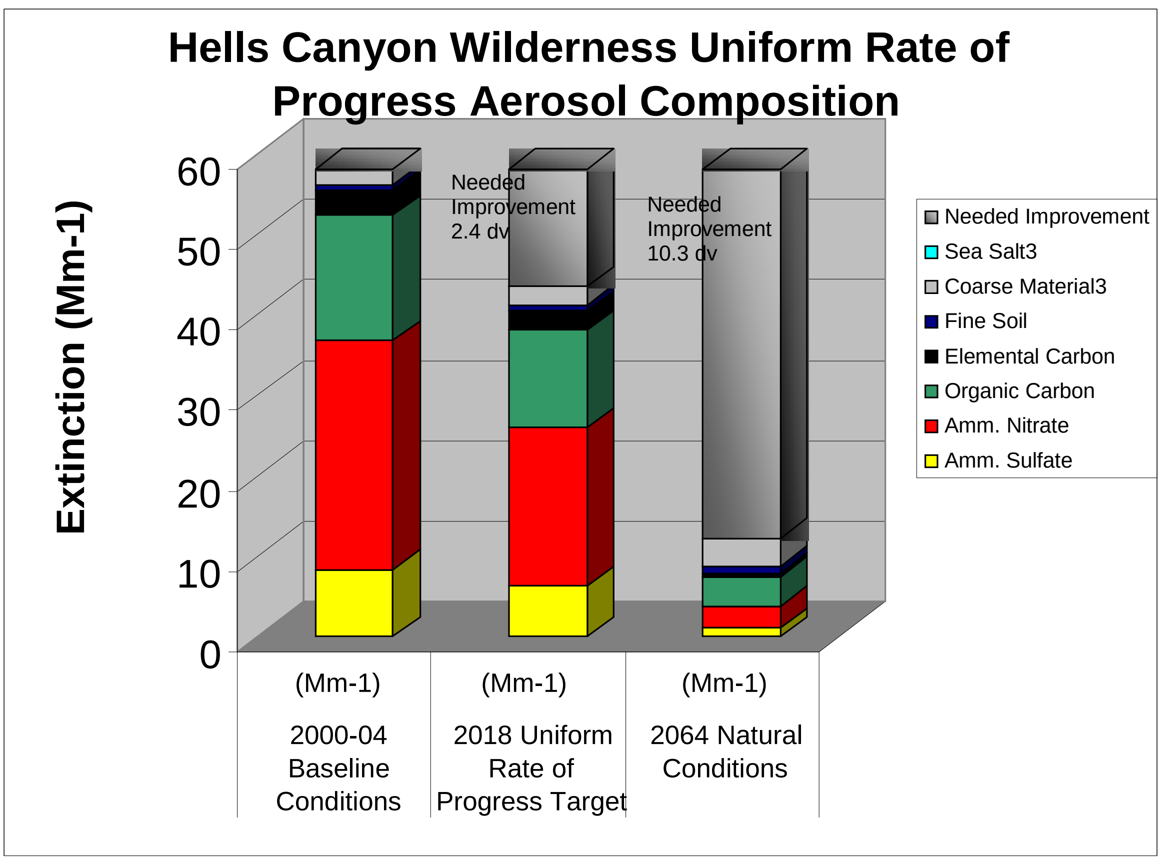


Figure 7-19. Hells Canyon Wilderness Aerosol Light Extinction Baseline (2000-2004), 2018 Target, 2064 Goal

7.4 Sawtooth Wilderness Area

7.4.1 Sawtooth Wilderness 20% Worst Days

As figure 7-20 depicts, in 2002 the largest contribution to visibility impairment to the 20% worst days in the Sawtooth Wilderness was organic mass carbon at 69%. Typically, organic mass carbon is attributed to fire activity. The two pollutants with the greatest influence from man-made pollutants was sulfate and nitrate which only accounted for 9% of the visibility impairment on the 20% worst days in the Sawtooth Wilderness.

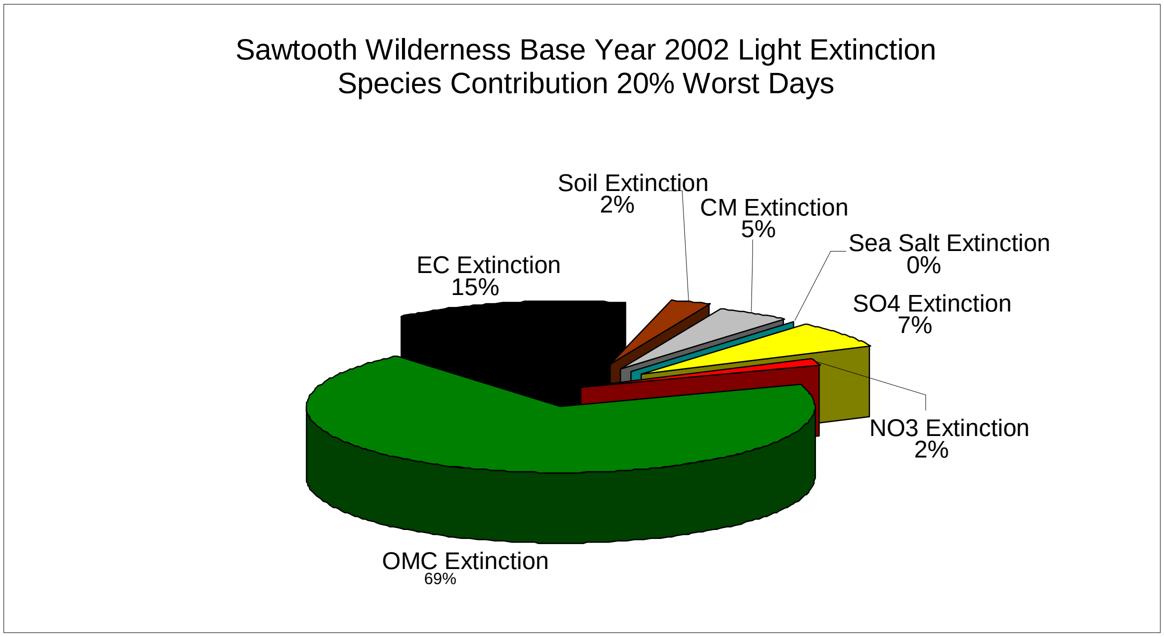


Figure 7-20 Sawtooth Wilderness 2002 Light Extinction 20% Worst Days

Organic mass carbon, nitrate, and sulfate concentrations were fairly consistent in the years 2001 through 2004. There was a slight variation in concentrations of elemental carbon, fine soil, and coarse mass as shown in Figure 7-21. The greatest concentrations are attributed to organic mass carbon for all five-years.

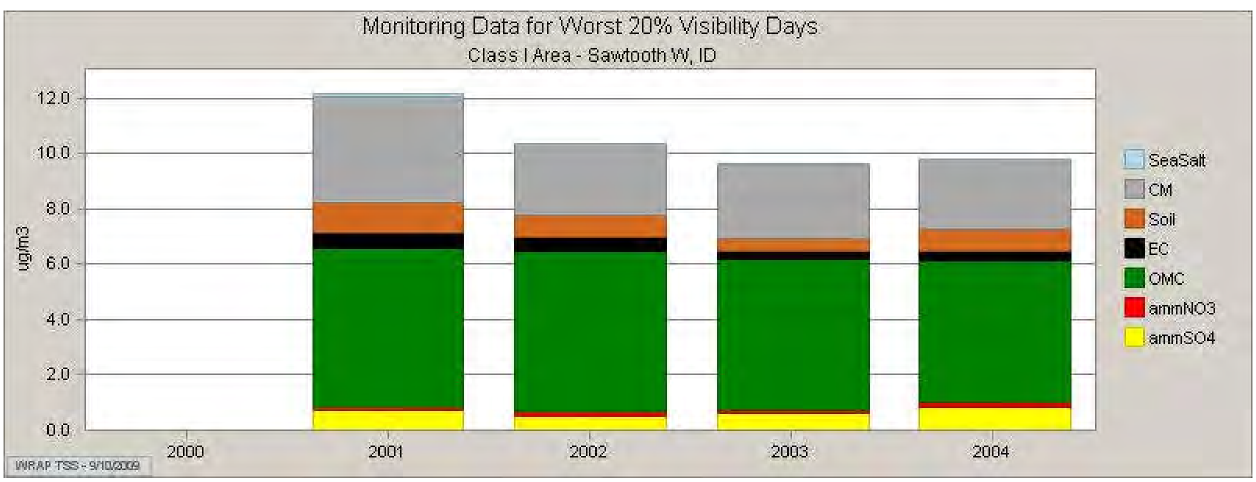


Figure 7-21 Sawtooth Wilderness Annual 2000-2004 Pollutant Species Concentrations 20% Worst Days

Figure 7-22 shows a greater variation in light-absorbing visibility impacts from elemental carbon than organic carbon. Elemental carbon is usually associated with the burning of fossil fuels and other organic materials.

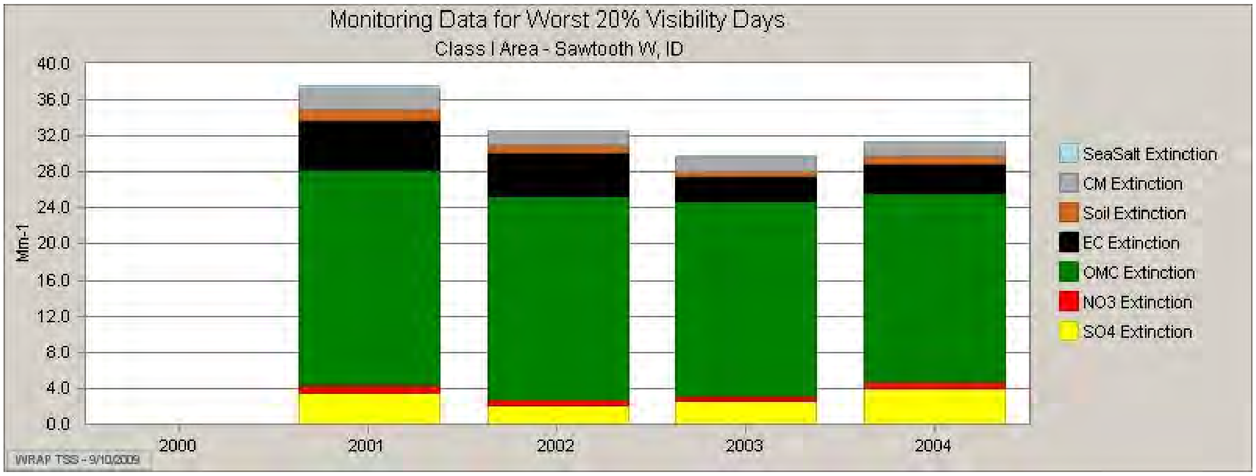


Figure 7-22. Sawtooth Wilderness Annual 2000-2004 Pollutant Species Light Impairment 20% Worst Days

The visibility impact of the various pollutants is highlighted in Figure 7-23. Organic mass carbon stands out distinctively as the largest contributor to visibility impairment and seems to have been in a slight downward trend. This downward trend may be due to a decline in local fires compared with the base year period but caution should be used when looking at this trend because of the cyclic nature of wild fire. Because organic mass carbon is such a large contributor in the Sawtooth Wilderness, it is important to identify whether the source is strictly wild fire or whether there are sources outside the normal fire season contributing to the problem.

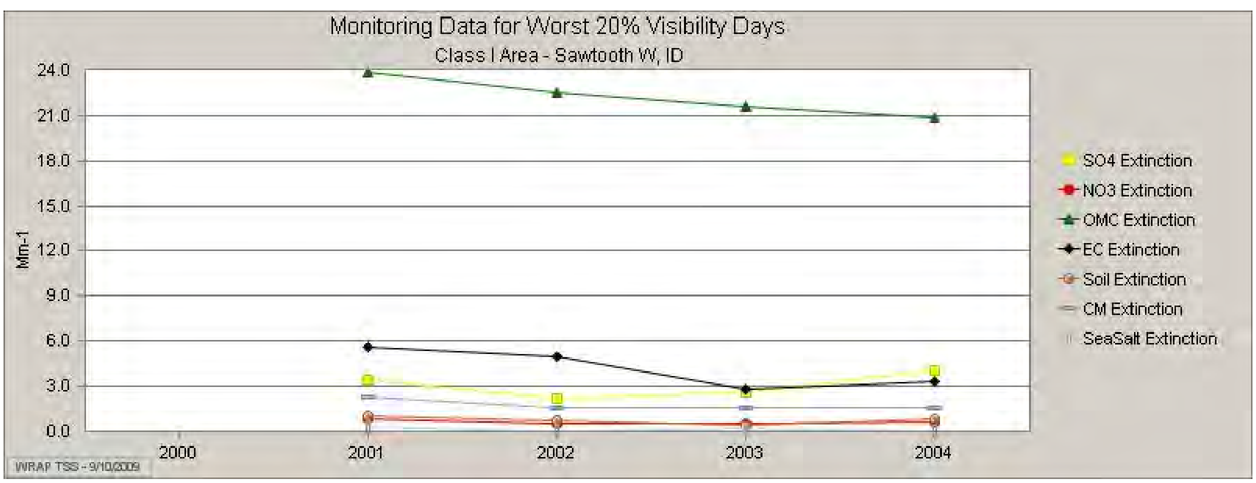


Figure 7-23. Sawtooth Wilderness Annual 2000-2004 Visibility Impairment by Pollutant Species 20% Worst days

The other pollutants all seem to be trending fairly flat. Nitrate and sulfate had both slight increases and slight decreases during the time period and they seem to be trending together. Overall elemental carbon was trending downward.

When looking at all the IMPROVE sampled days in Figure 7-24, the large spikes in organic coarse mass are typical of wildfire activity.

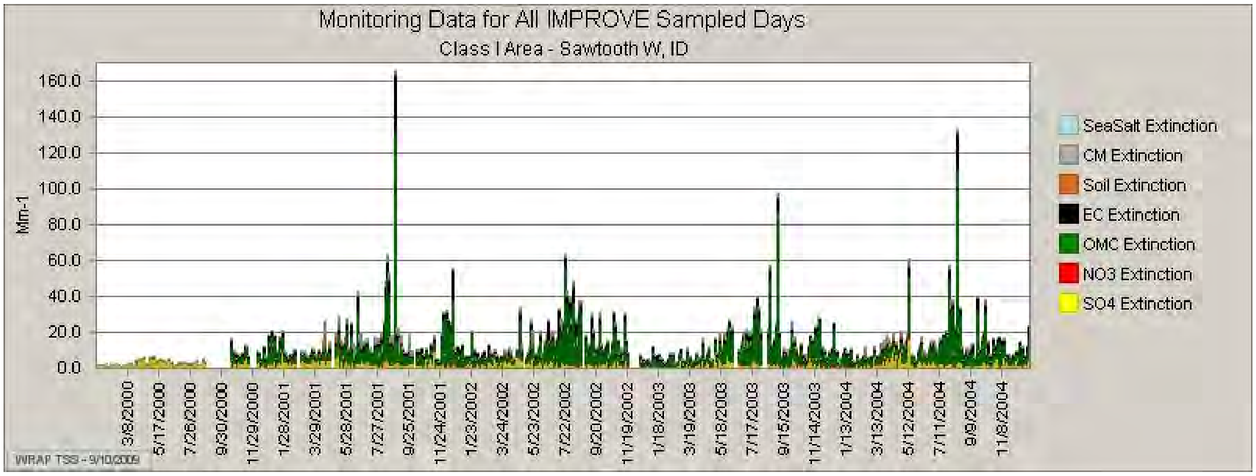


Figure 7-24. Sawtooth Wilderness, 2000-2004 Pollutant Species Visibility Impairment, All IMPROVE Monitoring Days

Looking at all the IMPROVE sampled days it is hard to determine whether fire activity is happening outside what would be considered fire season. By looking at the monthly 20% worst days, a different scenario begins to appear. Figure 7-25 shows significant organic mass carbon during the winter months of November and December and a sharp decline in January and February. While the fire season may last into the late fall it is typically gone during the first snows and late fall rain season. Because organic mass carbon appears to remain steady into the early winter, there may be localized slash burning or wood stoves. This is something that will require further investigation during this Regional Haze SIP planning period.

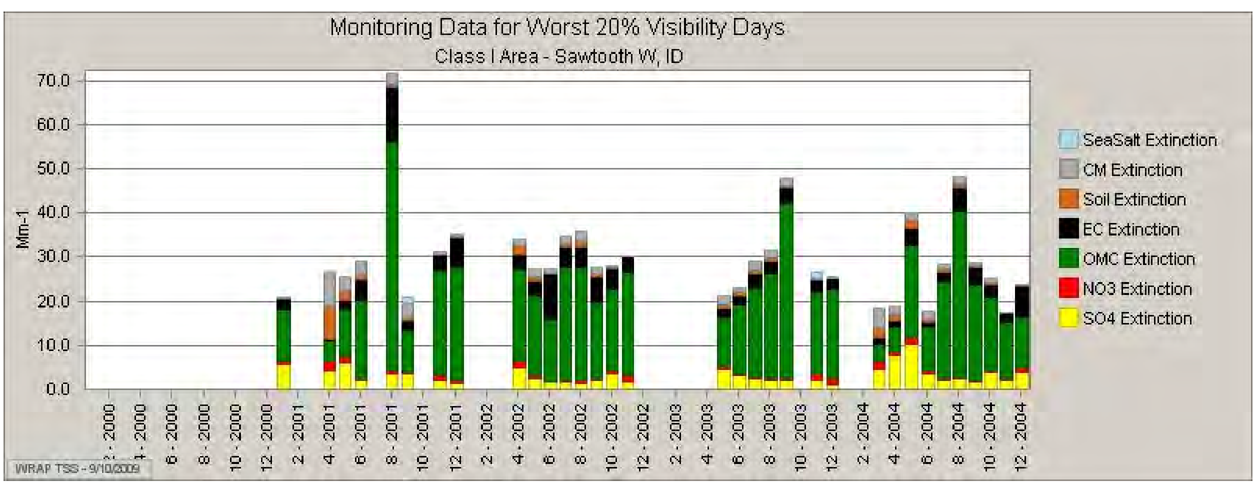


Figure 7-25. Sawtooth Wilderness Monthly 2000-2004 Pollutant Species Visibility Impairment 20% Worst Days

By separating out the organic mass carbon from the other pollutants in Figure7-26, a cyclic picture becomes clearer. The spikes occur during the summer months and decline into the fall but stay steady until January and then drop off dramatically.

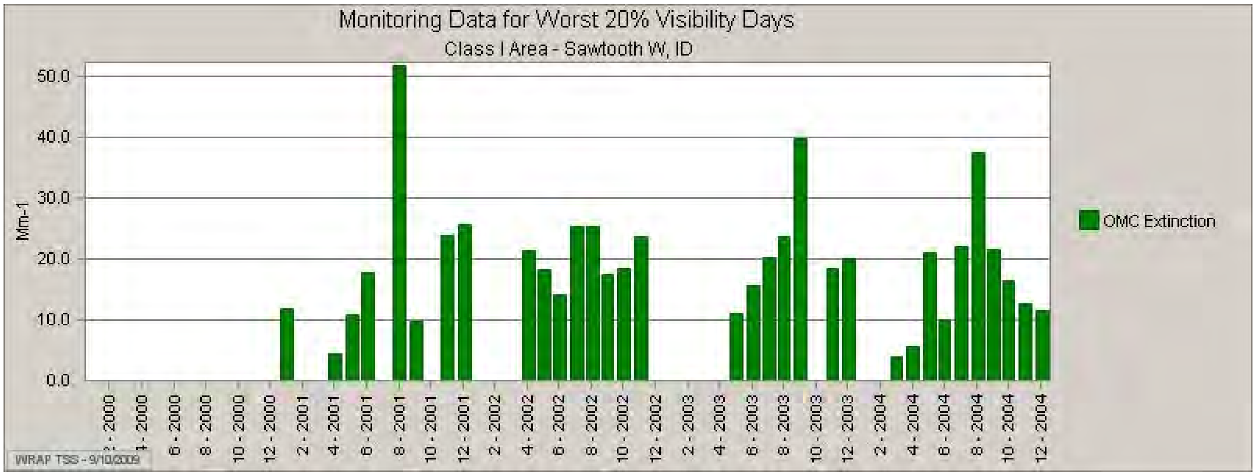


Figure 7-26 Sawtooth Wilderness Monthly 2000-2004 Organic Mass Carbon Visibility Impairment 20% Worst Days

The picture is different for nitrate and sulfate than for organic carbon. These two pollutants seem to rise rapidly in April and May and then decline into the fall. This may be due to weather patterns or mobile and sources within a relative close distance to the airshed. Figure 7-27 shows this trend and also shows that nitrate doesn't always track directly with sulfate which was the larger contributor to visibility impairment.

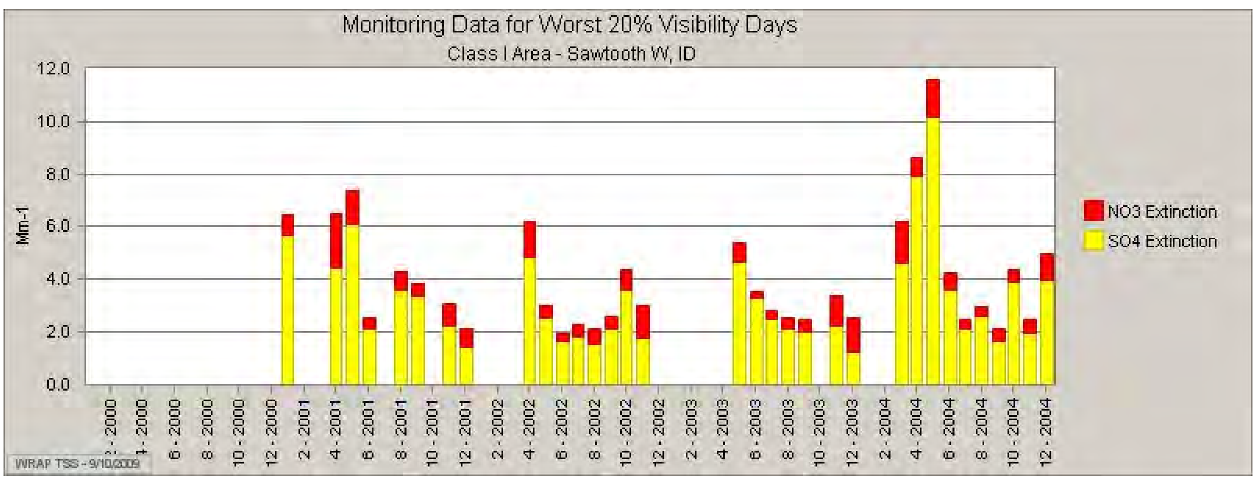


Figure 7-27 Sawtooth Wilderness Monthly 2000-2004 NO3 and SO4 Visibility Impairment 20% Worst Days

7.4.2 Sawtooth Wilderness 20% Best Days

When looking at the 20% best days, it appears that organic mass carbon was less of an influence but it still accounts for 46% of the total visibility impairment in 2002. Because sulfate and nitrate account for over 30% of the visibility impairment in 2002, improvement in the levels of these typically man-made pollutants for the 20% worst days will also improve and maintain visibility during the 20% best days. It will also be important to see whether there are man-made contributions to the organic mass carbon levels that can be reduced. Figure 7-28 depicts the contribution from each species in 2002.

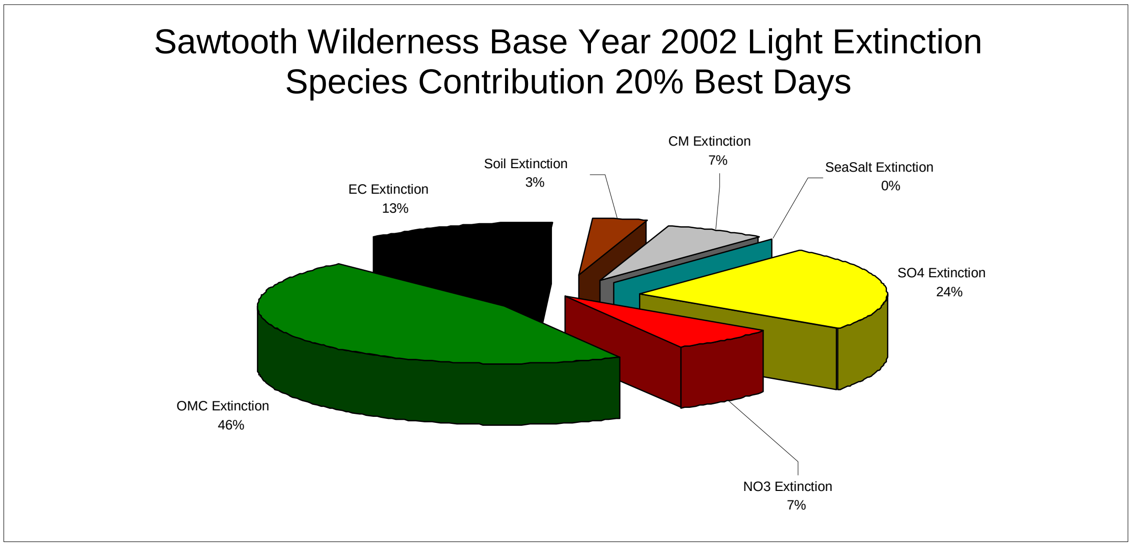


Figure 7-28. Sawtooth Wilderness 2002 Light Extinction 20% Best Days

Figure 7-29 shows the annual variation of visibility-impairing pollutant species over the base time period of 2001 through 2004. There is a variation in organic mass carbon and sulfate.

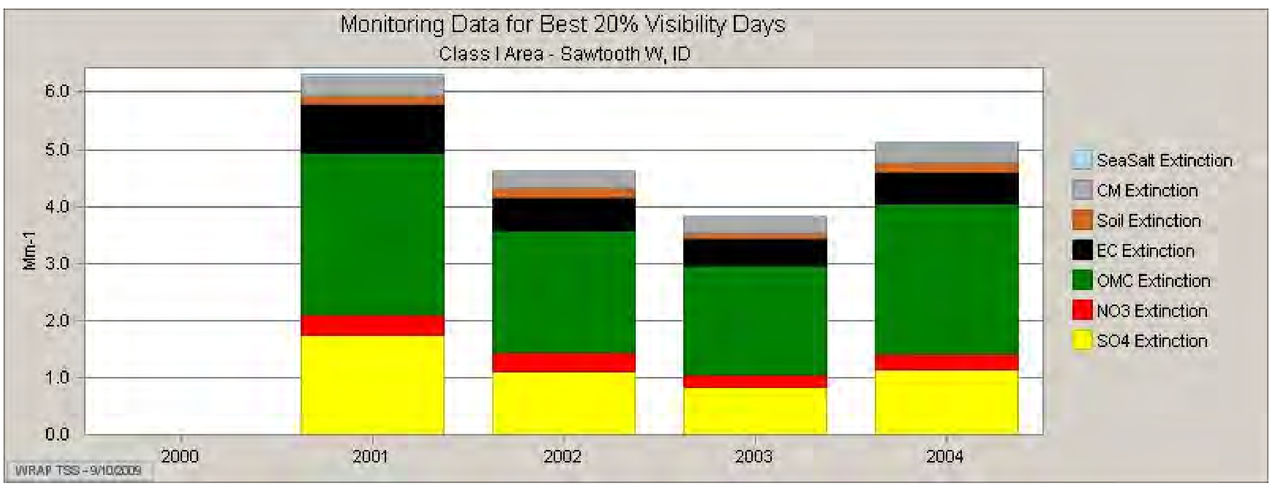


Figure 7-29. Sawtooth Wilderness Annual 2000-2004 Pollutant Species Light Impairment 20% Best Days

Figure 7-30 shows the base period average pollutant impact of 34Mm-1 with a needed improvement in visibility of 1.72dv by 2018 in accordance with the uniform rate of progress and a total improvement of 7.32dv needed by 2064 to meet the natural conditions goal.

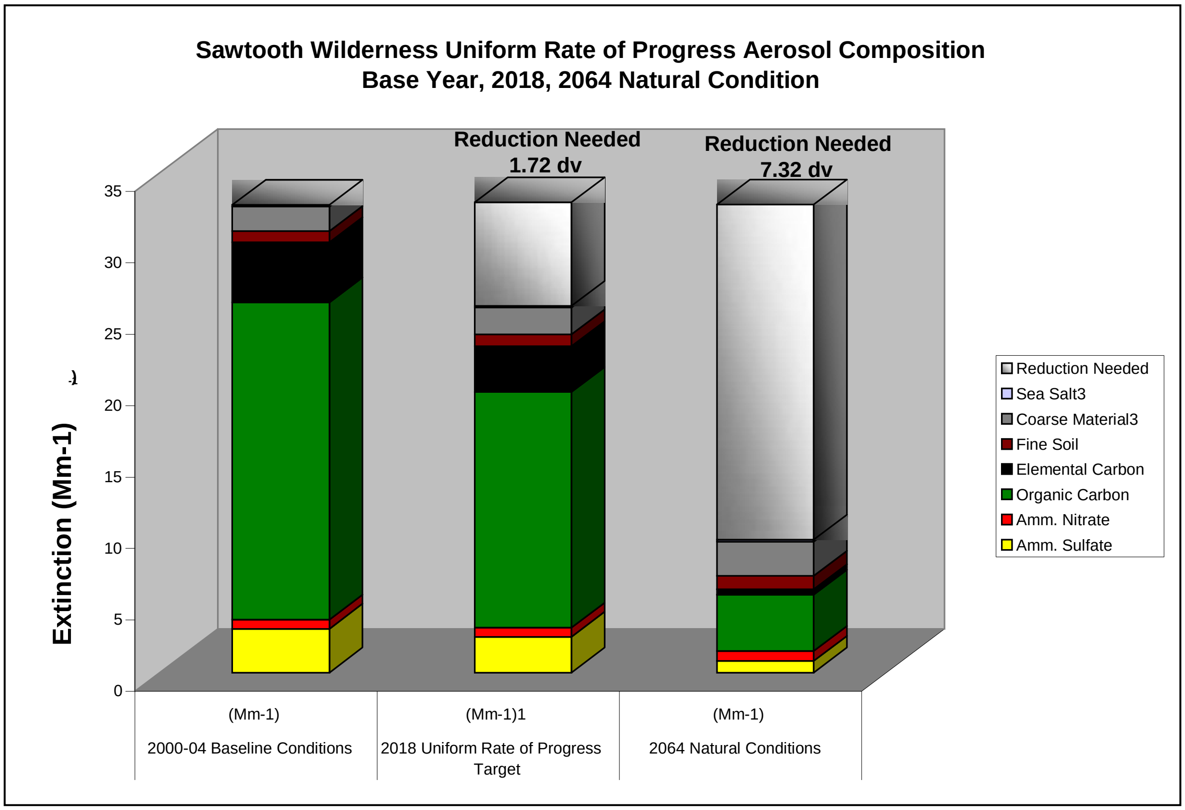


Figure 7-30. Sawtooth Wilderness Aerosol Light Extinction Baseline (2000-2004), 2018 Target, 2064 Goal

7.5 Selway-Bitterroot Wilderness Area

7.5.1 Selway-Bitterroot Wilderness 20% Worst Days

Much like the Sawtooth Wilderness, visibility in the Selway-Bitterroot Wilderness is predominantly impacted by organic mass carbon. Figure 7-31 shows 52% of the visibility impairment in 2002 was attributable to organic mass carbon. Twenty-six percent of the visibility impairment can be attributed to the combination of sulfate (19%) and nitrate (7%).

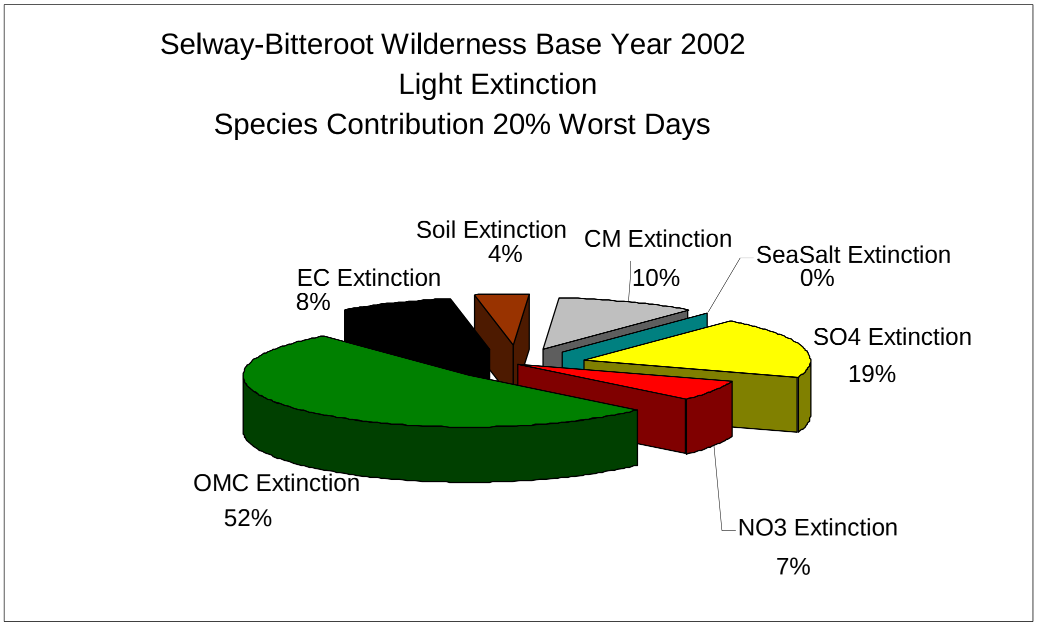


Figure 7-31. Selway-Bitterroot Wilderness, 2002 Light Extinction 20% Worst Days

Coarse mass and organic mass carbon show the greatest variation over the five-year baseline time period of 2001 through 2004. As Figure 7-32 displays, nitrate and sulfate concentrations remain relatively constant. Although the contribution of fine soil is relatively small, it does vary over the time period.

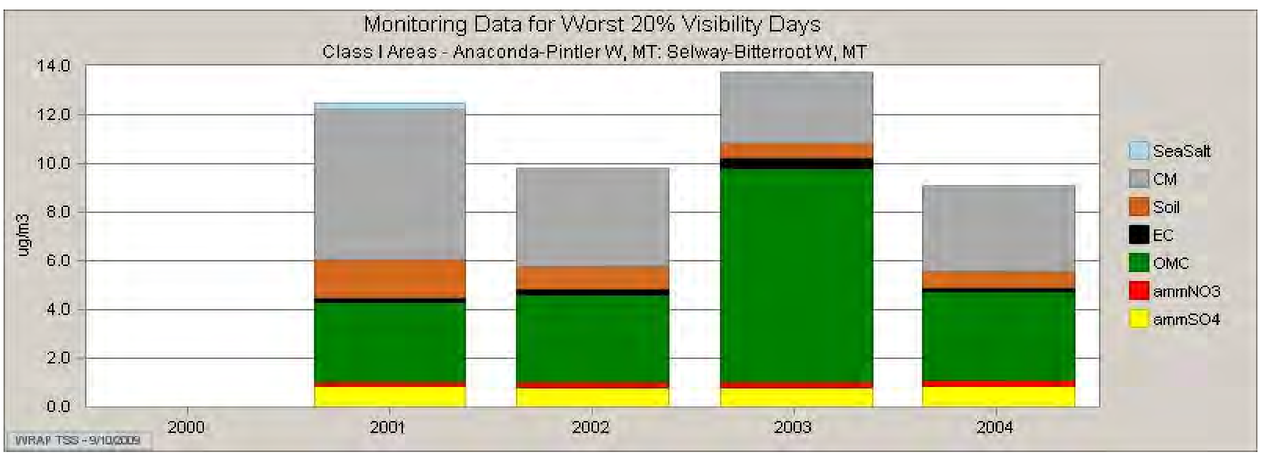


Figure 7-32. Selway-Bitterroot Wilderness Annual 2000-2004 Pollutant Species Concentrations 20% Worst Days

Moving from concentration levels to visibility impacts, the variation in organic mass carbon becomes more dramatic while the impacts from coarse mass become less dramatic. The visibility impact from fine soil is almost non-existent. And as Figure 7-33 shows, the visibility impacts from nitrate and sulfate remained fairly constant but did contribute a minimal combined amount of roughly 5Mm-1.

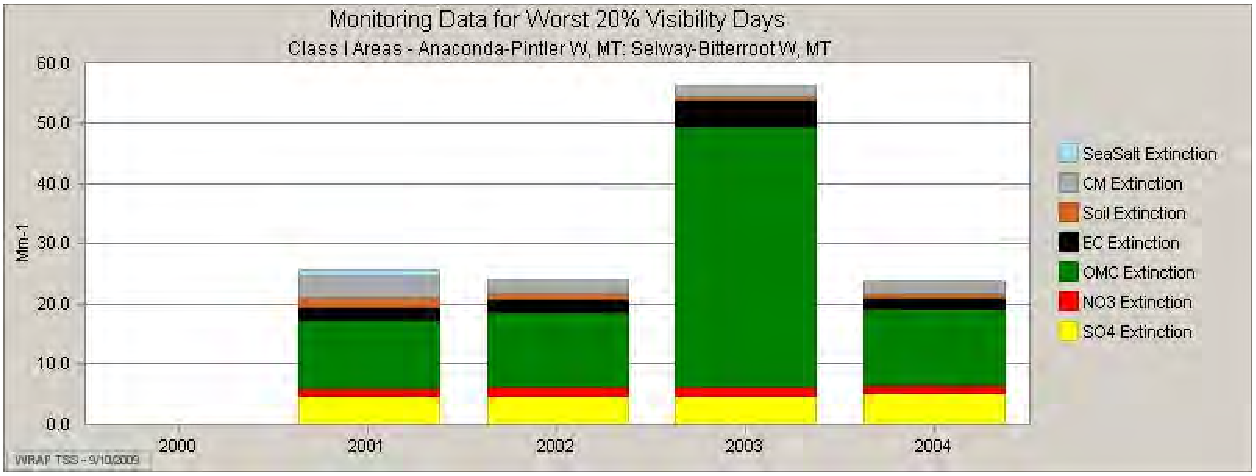


Figure 7-33. Selway-Bitterroot Wilderness Annual 2000-2004 Pollutant Species Light Impairment 20% Worst Days

By separating out the visibility-impairing pollutant species, the variation and impacts of each species can be seen to be more pronounced. The visibility impact from organic mass carbon was fairly flat with an impact of roughly 12Mm-1 in 2001, 2002, and 2004 but spiked to over 40Mm-1 in 2003. Sulfate, nitrate, elemental carbon, coarse matter, and soil were relatively flat and all contributed less than 5Mm-1. Figure 7-34 shows these changes over time.

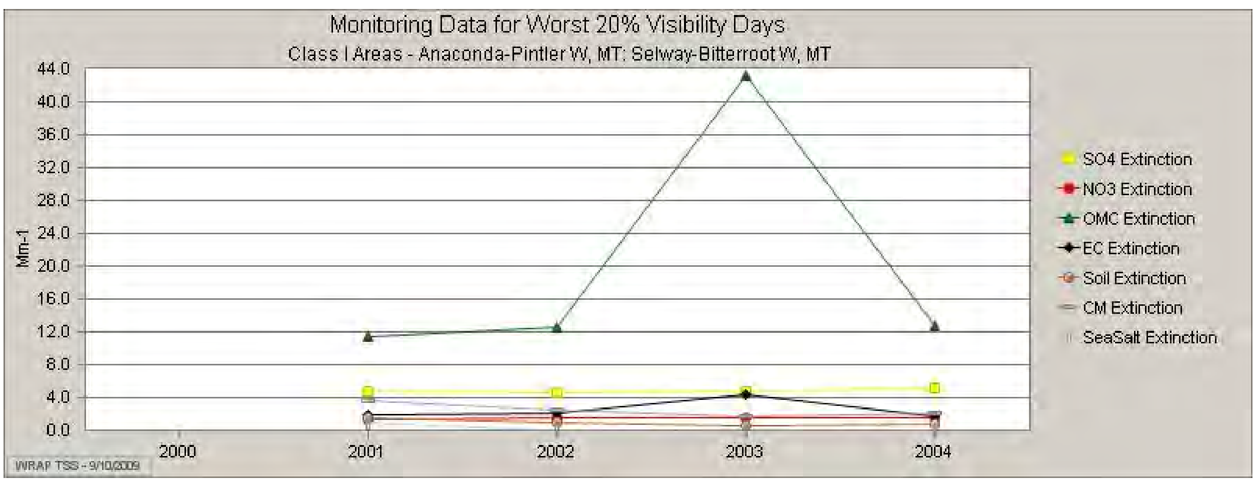


Figure 7-34. Selway-Bitterroot Wilderness Annual 2000-2004 Visibility Impairment by Pollutant Species 20% Worst days

Figure 7-35 displays the visibility impacts of all the IMPROVE sample days over the base period of 2000 through 2004. The huge spikes in 2000 and 2003 show a strong organic mass carbon signature attributed to fire events. This would explain the spike in organics in 2003. Everything else is dwarfed by the fire signature which spiked to over 400Mm-1 in 2000 although typically the highest impacts are below 50Mm-1. This scale makes it virtually impossible to see any trends in other visibility-impairing constituents.

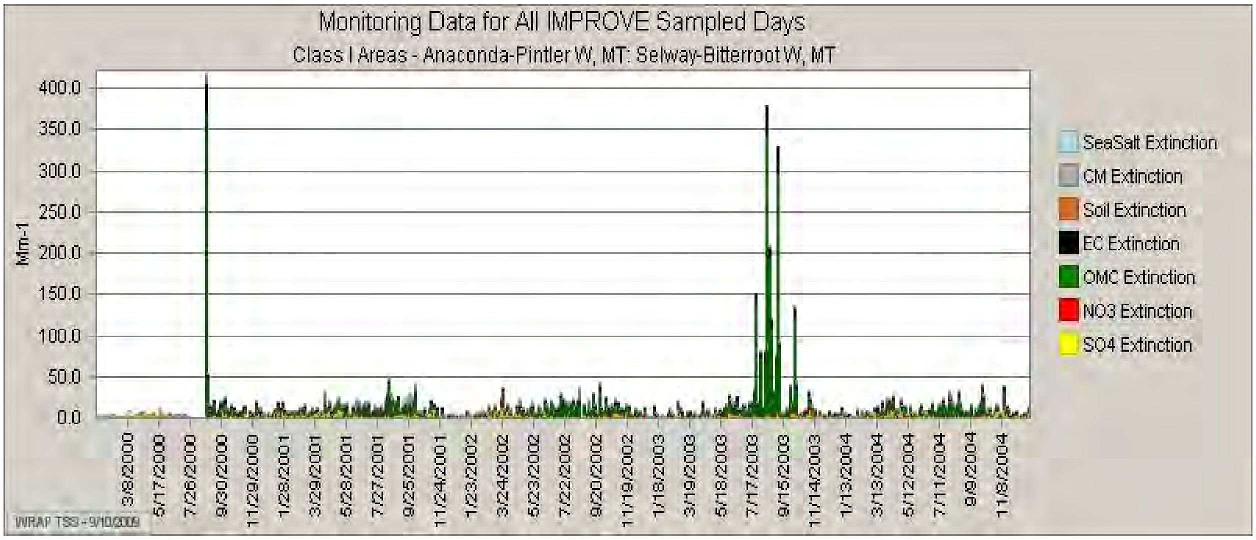


Figure 7-35. Selway-Bitterroot Wilderness, 2000-2004 Pollutant Species Visibility Impairment All IMPROVE Monitoring Days

Looking at the monthly trends over the base time period begins to show some trends with spikes in organic mass carbon over the summer time which coincides with the wild fire season. As Figure 7-36 displays, the scale due to organic carbon makes other trends difficult to see.

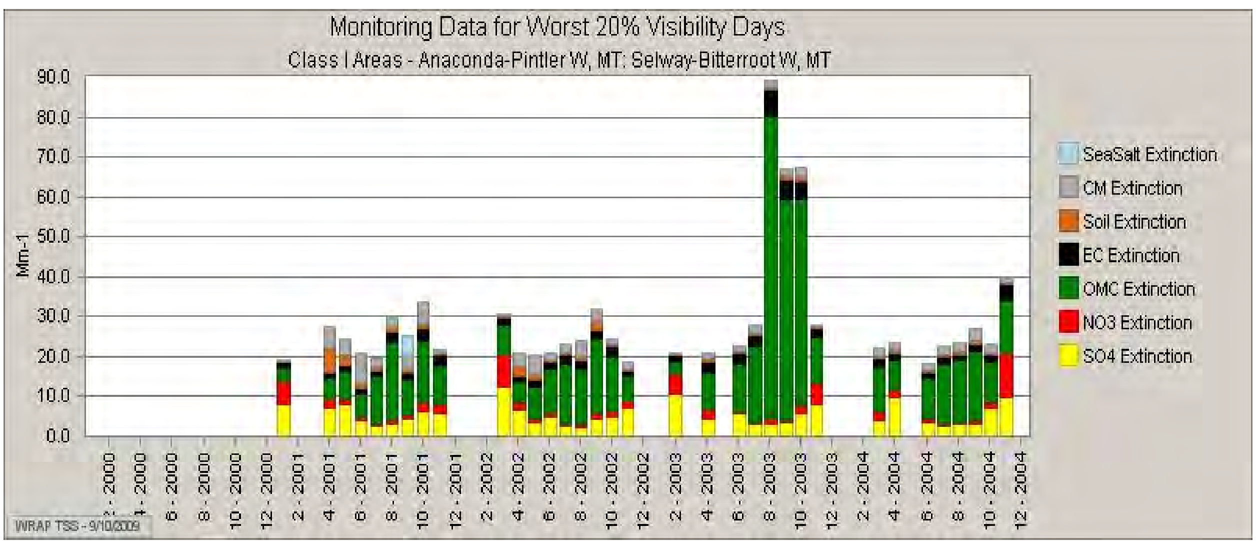


Figure 7-36. Selway Bitterroot Wilderness Monthly 2000-2004 Pollutant Species Visibility Impairment 20% Worst Days

By focusing on organic mass carbon as shown in Figure 7-37, it appears the raise and fall of visibility impairment over the summer months coincided with fire season and it doesn't appear there were activities other than wild fire and slash burning season contributing to the impacts from organic mass carbon.

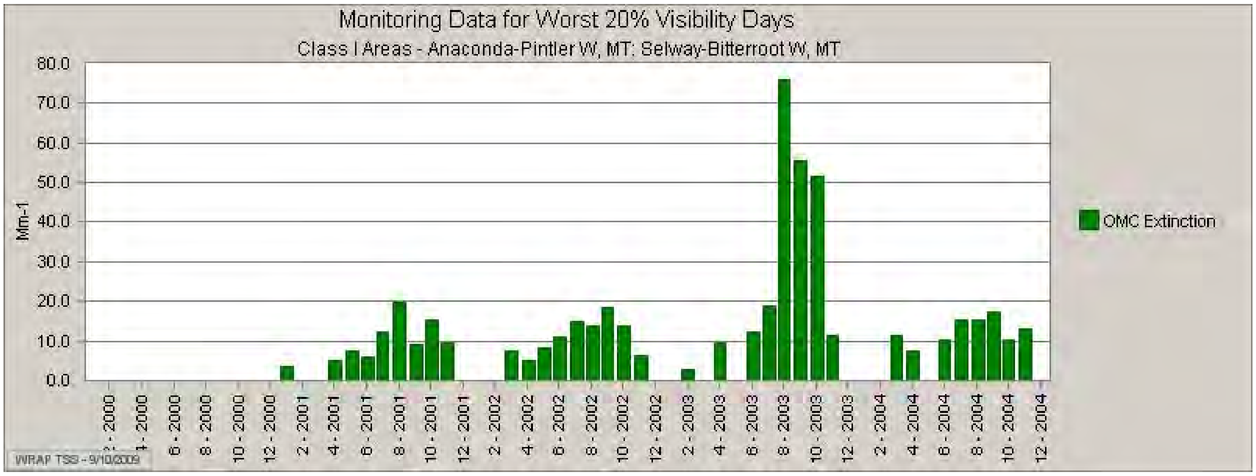


Figure 7-37. Selway Bitterroot Wilderness Monthly 2000-2004 Organic Mass Carbon Visibility Impairment 20% Worst Days

Nitrate and sulfate as shown in Figure 7-38 showed a u-shaped annual trend with the highs occurring during mid-winter and early spring and tapering off in the middle of the summer. This may be due to weather patterns or source activity in or near the airshed.

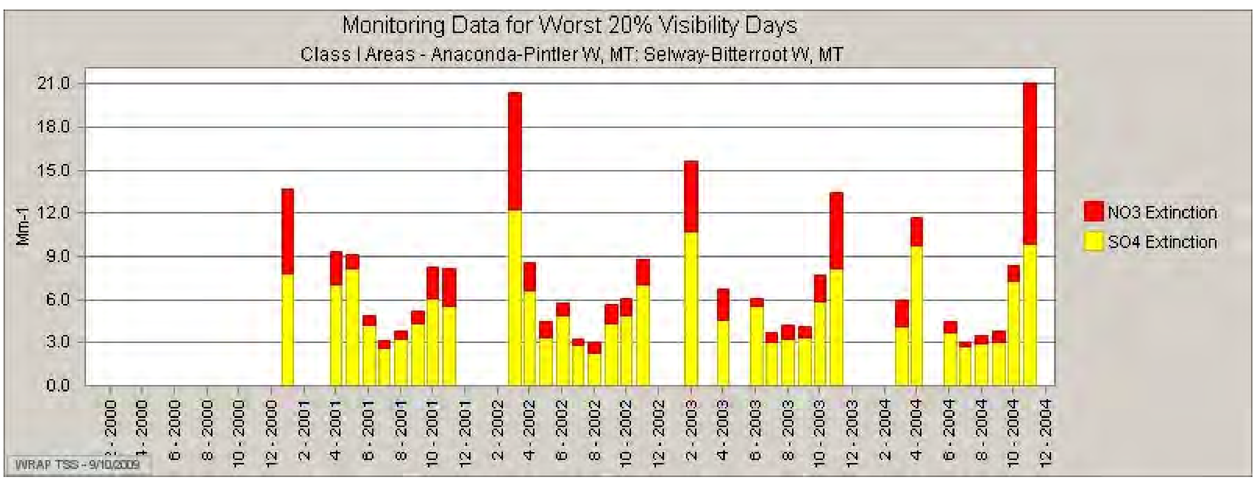


Figure 7-38. Selway-Bitterroot Wilderness Monthly 2000-2004 NO3 and SO4 Visibility Impairment 20% Worst Days

7.5.2 Selway Bitterroot Wilderness 20% Best Days

As displayed in Figure 7-39, the visibility impacts during the 20% best days in the Selway-Bitterroot showed a greater impact from sulfate and nitrate and less but still substantial impact from organic coarse mass in 2002. Reductions in nitrate and sulfate should improve both the best and worst days.

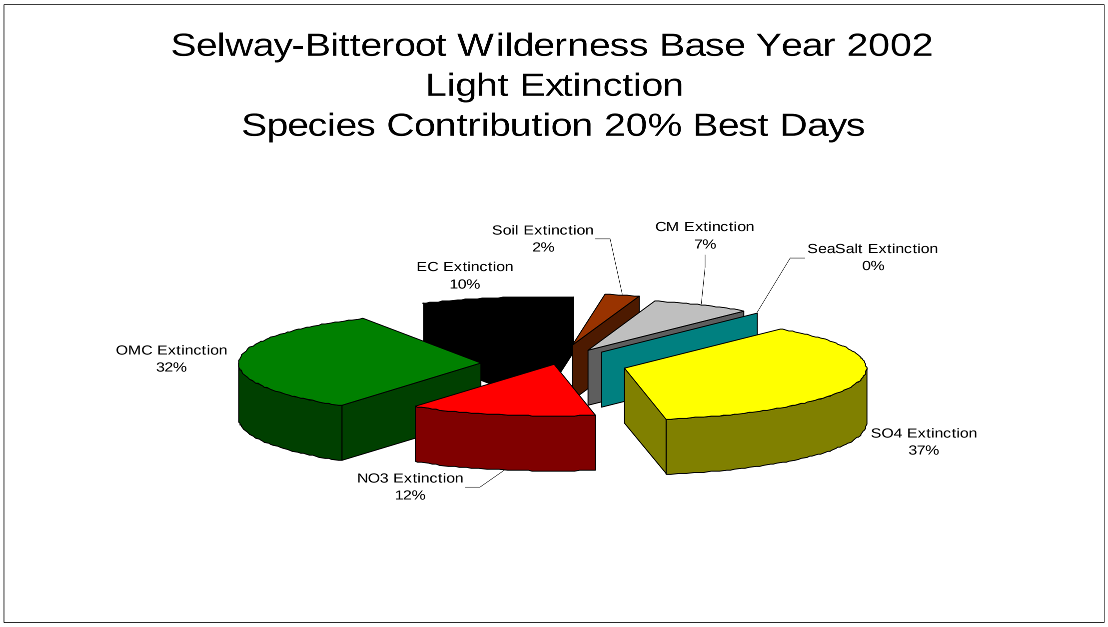


Figure 7-39. Selway-Bitterroot Wilderness 2002 Light Extinction 20% Best Days

Reductions in nitrate and sulfate should improve both the best and worst days. Figure 7-40 shows that 2002 appears to be representative of most other base years with the exception of 2003 which shows less impact from all visibility-impairing pollutants.

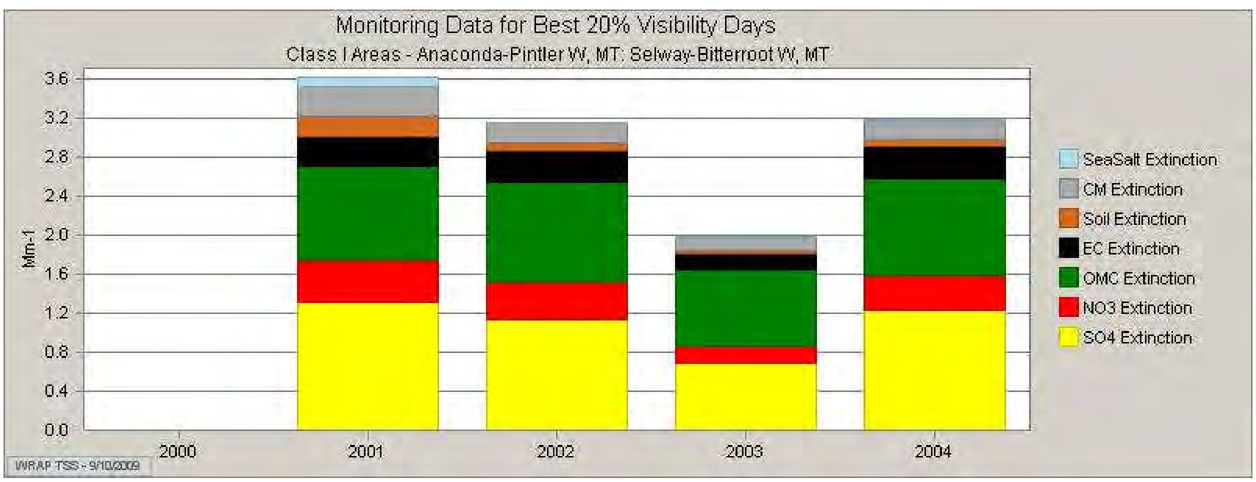


Figure 7-40 Selway-Bitterroot Wilderness Annual 2000-2004 Pollutant Species Light Impairment 20% Best Days

Figure 7-41 shows the base period average pollutant impact of 32.5Mm-1 with a needed improvement in visibility of 1.39dv by 2018 to stay in accord with the uniform rate of progress and a total improvement of 5.98dv needed by 2064 to meet natural conditions.

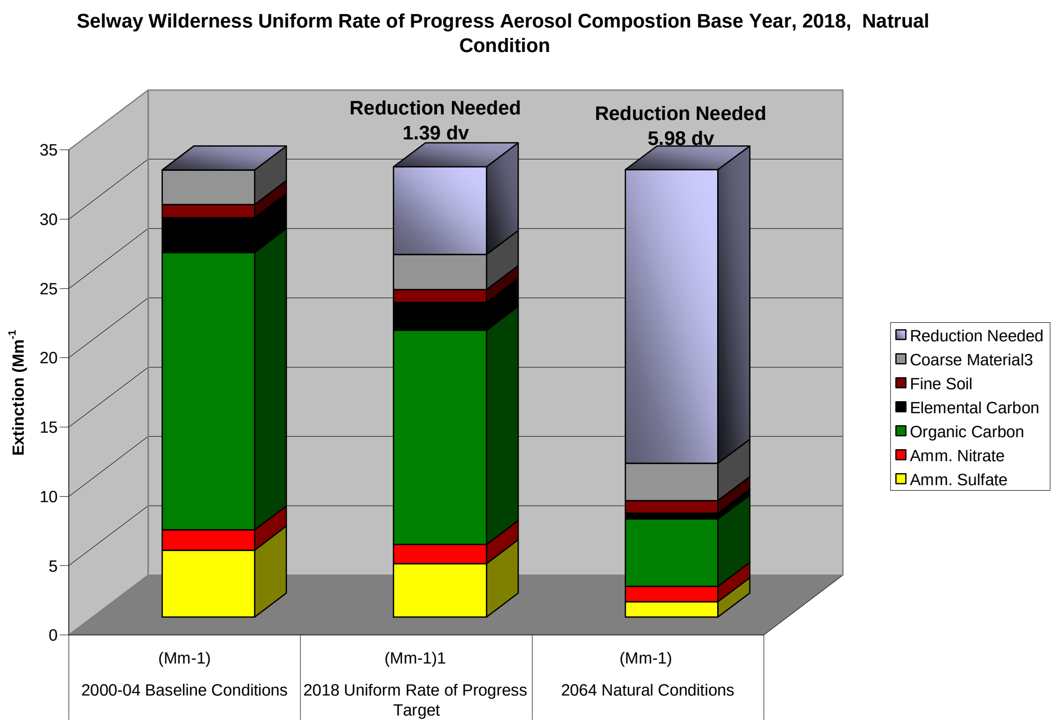


Figure 7-41 Selway-Bitterroot Wilderness Aerosol Light Extinction, Baseline (2000-2004), 2018 Target, 2064 Goal

7.6 Yellowstone National Park

7.6.1 Yellowstone National Park Worst 20% Days

Yellowstone National Park had a visibility impact of 49% from organic mass carbon in 2002, as shown in Figure 7-42. Sulfate (17%) and nitrate (7%) were 24% of the impact on visibility in 2002. This is very similar to conditions in the Sawtooth and Selway-Bitterroot Wildernesses but with slightly less nitrate. Coarse matter was slightly higher in Yellowstone than in these other two Class I areas.

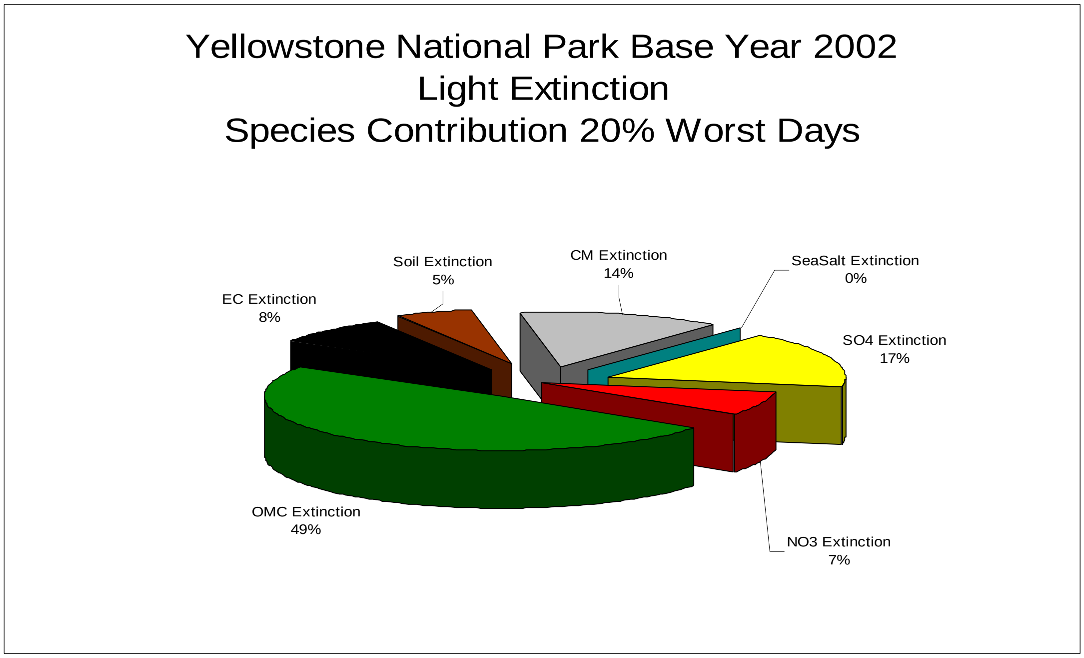


Figure 7-42. Yellowstone National Park 2002 Light Extinction 20% Worst Days

Figure 7-43 shows fairly consistent nitrate and sulfate over the base year period of 2000 through 2004. The greatest variability appears to have been in the concentrations of coarse matter.

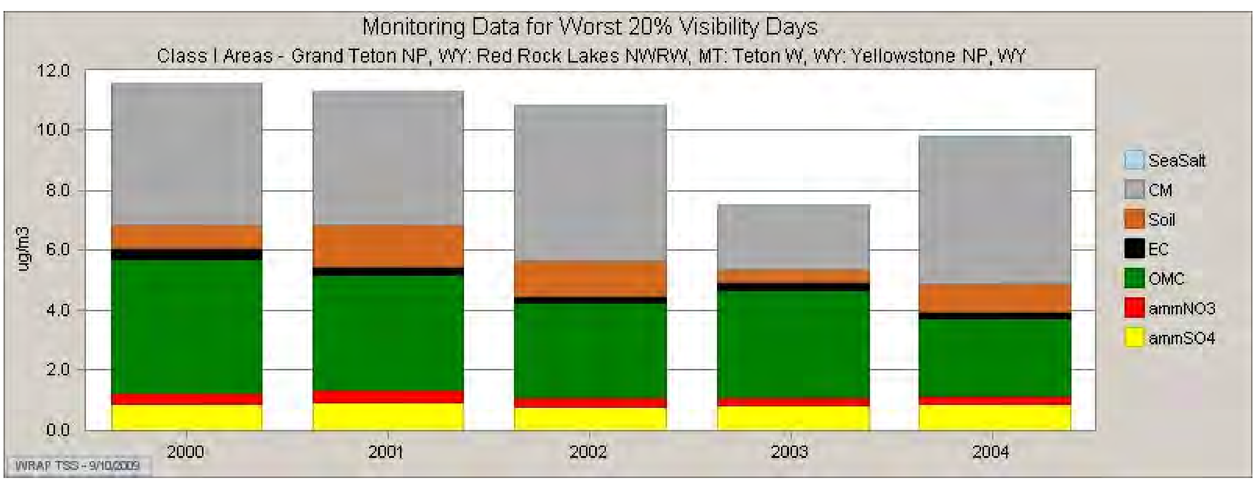


Figure 7-43. Yellowstone National Park Annual 2000-2004 Pollutant Species Concentrations 20% Worst Days

As seen in Figure 7-44, the impacts from the concentrations of coarse matter are less apparent when looking at the visibility impacts. The smaller variations in concentrations of elemental carbon and organic matter carbon become more apparent when looking at the visibility impairment associated with those pollutants. Nitrate and sulfate seem to have been trending a little above or below 6Mm-1 over the time period. Overall, visibility impairment seemed to be getting better over time and 2002 seems to have been about average of the years represented.

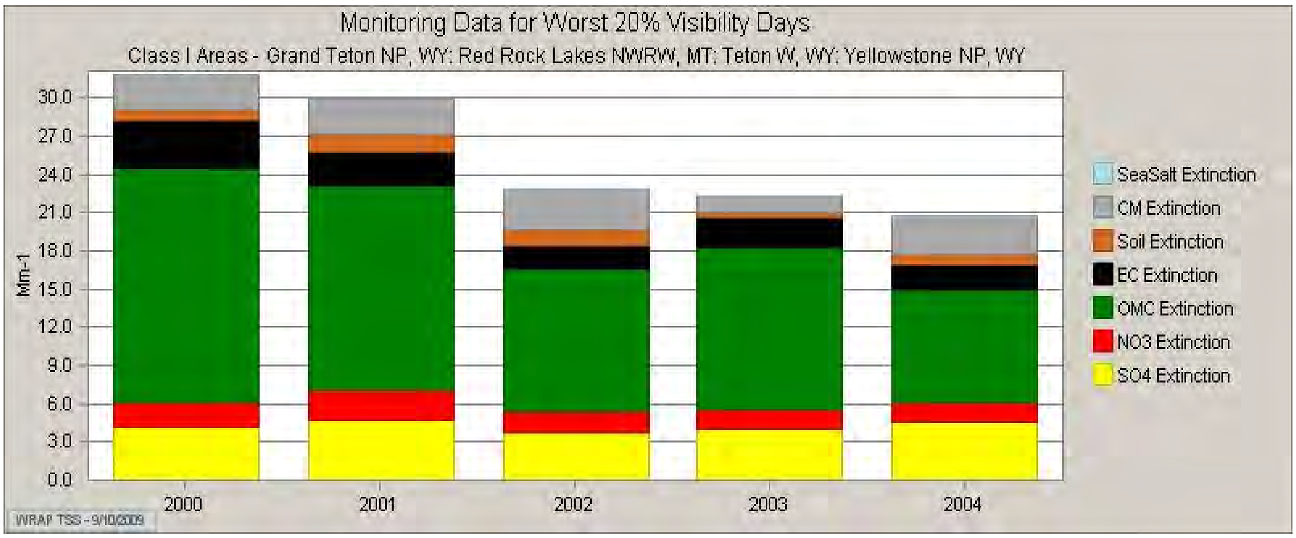


Figure 7-44. Yellowstone National Park Annual 2000-2004 Pollutant Species Light Impairment 20% Worst Days

Figure 7-45 shows the greatest reduction over the time period was from organic mass carbon. This may be misleading because organic mass carbon is usually associated with fire and the cyclic nature of fire is hard to predict. All of the other visibility-impairing pollutants appear to have been relatively flat with a change of only 1 or 2Mm-1 over the time period.

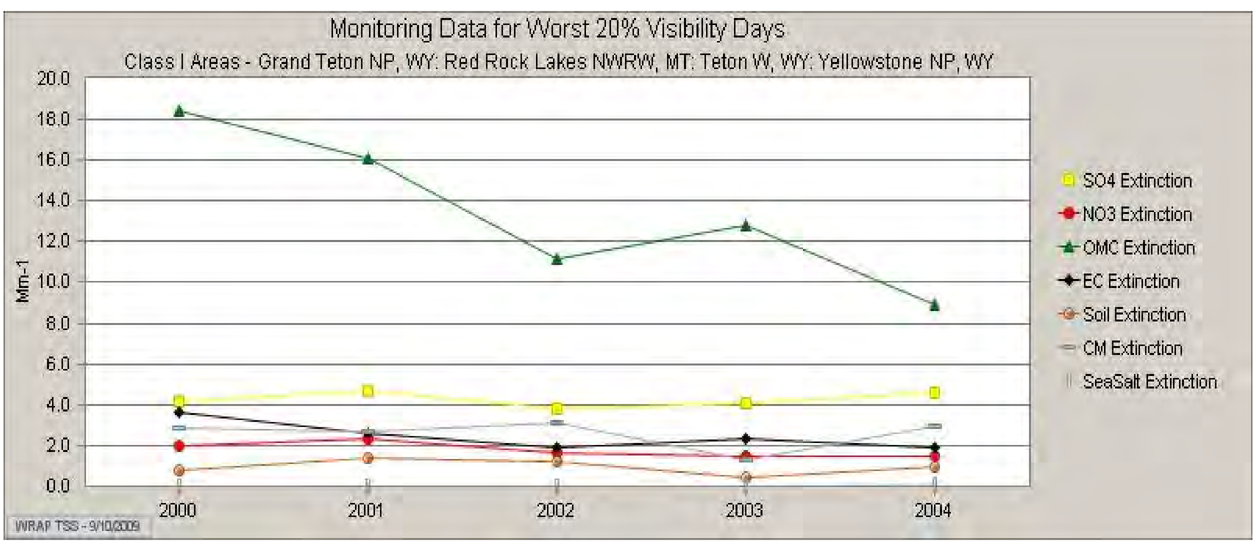


Figure 7-45. Annual 2000-2004 Yellowstone National Park Visibility Impairment by Pollutant Species 20% Worst Days

The greatest variability in the 20% worst days can be seen when looking at all the IMPROVE modeling days that show strong spikes in organic mass carbon during the summer months. All other visibility-impairing pollutants are dwarfed.

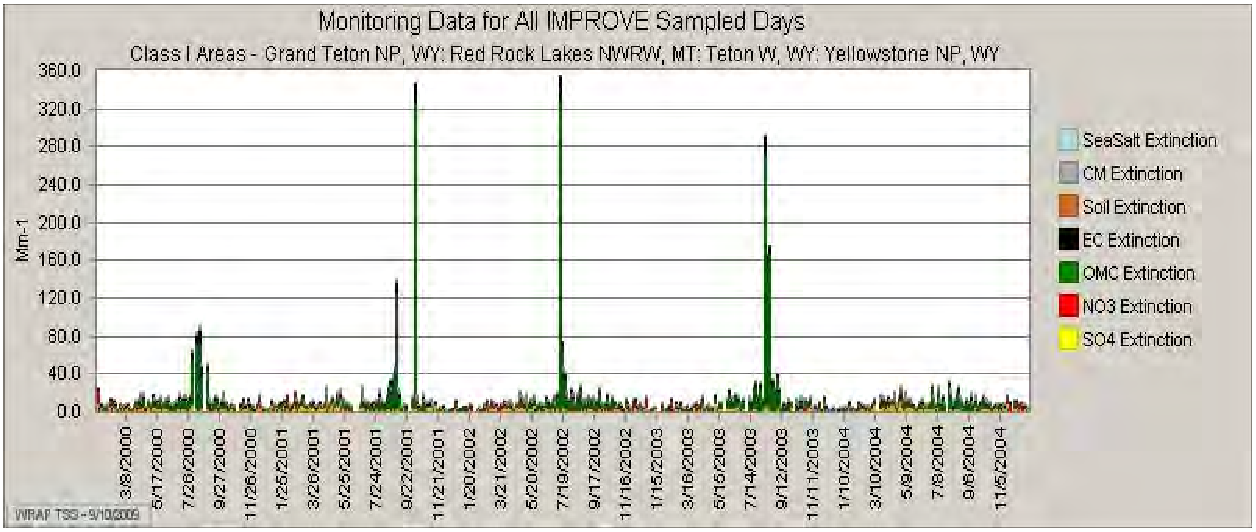


Figure 7-46. Yellowstone National Park 2000-2004 Pollutant Species Visibility Impairment All IMPROVE Monitoring Days

Looking closer at Figure 7-47, the monthly 20% worst days show trends similar to those in the Sawtooth and Selway-Bitterroot Wildernesses with summertime spikes of organic mass carbon. The scale makes it difficult to see whether there are other trends associated with other pollutants.

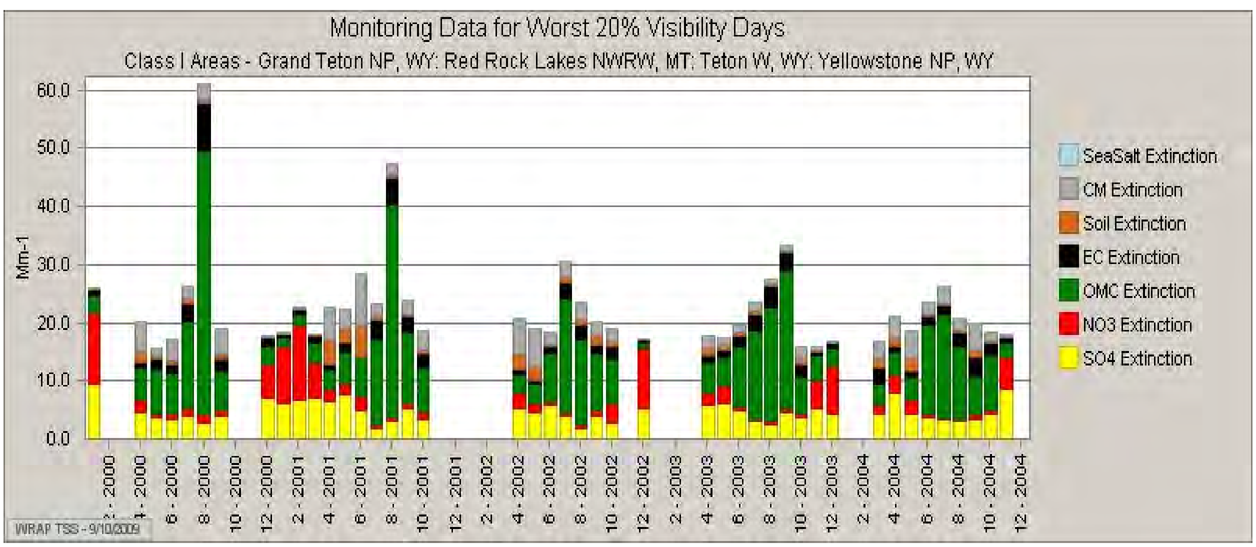


Figure 7-47 Yellowstone National Park Monthly 2000-2004 Visibility Impairment 20% Worst Days

Looking specifically at organic mass carbon in Figure 7-48, a strong fire season signature can be seen. The fire season hits the peak in late July and August and tapers off into the fall.

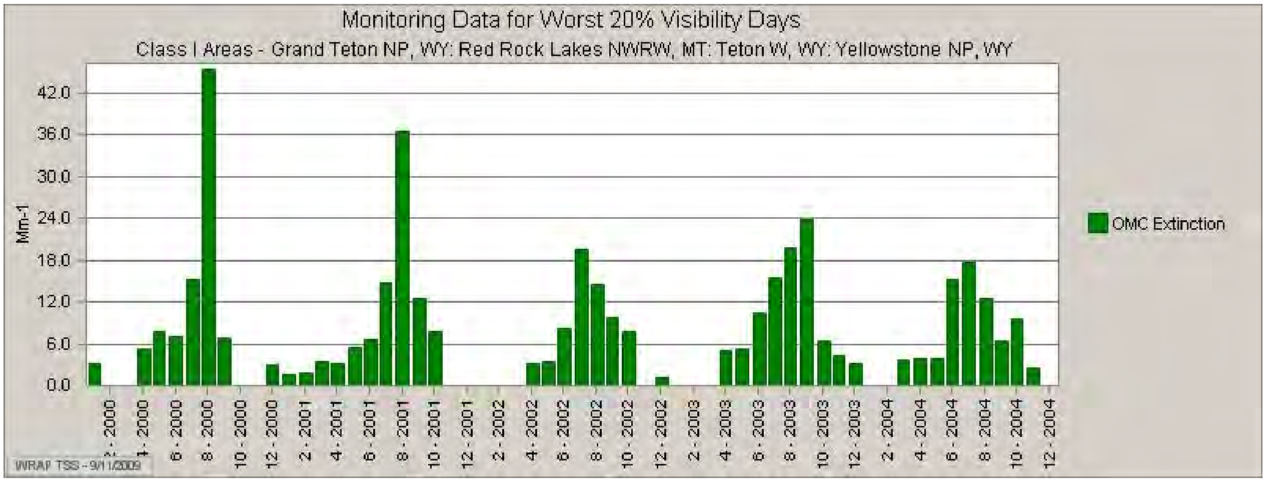


Figure 7-48 Yellowstone National Park Monthly 2000-Organic Mass Carbon Visibility Impairment 20% Worst Days

Similar to Craters of the Moon National Monument and Hells Canyon Wilderness, Figure 7-49 shows the biggest impact in Yellowstone National Park was from nitrate and sulfate starting in November and into early winter and tapering off into the falling fall season. This differs from the Sawtooth Wilderness area where the largest contributions were during May and June.

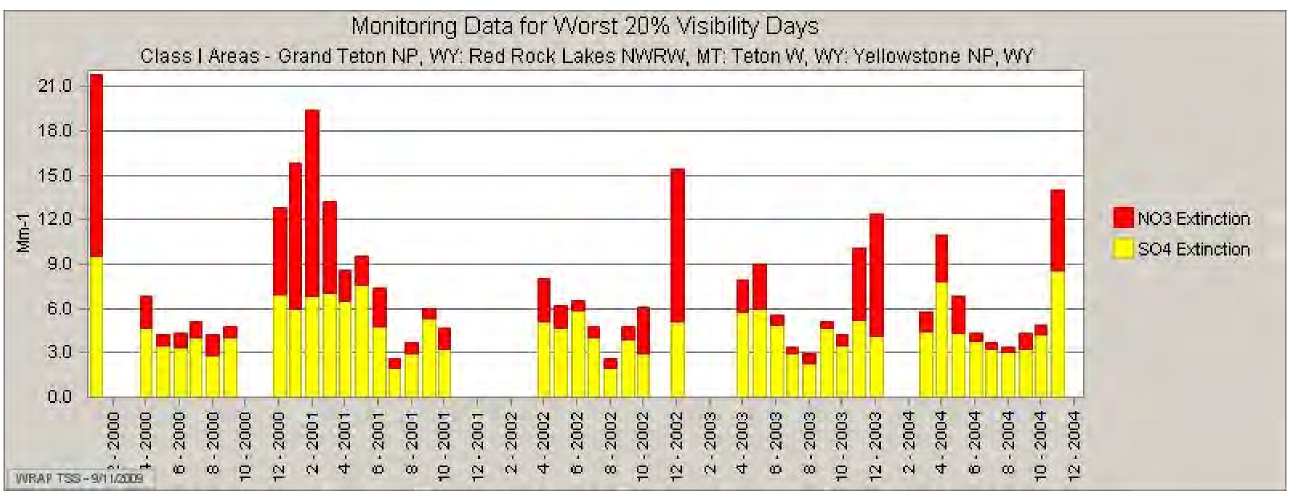


Figure 7-49 Yellowstone National park Monthly 2000-2004 NO3 and SO4 Visibility Impairment 20% Worst Days

7.6.2 Yellowstone National Park 20% Best Days

As shown in Figure 7-50, the visibility impacts during the 20% best days in the Selway-Bitterroot Wilderness show a greater impact from sulfate and nitrate and less but still substantial impact from organic coarse mass than the 20% worst days in 2002. Reductions in nitrate and sulfate should improve both the best and worst days.

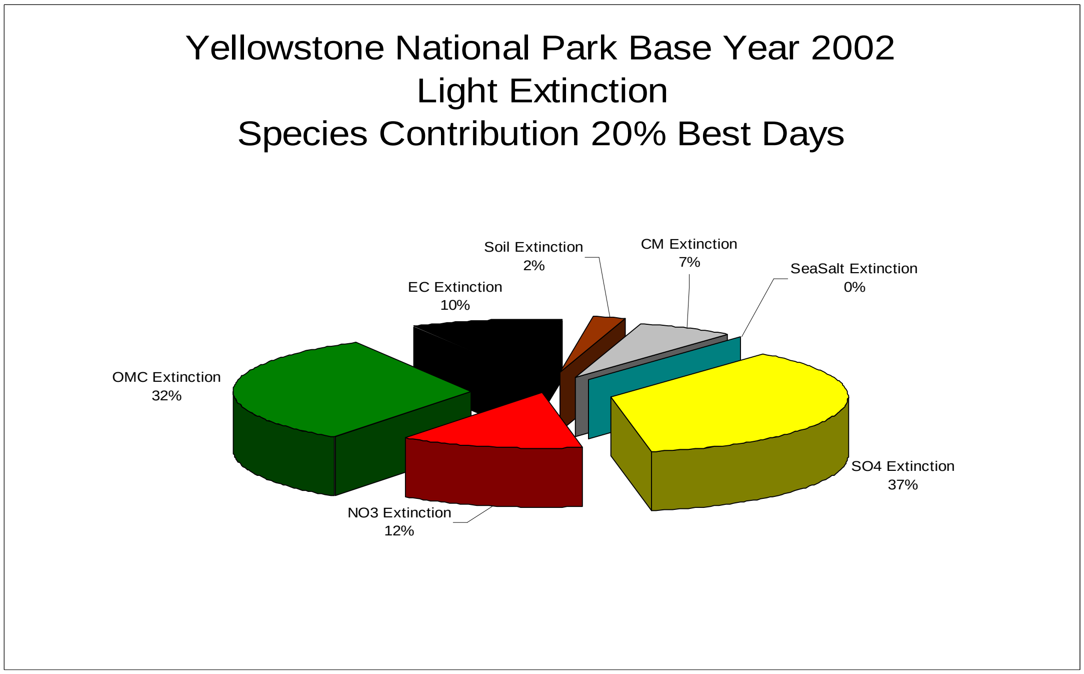


Figure 7-50 Yellowstone National Park 2002 Light Extinction 20% Best Days

Figure 7-51 shows annual 20% best days during the base time period in Yellowstone National Park are all with 1.5Mm-1 of each other and 2002 is representative of the other base years.

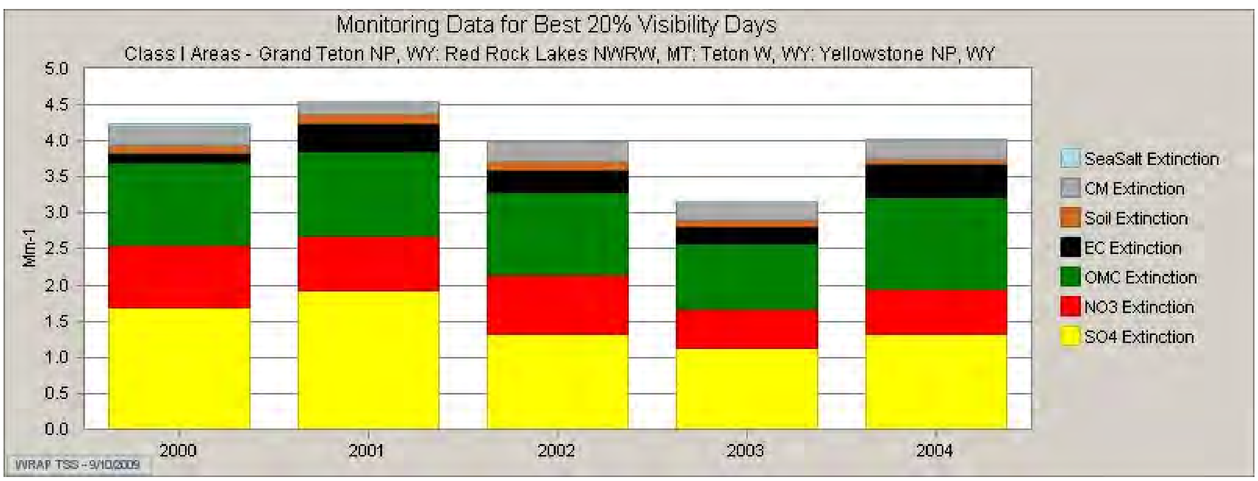


Figure 7-51. Yellowstone National Park Annual 2000-2004 Pollutant Species Light Impairment 20% Best Days

Figure 7-52 shows the base period average pollutant impact of 25.4Mm-1 with a needed improvement in visibility of 1.24dv by 2018 to stay in accord with the uniform rate of progress and a total improvement of 5.98dv needed by 2064 to meet natural conditions.

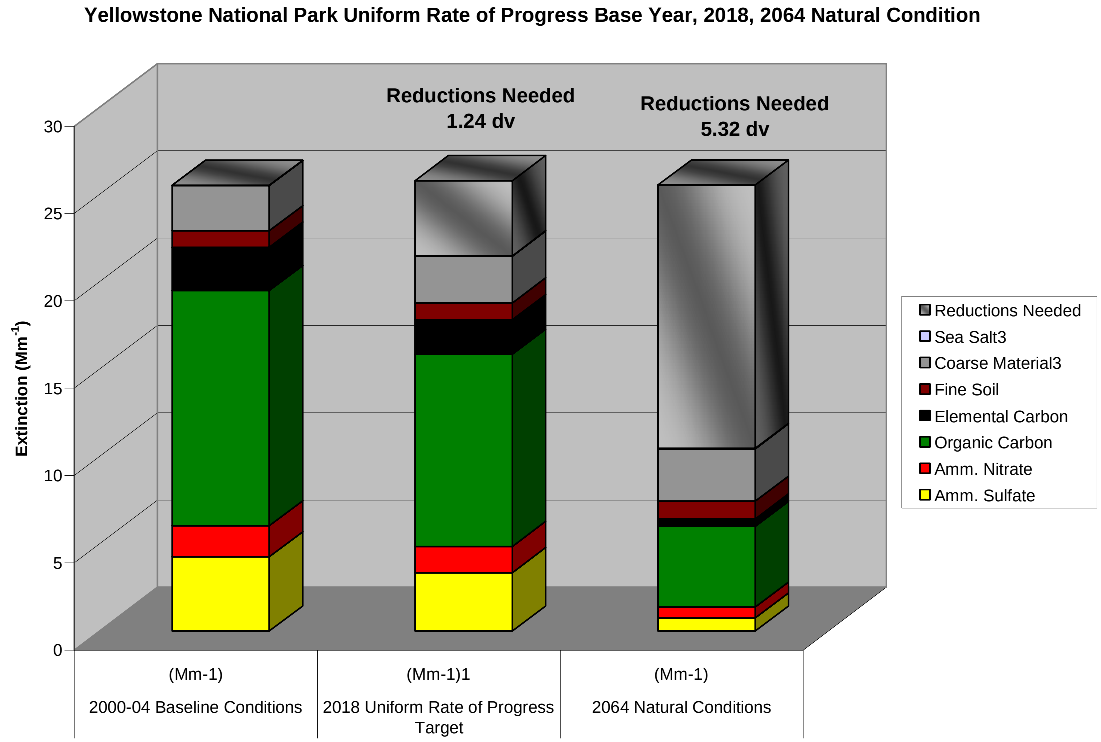


Figure 7-52. Yellowstone National Park Aerosol Light Extinction, Baseline (2000-2004), 2018 Target, 2064 Goal

Chapter 8. Emissions Source Inventory

8.1 Idaho Statewide Emissions Inventory

The root of visibility impairment in mandatory Class I areas is pollutant emissions. In determining what emissions to reduce to improve visibility, it is important to know the pollutant sources and have an understanding of the effect different pollutants have on visibility impairment. This chapter begins with a look at emissions and source types in Idaho. The second half of the chapter will look at emissions in the surrounding states that may be impacting visibility in mandatory federal Class I areas in Idaho. The focus will be on changes that are expected to occur during the first planning period starting in 2002 and ending in 2018. In an effort to be consistent with the following chapters, the emissions inventory was derived from the WRAP Plan "Plan02d" for the 2002 base year and "Plan Prp18b" for 2018. These are the most up-to-date emissions inventories developed by WRAP and the associated states and they are the inventories used for modeling in the following chapters. The emissions inventory was obtained from the WRAP technical Support System at: http://vista.cira.colostate.edu/TSS/Results/Emissions.aspx.

EPA's Regional Haze Rule (40 CFR 51.308(d)(4)(v)) requires "a statewide emission inventory that are anticipated to cause or contribute to visibility impairment in any mandatory Class I Federal area." Progress in the future will be based on the reductions between the baseline emissions identified at the beginning of the planning period and changes in emissions at the end of the planning period. The Regional Haze Rule also requires a mid planning period tracking of emissions (40 CFR 51.308(f)(5)). In addition, IMPROVE monitoring sites will be check to see if pollutant emission reductions are having a positive improvement on visibility. The pollutants of concern are sulfur dioxide (SO_2), nitrogen oxide (NO_x), volatile organic compounds (VOCs), organic carbon (OC) elemental carbon (EC), fine particulate of 2.5 microns or less ($PM_{2.5}$), coarse particulate (PM_{10}), and ammonia (NH_3). In the following tables, SO_2 and NO_x will include both the gaseous form and the particles formed by these pollutants. Ammonia is included because of its catalyst effect in photochemical particle formation. As discussed in Chapter 4.2, each of these pollutants has a different effect on visibility impairment.

The emissions sources are divided into the following broad categories: point, area, on-road mobile and off-road (combined as mobile), anthropogenic (human caused) fire, natural fire, road dust, fugitive dust, and windblown dust. Some of these emissions amounts are based on actual source emissions that are tracked (measured and recorded) while others, such as mobile, windblown dust, and fire are estimated based on modeling. For a full discussion on how these emissions amounts were estimated, see Appendix D. In the following tables, each pollutant is looked at separately by source category3.

3 The information used to develop these tables was taken from the WRAP technical support system. This information can be obtained at: http://vista.cira.colostate.edu/tss/Results/HazePlanning.aspx by following these steps: When the window opens, click on the "Emissions and Source Apportionment" box at the bottom of the window. Next, under "Data Review," click on the "Emissions Review Tool." A screen will open up that allows you to select pollutants, source categories, emission inventories, and source regions. For the following tables in this plan, emissions from "Idaho" using the emission inventory from "2000-04 – Baseline (plan02d)&PRPb(prp18b)" was used. When these options are selected, a

Since each of the source categories doesn't necessarily contribute to the emissions of the pollutants listed above, the tables will only include those categories that do contribute. As an example, neither fugitive dust or windblown dust contributes to SO_x or NO_x emissions, so these dust categories are not included in the tables for SO_x (Table 8-1) and NO_x (Table 8-2).

8.1.1 SO_X Emissions

Sulfur dioxide emissions are usually associated with the burning of fossil fuels. This source category is largely attributed to anthropogenic (human–caused) activities and in many instances is the primary pollutant that can be reduced to improve visibility. The tables below show each of the pollutants' primary source categories and the reductions that are expected to occur between 2002 and 2018 due to control measures already on the books (rules and ordinances already in place require pollutant emission controls) or control strategies that are expected to be implemented during the first planning period. The emissions reduction amounts shown in the tables include both the gaseous form and the particulate form. As table 8-1 depicts, point source activity is the largest contributor to SO_x emissions in Idaho. The point source emissions primarily come from burning coal to heat industrial boilers and other industrial activities. The second largest source category is fire. Unfortunately, only 2% of the fire-related emissions come from anthropogenic sources, so there is very little control available for reducing the overall fire-related emissions. The third largest category is mobile (on-road and off-road), contributing a combined 13% in 2002.

There are major reductions expected by 2018. Emission reductions expected from point sources are largely associated with emissions reductions that will result from implementing Best Available Retrofit Technology (BART) according to requirements, which will be discussed in Chapter 9. A large majority of these reductions have already occurred. The emissions reductions from the mobile category are associated with reductions in the sulfur content of fuels required under the Federal Tier II mobile regulations and off-road diesel requirements. Overall, Idaho is reducing SOx emissions by 33.9%.

Table 8-1 Idaho SO_2 Statewide Emissions Inventory 2002-2018

Idaho Statewide Sulfate Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	17,613	9,395	-8,218	-46.7%	45%
Area	3,280	3,539	259	7.9%	8%
On-Road Mobile	1,662	209	-1,453	-87.4%	4%
Off-Road Mobile	3,702	290	-3,412	-92.2%	9%
Anthropogenic Fire	895	445	-450	-50.3%	2%
Natural Fire	12,008	12,008	0	0.0%	31%
Total	39,159	25,885	-13,274	-33.9%	100%

graph showing the pollutant by source category by base and future year will appear. The data used to develop these graphs and the following tables can be obtained by clicking on the "show data" choice at the bottom of each graph.

8.1.2 NO_X Emissions

Nitrogen oxide emissions, like SO_x emissions, also comes primarily from anthropogenic sources emissions, for which there is great promise in reductions to improve visibility in mandatory federal Class I areas. The NOx emissions in table 8-2 include both the gaseous and particulate forms of NO_x. NO_x emissions are usually attributed to burning of fuel which can range from fossil fuels to wood. The largest category contribution comes from mobile sources which, combined, contribute 46% of the overall NO_x emissions. The area source category is the second largest anthropogenic source and area emissions are associated with heating of buildings and other general population-based activities.

The 2018 emissions from mobile sources are expected to drop dramatically. The federal motor vehicle emissions standards are expected to ratchet down the levels of allowable NO_x emissions, so as vehicle fleets turn over and put newer vehicles on the road, large NO_x reductions will occur. Emissions from both point sources and area sources are expected to increase due to increases in population and startup of new industrial sources. Although the industrial sources will be required to meet New Source Review standards, there will be new industry and therefore additional NO_x emissions. The second largest category is fire, of which only 2% of the 2002 emissions were anthropogenic. Natural fire is held at a constant from the base year with only a slight overall change due to the 51% reduction from anthropogenic fire. Overall, Idaho has reduced NOx emissions by 20.6%.

Table 8-2 Idaho NOx Statewide Emissions Inventory 2002-2018

Idaho Statewide Nitrate Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	11,487	12,057	570	5.0%	7%
Area	30,318	42,068	11,750	38.8%	19%
On-Road Mobile	44,611	12,326	-32,285	-72.4%	28%
Off-Road Mobile	27,922	17,235	-10,687	-38.3%	18%
Anthropogenic Fire	3,461	1,693	-1,768	-51.1%	2%
Natural Fire	39,401	39,401	0	0.0%	25%
Total	157,199	124,780	-32,420	-20.6%	100%

8.1.3 VOC Emissions

Volatile organic compounds are highly evaporative and usually associated with industrial solvents, paints, refrigerants, pharmaceuticals, and other man-made chemicals. The same properties that make these chemicals excellent as solvents make them very reactive in secondary particle formation. Emissions of VOCs are separated out from the other forms of carbon emissions because VOCs are primarily associated with human-caused activities and should be tracked through the photochemical and other modeling approaches to identify visibility impairment due to human-caused carbon emissions. The largest source category for VOC emissions in 2002 was area source emissions, as shown in Table 8-3. These are primarily emissions associated with the general population and small business source activities.

These activities range from home painting to small businesses using solvents to clean parts. The second largest man-made source is mobile with a combined 2002 contribution of 19%. Sources in the on-road mobile category provide a larger contribution than off-road mobile sources due to the higher percentage of gasoline fuel vehicles in the on-road fleet and because of the higher evaporative effects of gasoline in comparison to diesel fuel.

The projected 2018 emissions inventory shows the expansive growth in emissions expected from area source emissions because of the direct link to population and business growth. However, this category shows great promise for future emissions reductions. There are numerous control strategies such as vapor recovery at gas stations, using ultrasound instead of solvents for parts cleaning, and using non-solvent based paint. Mobile VOC emissions are expected to decline in future years because of federal vehicle emissions standards and the turnover of the vehicle fleet from carbureted to fuel injected systems as well as other on-board vapor recovery systems. Emissions from anthropogenic fire is also expected to decrease in the future due to improvements in smoke management programs. Overall, Idaho's VOC emissions are expected to increase by 19.2%. Because of this increase, DEQ should investigate the possible implementation control strategies for area source VOC emissions during the first planning period.

Table 8-3 Idaho VOC Statewide Emissions Inventory 2002-2018

Idaho Statewide VOC Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	2,113	3,017	904	42.8%	1%
Area	124,137	203,867	79,729	64.2%	46%
On-Road Mobile	26,972	10,332	-16,640	-61.7%	10%
Off-Road Mobile	23,511	15,931	-7,580	-32.2%	9%
Anthropogenic Fire	8,316	3,967	-4,349	-52.3%	3%
Natural Fire	86,162	86,162	0	0.0%	32%
Total	271,211	323,275	52,064	19.2%	100%

8.1.4 Organic Carbon

Organic carbon is usually thought of as carbon associated with natural sources such as decaying bio-mass but this isn't always the case. Organic carbon can come from man-made sources such as wood stove combustion and transportation sources. Table 8-4 shows that the largest source of organic carbon is from fire with natural fire contributing 82% of the 2002 organic carbon emissions. The contributions from natural fire dwarf the contributions from all other emissions categories. Although natural fire is assumed to be constant in future years, the dramatic fluctuations in wildfires emissions from year to year can be extensive. Storm cycles, drought and fuel loading, and possibly global climate change could all contribute to changes in wildfire emissions. Because of organic carbon's ability to impact visibility more than other pollutants, small changes in concentrations greatly affect visibility.

Table 8-4 Idaho Organic Carbon Statewide Emissions Inventory 2002-2018

Idaho Statewide Primary Organic Aerosol Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	106	133	26	24.9%	0%
Area	425	617	192	45.2%	1%
On-Road Mobile	383	341	-42	-10.8%	1%
Off-Road Mobile	747	424	-322	-43.1%	1%
Anthropogenic Fire	8,454	4,089	-4,366	-51.6%	15%
Natural Fire	47,883	47,883	0	0.0%	82%
Road Dust	150	197	48	32.0%	0%
Fugitive Dust	156	203	47	30.1%	0%
Total	58,304	53,888	-4,416	-7.6%	100%

8.1.5 Elemental Carbon

Elemental carbon is usually associated with incomplete combustion of fuels. Elemental carbon comprises the fraction of carbon known as light-absorbing carbon (LAC) and has a visibility impairment effect 10 times greater than soil does. As with VOCs, the largest source of elemental carbon is natural fire at 72% of the 2002 emissions, as shown in Table 8-5. The second largest source category is off-road diesel at 14% and anthropogenic fire is the third largest with a 10% contribution in 2002. Elemental carbon can be seen emitting from diesel exhaust as black soot particles.

In the first planning period, Federal vehicle fuel standards are expected to reduce off-road diesel elemental carbon emissions by 64%. Changes in burning techniques, alternatives to burning, and advances in smoke management programs are expect to reduce elemental carbon from anthropogenic fire by 51% during the first planning period. Overall, Idaho elemental carbon emissions are expected to reduce by 15% by 2018. However, since natural fire is the largest source of elemental carbon, an increase in this category could overwhelm the overall reduction associated with off-road diesel and anthropogenic fire.

Table 8-5 Idaho Elemental Carbon Statewide Emissions Inventory 2002-2018

Idaho Statewide Elemental Carbon Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	11	15	4	32.3%	0%
Area	192	257	65	33.9%	1%
On-Road Mobile	390	102	-288	-73.8%	3%
Off-Road Mobile	1,859	663	-1,196	-64.3%	14%
Anthropogenic Fire	1,331	656	-675	-50.7%	10%

Idaho Statewide Elemental Carbon Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Natural Fire	9,938	9,938	0	0.0%	72%
Road Dust	11	15	4	32.0%	0%
Fugitive Dust	11	14	3	30.1%	0%
Total	13,743	11,659	-2,084	-15.2%	100%

8.1.6 Fine Particulate Matter - PM Fine Emissions

PM fine includes particulate matter of 2.5 microns and less. PM fine is composed of secondary aerosols formed by chemical reactions (excluding particulates of SO_x and NO_x), fine soil, or other materials ground to 2.5 microns or less. The $PM_{2.5}$ emissions from the mobile category are captured in the particulates accounted for in the NO_x and SO_x emissions. Table 8-6 shows the largest source category of PM fine is windblown dust at 26% (agriculture, mining, construction, and stockpiling of blowable material). Area source is the second largest source category with emissions attributed to things like woodstoves and small manufacturing and industrial source activities.

Future PM fine emissions from both area and point sources are expected to increase with the growth in population and industrial sources. Some of the increase is expected to be offset with the 54% reduction anticipated from anthropogenic fire. Overall, PM fine is expected to grow roughly 12% by 2018.

Table 8-6 Idaho PM Fine Statewide Emissions Inventory 2002-2018

Idaho Statewide Fine Particulate Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	305	386	82	26.8%	2%
Area	4,749	6,343	1,595	33.6%	24%
On-Road Mobile	0	0	0	0%	0%
Off-Road Mobile	0	0	0	0%	0%
Anthropogenic Fire	1,536	713	-823	-53.6%	8%
Natural Fire	3,013	3,013	0	0.0%	15%
Road Dust	2,153	2,841	688	32.0%	11%
Fugitive Dust	2,687	3,495	808	30.1%	14%
Wind Blown Dust	5,050	5,050	0	0.0%	26%
Total	19,492	21,842	2,350	12.1%	100%

8.1.7 PM Coarse Emissions

PM coarse is the fraction of particulate matter that includes particles between 2.5 and 10 microns in size. PM coarse is composed of larger particles of wind blown dust, and other particles ground through industrial grinding processes. Other sources include materials that have been stockpiled and available for wind transport, transporting materials, road dust from both paved and unpaved roads, agriculture, and mining, to name a few. Table 8-7 shows the largest source category for PM coarse emissions is windblown dust at 40%. Most of these emissions come from wind blowing over the vast undeveloped erodible lands in Idaho as well as lands left barren through agriculture, construction, and mining activities.

The only source of PM coarse emissions for which future reductions are indicated is anthropogenic fire. Point source, road dust, and fugitive dust are all expected to increase substantially during the first planning period. The reductions in future anthropogenic fire are outweighed by the increases in other categories with an overall increase in Idaho PM coarse emissions of 12% by 2018. The good news is that PM coarse has the least impact on visibility of any of the pollutants.

Table 8-7 Idaho PM Coarse Statewide Emissions Inventory 2002-2018

Idaho Statewide Coarse Particulate Matter Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	643	937	294	45.8%	1%
Area	2,933	3,216	283	9.6%	3%
On-Road Mobile	238	259	20	8.5%	0%
Off-Road Mobile	0	0	0	0.0%	0%
Anthropogenic Fire	1,354	655	-699	-51.7%	1%
Natural Fire	25,323	25,323	0	0.0%	22%
Road Dust	19,690	25,987	6,297	32.0%	17%
Fugitive Dust	17,496	24,807	7,311	41.8%	15%
Wind Blown Dust	45,451	45,451	0	0.0%	40%
Total	113,127	126,633	13,507	11.9%	100%

8.1.8 Ammonia Emissions

While ammonia emissions do not directly affect visibility impairment, ammonia does act as an agent in the formation of secondary aerosols such as ammonium nitrate and ammonium sulfate. It is important to track ammonia emissions amounts because both of the secondary aerosols mentioned above have major impacts on visibility impairment. As table 8-8 shows, area source is the predominant source category, contributing 85% of the ammonia in 2002. Most of the area source emissions of ammonia come from agriculture fertilizing and feedlot operations. It should be noted that this emissions inventory is highly variable due to the unknowns in science and monitoring data relating to ammonia.

Area source emissions of ammonia are expected to grow less than 1% over the first planning period with a total increase in Idaho of 1.3%.

Table 8-8 Idaho Ammonia Statewide Emissions Inventory 2002-2018

Idaho Statewide Ammonia Emissions (tons/year)					
Source Category	Plan02d 2002	Prp18b 2018	Net Change		2002 Source Contribution
Point	1,043	1,593	550	52.8%	1%
Area	67,293	67,898	605	0.9%	85%
On-Road Mobile	1,430	1,930	499	34.9%	2%
Off-Road Mobile	17	24	7	40.0%	0%
Anthropogenic Fire	1,253	584	-669	-53.4%	2%
Natural Fire	8,246	8,246	0	0.0%	10%
Total	79,282	80,275	993	1.3%	100%

8.2 Regional Emissions

8.2.1 Idaho vs. Surrounding States: Introduction

As mentioned at the beginning of the chapter, EPA's Regional Haze Rule requires states to look at pollutants that are anticipated to cause or contribute to visibility impairment in mandatory federal Class I areas. For each Class I area, the rule (40 CFR 51.308(d)(1)(B)(iv)) instructs states to, "consult with those States which may reasonably be anticipated to cause or contribute to visibility impairment in the mandatory Class I Federal area." Reviewing the emissions inventory of those states surrounding Idaho is the first step in determining if other states have the potential to cause or contribute to visibility impairment in Idaho's mandatory federal Class I areas.

Reviewing emissions levels from Washington, Oregon, Nevada, Utah, Wyoming, and Montana also provides an opportunity to analyze Idaho's relative emissions in relation to those of the surrounding states. Knowing the relative emissions provides better understanding of what can be expected from in-state emissions control strategies when considered in a broader sense. In-state emissions reductions may be offset by large emissions increases in upwind states and, conversely, in-state increases may be offset by large reductions in upwind states. The emissions inventory is the first step in understanding visibility impacts; applying air dispersion modeling and other weighted emissions factors will provide additional weight of evidence in future chapters.

The tables in the remainder of this chapter provide emissions amounts of each pollutant from sources in these categories: windblown dust (WB), fugitive dust, road dust, off –road mobile, on-road mobile, WRAP area oil and gas (O&G), area, biogenic, all fire, natural fire, anthropogenic fire and point source. The pollutant emissions will follow the same color coding as used in chapter 7. The emissions inventories used for this analysis are the 2002-2004 baseline from (plan02d) and 2018 from PRPb (prp18b). These graphs were taken from the same source as described in the footnote at the beginning of the chapter.

8.2.2 Surrounding States SO_2 Emissions

As depicted in Table 8-9, all of the states surrounding are projected to have declining emissions in future years. Idaho's emissions are smaller than those of surrounding states with the major emissions coming from point sources and natural fire. The other states emissions are primarily from point source with some from area and off-road sources. Both Oregon and Washington show major reductions expected in SOx.

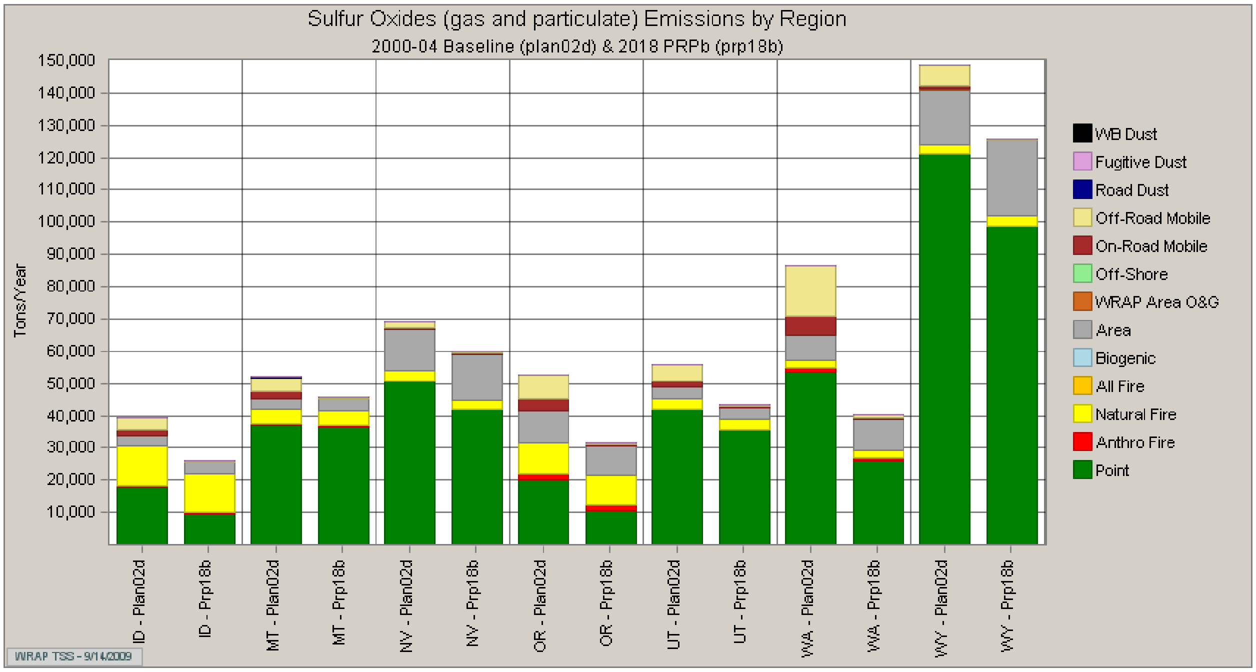


Table 8-9 Idaho vs. Surrounding States SO_2 Emissions Inventory

8.2.3 Surrounding States NOx Emissions

The NO_x 2002 baseline emissions and 2018 projected emissions show a difference in source contribution with on-road and off-road mobile sources contributing more than point sources. These reductions are projected to result from federal vehicle emissions standards and fleet turnover. All the surrounding states are reduced NOx emissions in future years. As table 8-10 indicates, Idaho is one of the only states expecting an increase in area source emissions in future years.

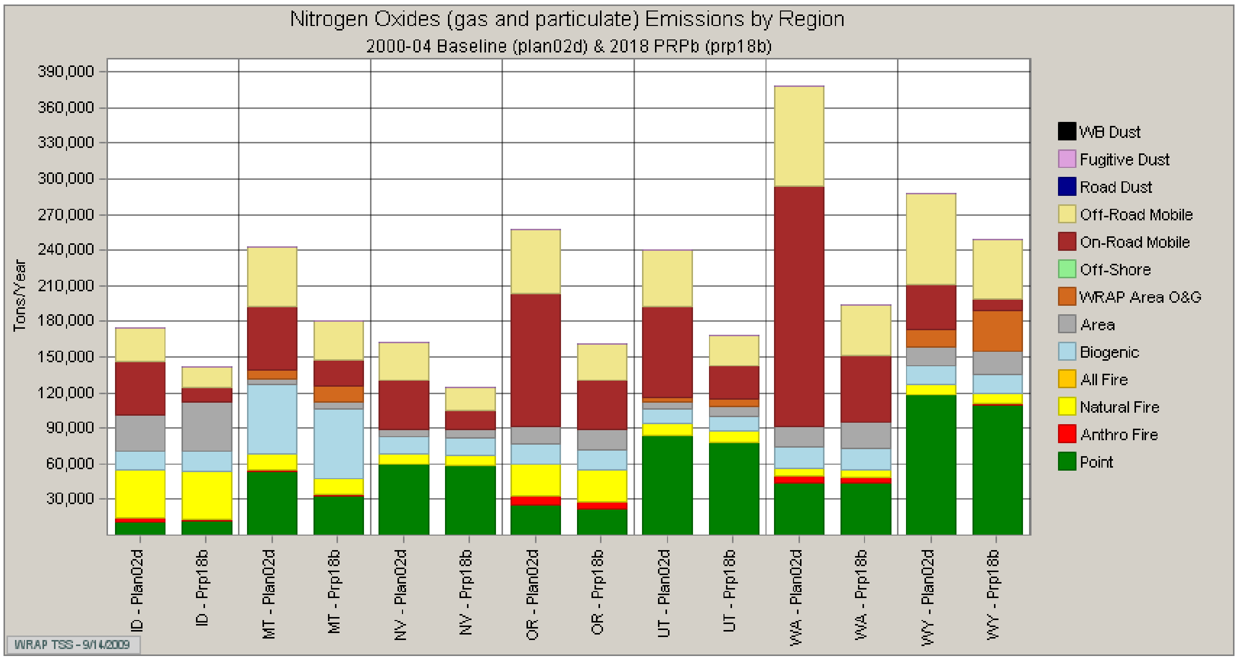


Table 8-10 Idaho vs. Surrounding States NOx Emissions Inventory

8.2.4 Surrounding States VOC Emissions

Table 8-11 shows biogenic emissions are the predominant source of VOC emissions. Washington seems to be the only state expecting declining future year emissions due to reductions in off-road mobile emissions. Although all states are expected to have reductions in future year emissions from on-road mobile, these decreases are offset by expected increases in area source emissions. Area source emissions are expected to increase in the future because of the close connection with population growth.

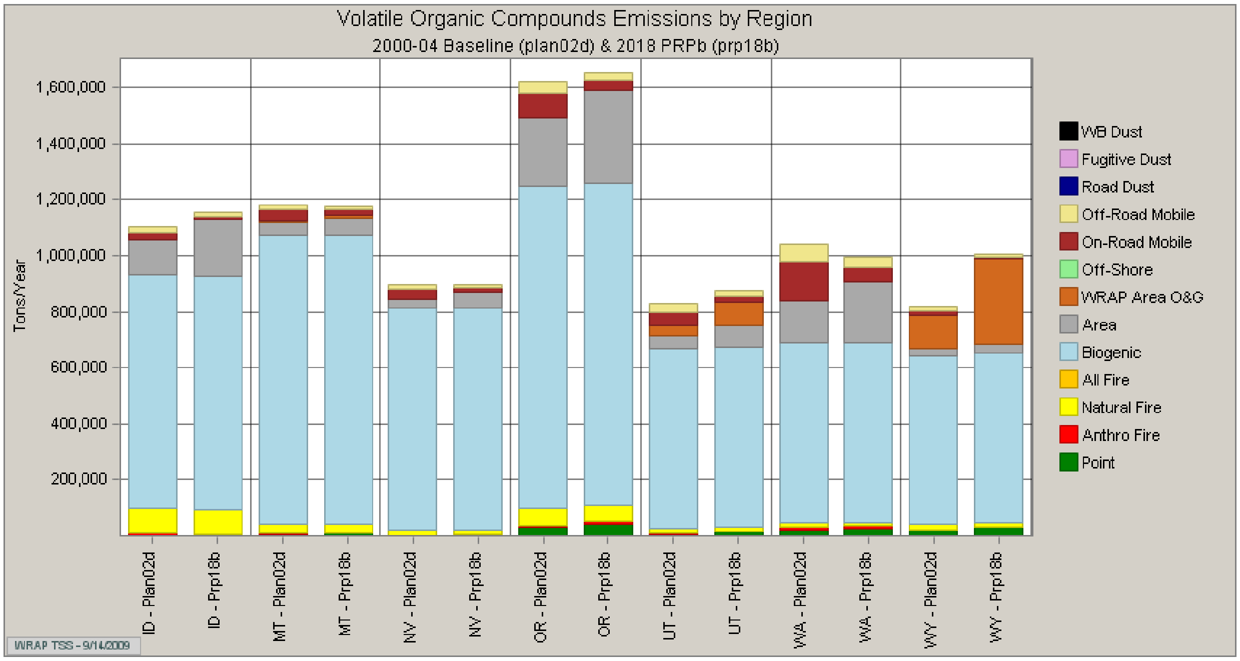


Table 8-11 Idaho vs. Surrounding States VOC Emissions Inventory

8.2.5 Surrounding States Organic Carbon Emissions

Like other carbon emissions, organic carbon is driven by fire sources with natural fire being the predominant source. Table 8-12 does show each state is expecting a very slight decrease in overall organic emissions due to reductions expected from anthropogenic fire. Oregon does stand out in the graph as the state with the largest emissions mostly coming from natural fire. This observation should be noted since a large fire year in Oregon in 2002 could affect visibility modeling results attributed to organic carbon from Oregon. Like Oregon, Idaho's 2002 natural fire emissions are larger than those of surrounding states. The huge variability in natural fire from year to year could be overstating emissions from some states and under-predicting the average year in other states. The impacts from natural fire were held constant since future changes to fire are difficult to project. However, droughts and the effects of climate change may drastically change future year organic carbon from natural fire. Unfortunately, because of organic carbon's heightened ability to impair visibility, greater than SO_x and NO_x, future controls on human-caused emissions may be overwhelmed by future increases from organic carbon.

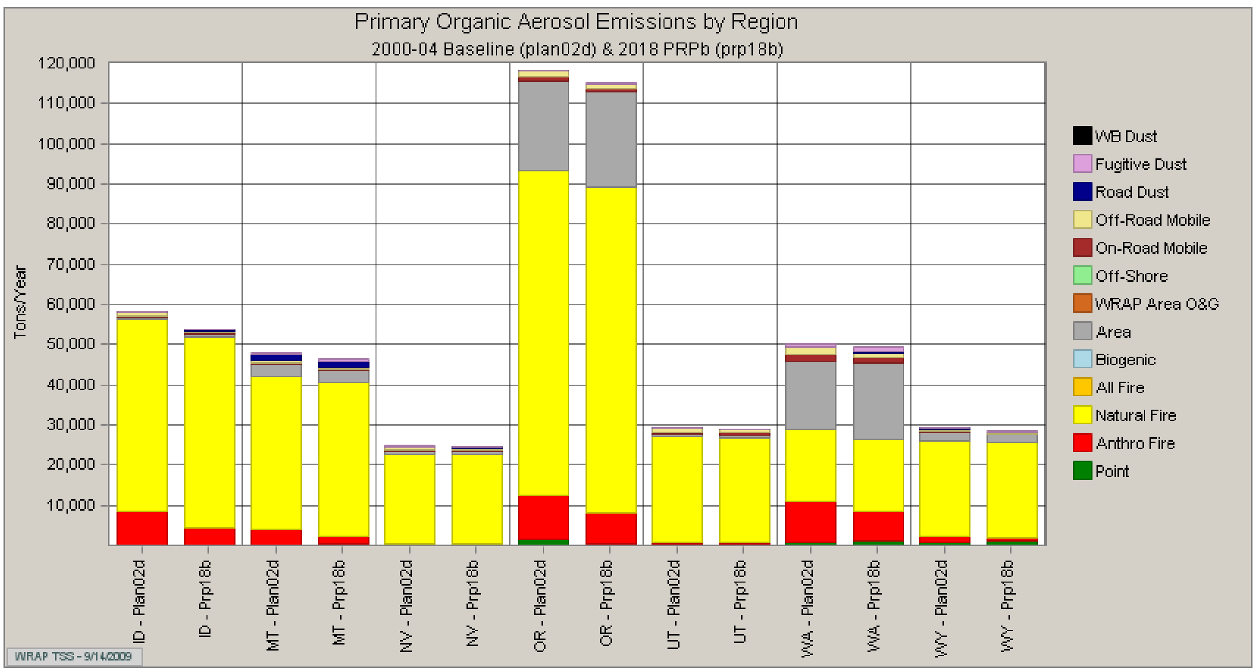


Table 8-12 Idaho vs. Surrounding States Organic Carbon Emissions Inventory

8.2.6 Surrounding States Elemental Carbon Emissions

Table 8-13 indicates elemental carbon emissions are similar to organic carbon emissions with a high percentage of the emissions coming from natural fires. Overall, there are greater reductions expected in elemental carbon than organic carbon due to reductions from off-road mobile sources. Most states with anthropogenic fire emissions in the base year are expecting emissions reductions in future years. Overall, most states appear to be reducing elemental carbon by roughly 2,000 tons per year.

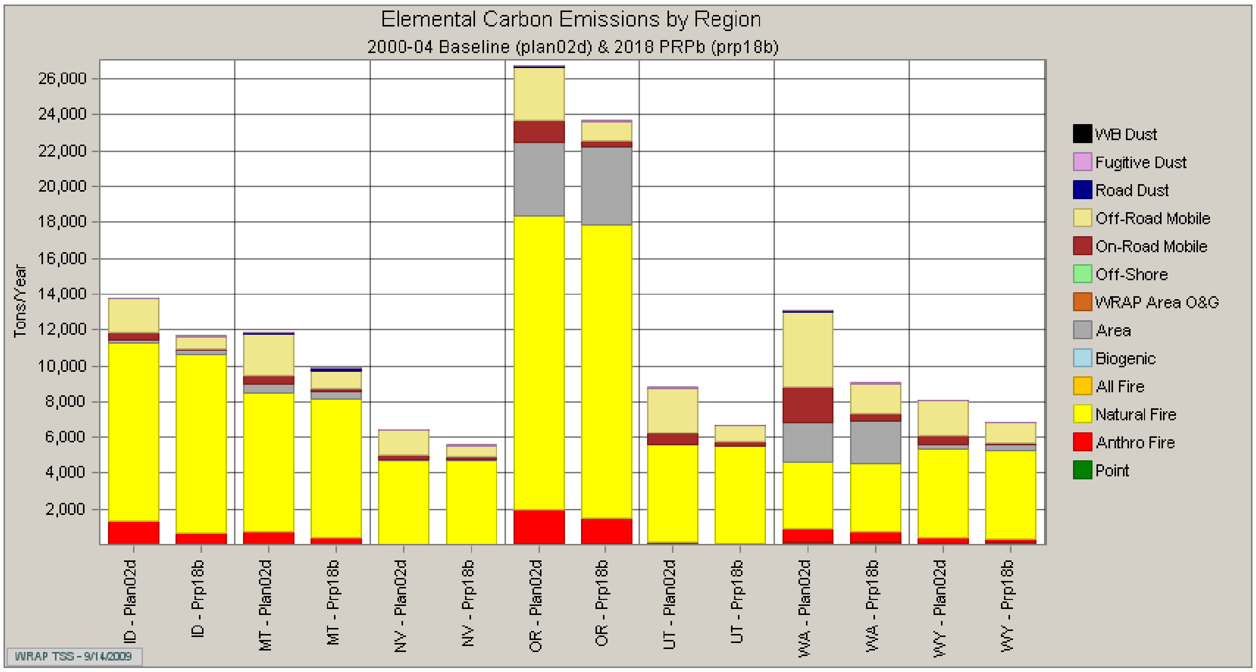


Table 8-13 Idaho vs. Surrounding States Elemental Carbon Emissions Inventory

8.2.7 Surrounding States PM Fine Emissions

Table 8-14 shows Oregon and Nevada as the only two states projecting a slight decrease in fine particulate. Idaho's emissions are smaller than most states with the exception of Utah which is only slightly lower. There is great variability in the relative contributions from the different source categories in each state. Montana appears to have much greater PM fine emissions than other states but this may be due to the way Montana calculates fugitive dust from its large number of unpaved roads.

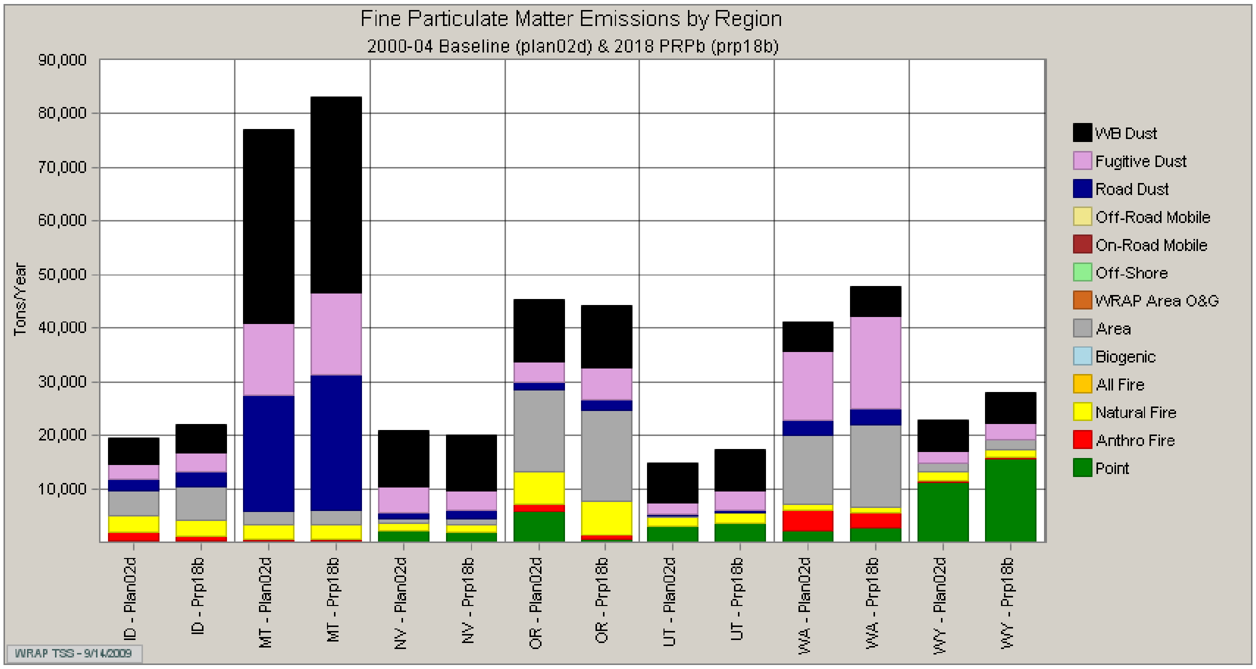


Table 8-14 Idaho vs. Surrounding States PM Fine Emissions Inventory

8.2.8 Surrounding States PM Coarse Emissions

With the exception of Montana, most of the surrounding states are showing coarse particulate between roughly 100,000 and 200,000 tons per year. Again, this may be the way Montana calculates emissions from unpaved roads and fugitive emissions. All of the states are expected to experience minor increases of PM coarse emissions for future years primarily from fugitive dust and windblown dust sources. When looking at coarse particulate matter emissions, it is important to keep in mind that coarse PM has a faster deposition rate than finer particulate; therefore, there is less interstate transport of coarse PM than fine PM as shown in Figure 8-15.

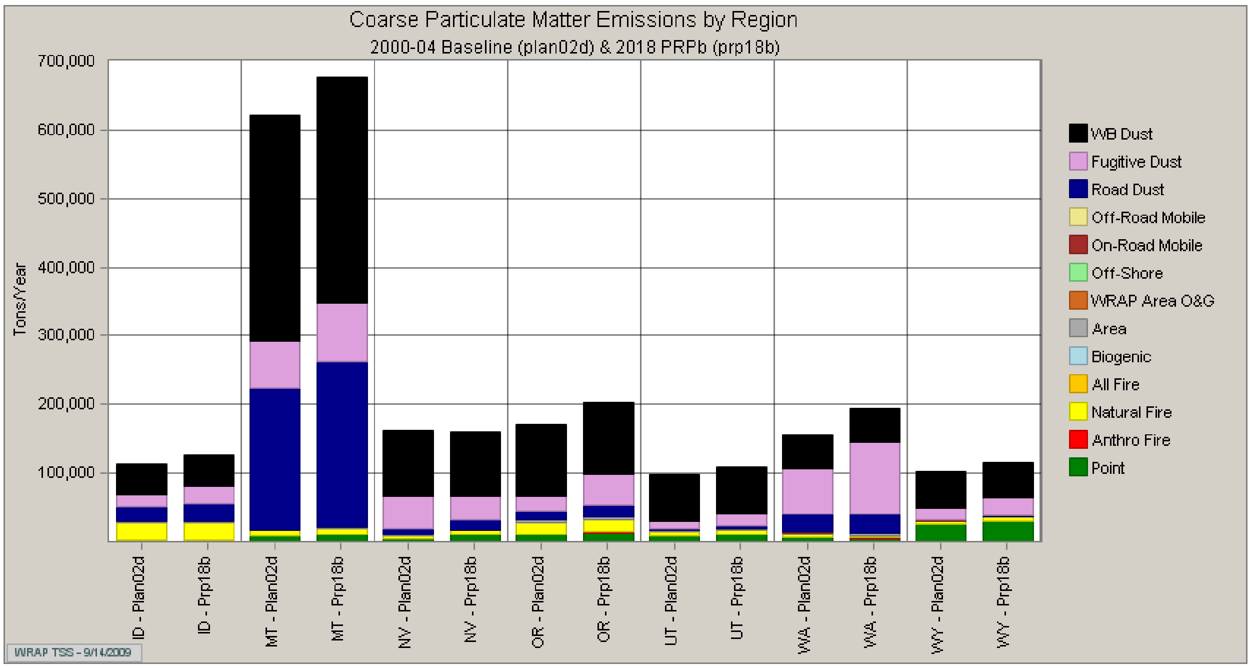


Table 8-15 Idaho vs. Surrounding States PM Coarse Emissions Inventory

8.2.9 Surrounding States Ammonia Emissions

As shown in Figure 8-16, Idaho's ammonia emissions are much larger than those of the surrounding states and are primarily coming from confined animal feedlot operations, agriculture, and other area sources. Over the first planning period, a small amount of increase in ammonia emissions is expected from on-road mobile sources, primarily due to population increases and the associated additional vehicle miles traveled.

Since ammonia plays a large part in visibility impact due to the formation of ammonium sulfate and ammonia nitrate, it should receive increased focus during the first planning period. This will require more research on the wet and dry deposition rates of ammonia and its chemical reactions with other pollutants. It may also require changes in monitoring for nitrogen and ammonia to get a better understanding how these pollutants are transported and the chemical reactions that are occurring. WRAP should be the centralized organization that compiles and helps coordinate the activities of the federal land managers, contractors, and the states so the information and studies are readily available for all of those interested.

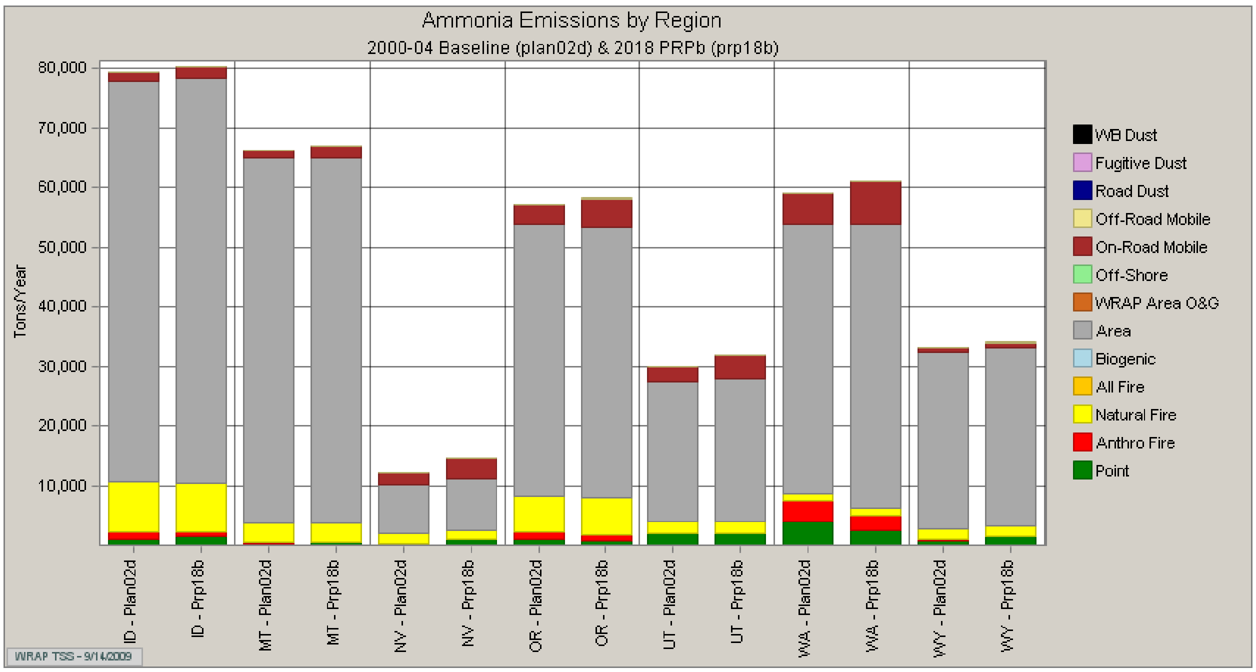


Table 8-16 Idaho vs. Surrounding States Ammonia Emissions Inventory

Chapter 9. Source Apportionment

9.1 Overview of Source Apportionment

EPA's Regional Haze Rule requires each state to submit a long-term strategy that addresses regional haze visibility impairment for each mandatory class I Federal area inside the state and outside the state which may be affected by emissions from the state (40 CFR 51.308(d)(3)). In establishing the long-term strategy for regional haze, the state must meet the following requirements:

> *Where the State has emission that are reasonably anticipated to contribute to visibility impairment in any mandatory Class I Federal area located in another State or States, the State must consult with the other State(s) in order to develop coordinated emission management strategies. The State must consult with any other State having emissions that are reasonably anticipated to contribute to visibility impairment in any mandatory Class I Federal area within the State (40 CFR 308(d)(3)(i)).*
>
> *Where other States cause or contribute to impairment in a mandatory Class I Federal area, the State must demonstrate that it has included in its implementation plan all measures necessary to obtain its share of the emissions reductions needed to meet the progress goal for the area. If the state has participated in a regional planning process, the State must ensure it has included all measures needed to achieve its apportionment of emission reductions obligations agreed upon through the process (40 CFR 51.308(d)(3)(ii)).*
>
> *The State must document the technical basis, including modeling, monitoring and emissions information, on which the State is relying to determine its apportionment of emission reduction obligations necessary for achieving reasonable progress in each mandatory Class I Federal area it affects. The State may meet this requirement by relying on technical analyses developed by the regional planning organization and approved by all State participants. The State must identify the baseline emissions inventory on which its strategies are based. The baseline emissions inventory year is presumed to be the most recent year of the consolidated periodic emissions inventory (40 CFR 51.308(d)(3)(iii)).*

The state should consider major and minor sources, area sources, and mobile sources as part of the attribution process. This chapter will focus on each state's contribution to regional visibility impairment from the anthropogenic sources of point, area, mobile, and anthropogenic fire as well as the natural contributions from windblown dust and wild fire. In some instances, fugitives will be included in the apportionment.

Two different modeling approaches were used to develop a weight of evidence for each state's contribution of the visibility-impairing pollutants and source categories. Each Class I area within Idaho was reviewed using both CAMx PSAT and WEP approaches and then both sets of results were evaluated to determine which model provided more accurate results for each pollutant. For nitrates and sulfates, modeling results from the Comprehensive Air Quality Model with Extensions (CAMx) PM Source Apportionment Technology (PSAT) model were used to trace the sources, categories, and states of origin. For the carbon pollutants (primary organic aerosol) and both fine and coarse particulate matter, a weight of emissions potential (WEP) analysis was used to track the sources, categories, and states of origin. Later in the chapter, Idaho's impacts on Class I areas residing outside the state or with shared borders will use a similar approach to investigate any contributions to visibility impairment in those areas that come from Idaho.

9.1.1 Introduction to Air Dispersion and Source Apportionment Modeling Using PM Source Apportionment Technology (PSAT)

The WRAP and member states relied upon two different gridded three-dimensional photochemical Eulerian models: EPA's Community Multi-Scale Air Quality Model (CMAQ) and ENVIRON Inc.'s Comprehensive Air Quality Model with Extensions (CAMx). Both of these models include mass-tracking algorithms to explicitly track the chemical transformations, transport, and removal of the particulate that was formed from a given emissions source. At the time of the apportionment modeling, the CAMx PSAT (PM Source Apportionment Technology) model did a better job of identifying total mass contribution than the CMAQ TSSA (Tagged Species Source Apportionment) model that was available at the time[4].

The CAMx PSAT apportionment modeling used the 2002 Plan02c emissions inventory for the baseline emissions and 2018 Base Case 18b emissions inventory for the future year emissions. The WRAP originally intended to conduct apportionment modeling again later when refined models and updated emissions inventories became available, but was not able to do so because of funding concerns. Therefore, this plan relies on the initial apportionment modeling performed by WRAP, and that creates at least one special concern for Idaho. Idaho's special concern with the WRAP apportionment modeling is that the 2018 Base Case 18b was an early version of the inventories and it used future electrical demand projections that included one coal-fired electrical generation unit (EGU) in Idaho[5]. The projected emissions from this anticipated EGU were removed from later versions of the 2018 emissions inventory due to the moratorium placed on EGU development by Idaho's governor while Idaho determines how to deal with mercury issues and rule development[6].

While the CAMx PSAT modeling was used to identify SO_x and NO_x source attributions at each relevant Class I area, the CMAQ model is used to summarize all of the pollutants' visibility impacts at each of the Class I areas. The CMAQ modeling summaries at the end of this chapter use the most up-to-date emissions inventories, specifically including the 2002(plan02d) and 2018(prp18b) emissions inventories for baseline and future projections, respectively. Since the modeling results don't match exactly with the pollutant species measured by the IMPROVE monitoring network, a relative reduction factor (RRF) was used to adjust the modeling results. For each Class I area and each PM species, an RRF was calculated as the ratio of the 2018 modeling results to the 2002

---

4 Air Quality Modeling, Western Regional Air Partnership, Joe Adlhock, December 2002, page 25. as available at: http://vista.cira.colostate.edu/docs/wrap/Modeling/AirQualityModeling.doc
5 WRAP Point and Area Source Emissions for the 2018 Base Case Version 1, Eastern Research Group, January 25, 2006, page 4-7. as available at: http://www.wrapair.org/forums/ssjf/documents/eictts/docs/WRAP_2018_EI-Version_1-Report_Jan2006.pdf
6 Tech Memo WRAP 2018 PRP – Final Revised 1, Eastern Research Group, June 18, 2007, page 53. as available at: http://www.wrapair.org/forums/ssjf/documents/eictts/Projections/PRP18_EI_tech%20memo_061607.pdf

modeling results. Future year PM levels were then projected by applying the appropriate RRF to the PM species levels observed under baseline conditions. The light extinction equation identified in section 4.2.2 was then applied to the concentration levels.

9.1.2 Introduction to Source Apportionment using Weight of Emissions Potential (WEP)

The Weight of Emissions Potential (WEP) method of analysis was developed as a screening tool for states to use in identifying source regions that have the potential to contribute to haze at specific Class I areas. The method relies on an integration of gridded emissions, residence times of air masses calculated by back trajectory, a one-over-distance factor to approximate deposition (an inverse distance factor, which accounts for the fact that, up to some limit, more of the pollutant is deposited further from the Class I area than nearer to it), and a normalization of the final results. This process is not as robust as PSAT because it doesn't account for chemistry or other deposition process.

The back trajectory residence times were provided by the WRAP Causes of Haze Assessment (COHA). The COHA used the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model (developed by the National Oceanic and Atmospheric Administration) to generate eight back trajectories daily for each WRAP Class I area for the entire base period (2000-2004). Residence times were generated for grid cells of one-degree latitude by one-degree longitude. Residence time analysis computes the amount of time in hours or percent of time an air parcel is in a horizontal grid cell. Residence time is shown on maps as a percent of the total hours that is spent in each grid cell across the domain, which can be interpreted as general air flow patterns for a given Class I area. Residence times were generated for both the 20% best days and 20% worst days.

The WEP analysis consists of weighting the annual gridded emissions (by pollutant and source category) by the worst and best extinction days' residence times for the five-year base period. The 2002 plan02d and 2018 prp18b emission inventories were used for the analysis. To account for rates of deposition along the trajectories, the results were weighted by a one-over-distance factor, using the distance in kilometers between the centroid of each emissions grid cell and the centroid of the cell containing the Class I area monitoring site under investigation.

9.2 Source Apportionments for Class I Areas in Idaho

9.2.1 Craters of the Moon National Monument Source Apportionment

Sulfate at Craters of the Moon National Monument Based on PSAT

The regional source contribution pie charts in Figure 9-1 show the WRAP states are only contributing roughly a third of the visibility impairment on the 20% worst days at Craters of the Moon. Through the consultation process, the WRAP states can work together on reducing contributions from within the WRAP region; the remaining contributions are outside the regulatory authority of the WRAP states.

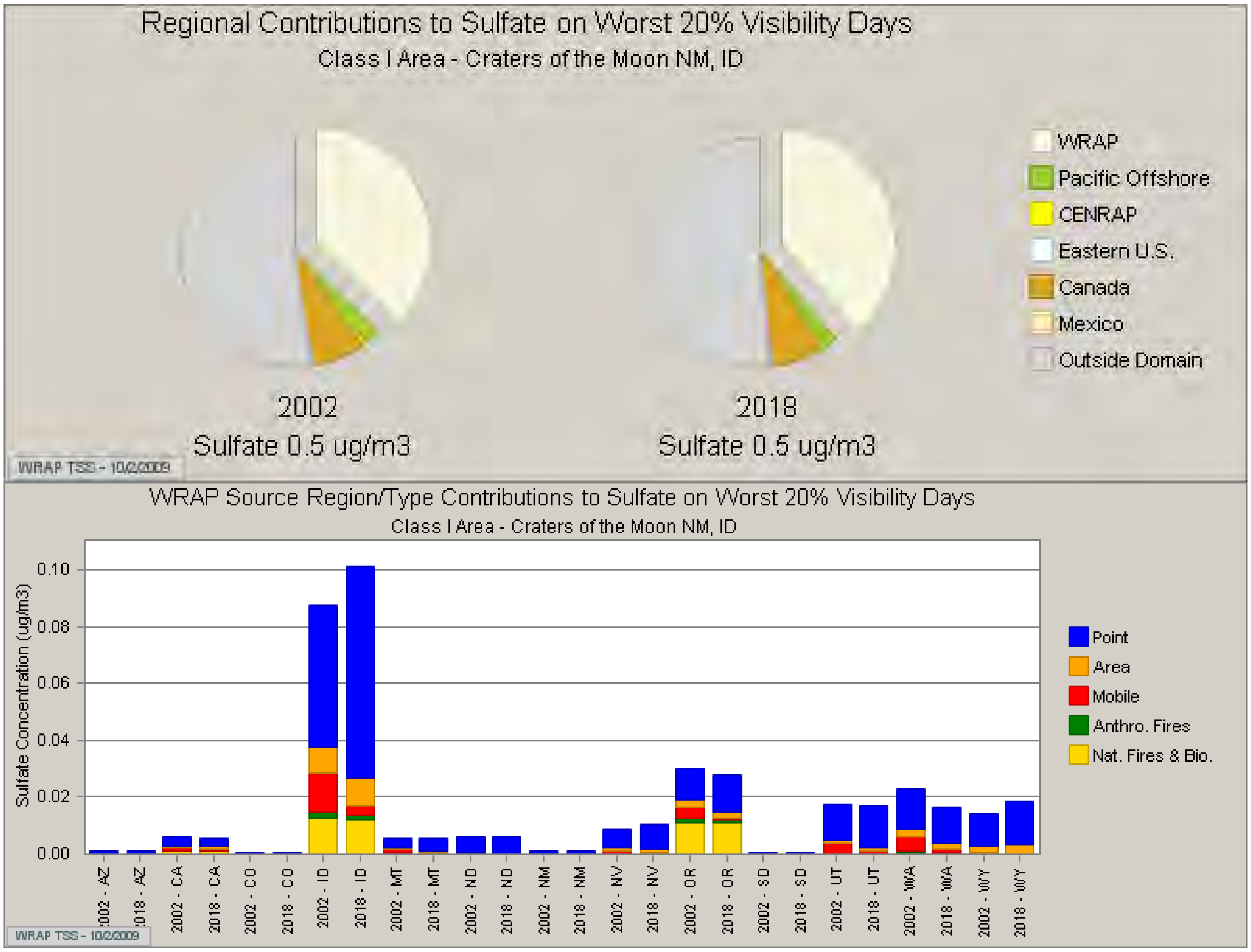


Figure 9-1 PSAT Sources of Sulfate Concentrations at Craters of the Moon National Monument 20% Worst Days

For the 20% worst days at Craters of the Moon National Monument, Figure 9-1 shows the largest contribution coming from Idaho's point sources. However, the graph shows an increase in emissions from point sources in 2018 that is overstated. During the development of the early versions of the 2018 emissions inventory, future electrical needs were identified and coal-fired power plants were anticipated throughout the west to fulfill electrical demands. Idaho was expected to get at least one new electrical generation unit (EGU) and for modeling purposes it was presumed located in Jerome County just north of the Jarbidge Wilderness area and slightly southwest of Craters of the Moon National

Monument. Even with the emissions from the projected EGU included, Idaho's anthropogenic emissions were estimated to be only 16% of the sulfate concentration at Craters of the Moon. The WRAP TSS emission inventory tools were used to produce the chart in Figure 9-2, which shows an expected increase in SOx emissions in Jerome County, based mostly on the anticipated EGU; however, as discussed below, the EGU is now unlikely to be built and almost certainly not within the first planning period ending in 2018.

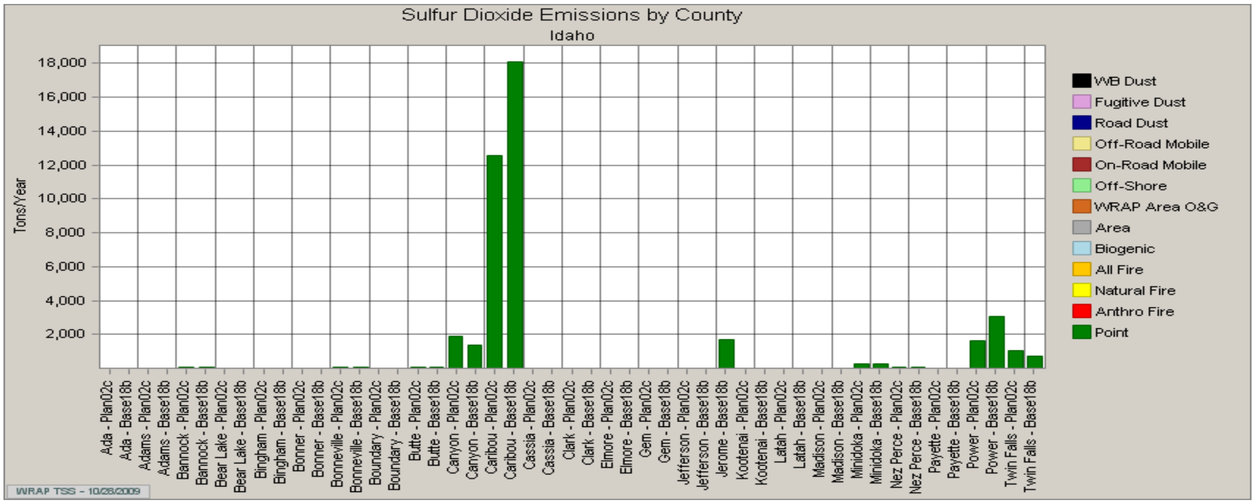


Figure 9-2 SOx Emissions, Difference Between 2002 Plan02c and 2018 Base18b

As stated in the introduction to PSAT modeling, the Idaho governor placed a moratorium on new coal-fired power plants to give the state an opportunity to make decisions about mercury emissions. The projected emissions from the once-anticipated power plant (EGU) slated for Jerome County were therefore removed from future emissions inventories including the 2018 prp18b represented in the chart in Figure 9-3. (In Figure 9-3, Jerome County does not appear at all because the expected emissions are too low to be seen at the scale of the chart.)

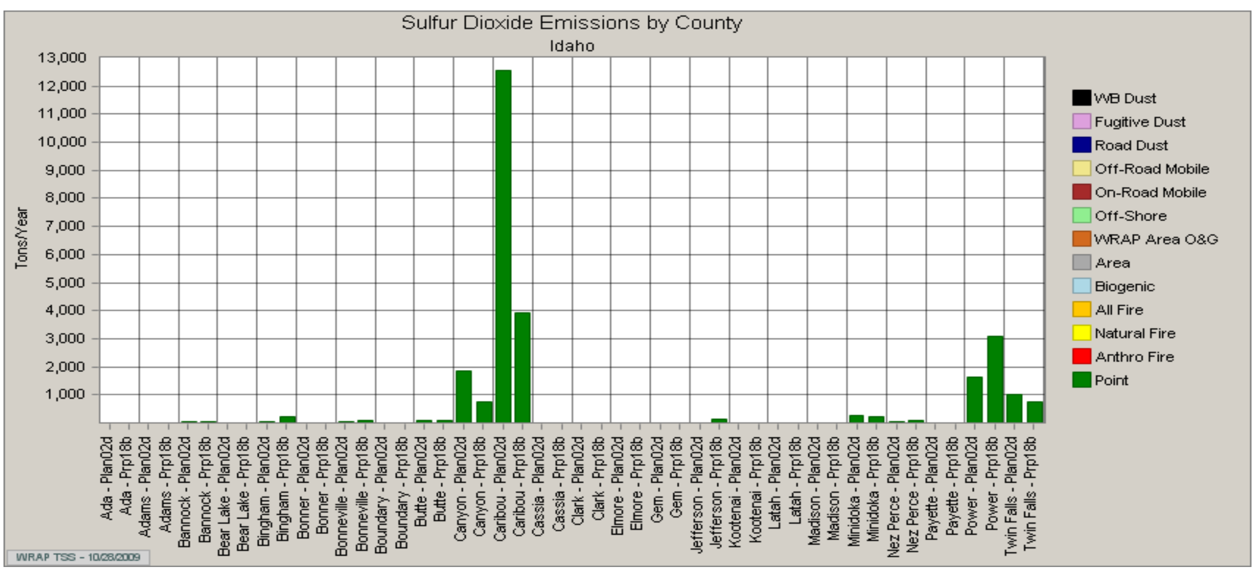


Figure 9-3 SOx Emissions, Difference Between 2002 Plan02d and 2018 Base Prp18b

Note that Figure 9-3 also shows the reduction of roughly 9,000 tons per year of SOx in Caribou County expected from the installation of BART technologies at P4 Production (formerly Monsanto).

The annual SOx emissions from the once-anticipated 500-megawatt coal-fired power plant were anticipated to be 1675 tons per year. Since the location of the anticipated power plant was so close to Craters of the Moon National Monument, even the relatively low concentration levels that would have resulted would have meant a relatively large change in sulfate levels expected from point sources, as project in the charts in Figure 9-1. In reality, the SOx impacts at Craters of the Moon National Monument should be declining due to large reductions from the point source category and from regulations that reduced the sulfur content in on- and off-road diesel fuel. Overall, there should be a reduction in future sulfate contributions coming from Idaho according to the WEP analysis as depicted in Figure 9-4 which shows roughly a 15% reduction.

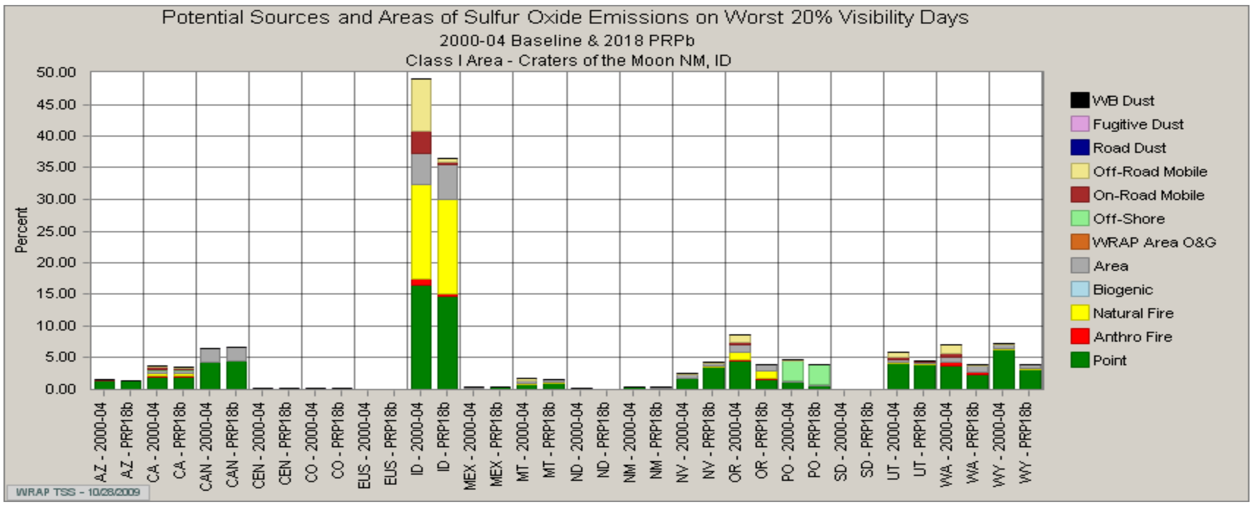


Figure 9-4 WEP SOx Craters of the Moon NM 20% Worst Days

The Regional Haze Rule requires no additional degradation during the 20% best days. Figure 9-5 shows improvement in sulfate contributions from all the WRAP states on the 20% best days from 2002 to 2018 (the 2002 bars on the chart are not labeled).

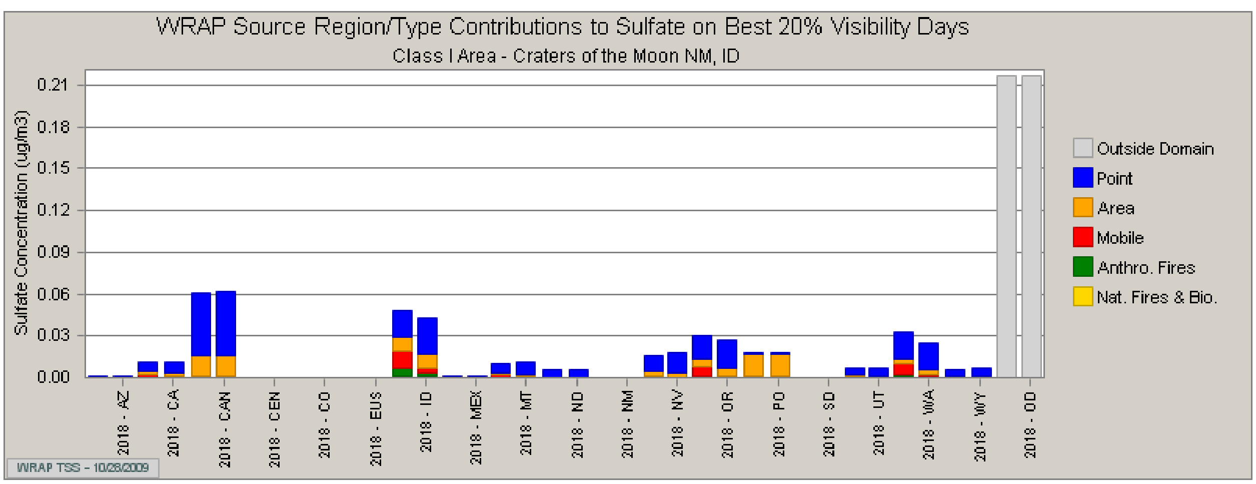


Figure 9-5 PSAT Sulfate Concentrations at Craters of the Moon National Monument 20% Best Days

Nitrate at Craters of the Moon National Monument Based on PSAT

Figure 9-6 shows the WRAP states contribute slightly more than 75% of the nitrates on the 20% worst days. As WRAP states reduce nitrate contributions over the first planning period ending in 2018, the contributions coming from outside the domain, offshore shipping, and Canadian emissions will have a greater impact. This will require regulator actions and negotiations outside the WRAP states control.

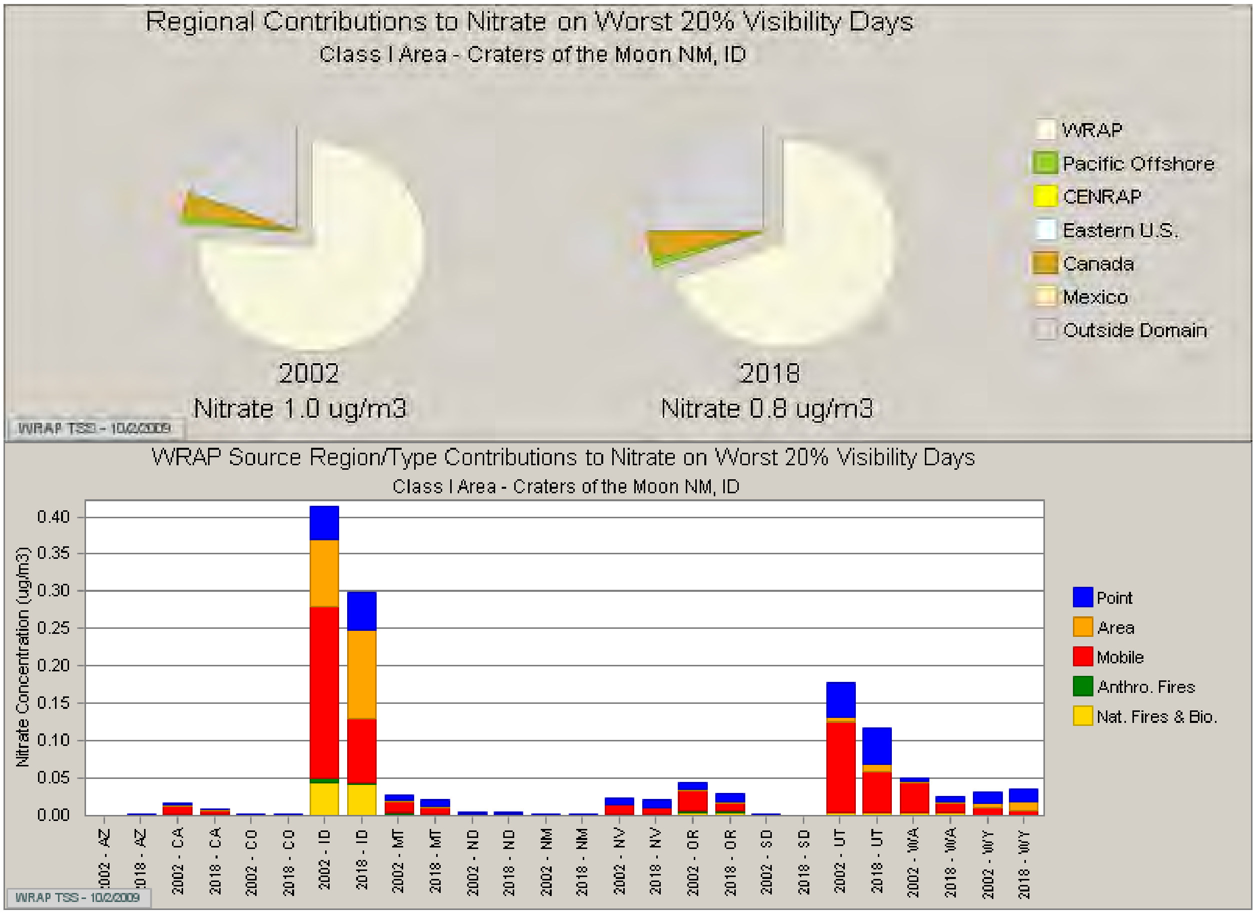


Figure 9-6 PSAT Sources of Nitrate Concentrations at Craters of the Moon National Monument
20% Worst days

Figure 9-6 shows Idaho as the largest contributor to nitrate concentrations at the Craters of the Moon National Monument on the 20% worst days. Overall, Idaho's nitrate emissions are expected to decline 28% over time primarily due to reductions in mobile emissions. Sulfate contribution from the WRAP states should drop 22%.

Because the overall nitrate concentrations are high and point source contributions from Idaho are not as large as contributions from other categories, the impact from adding an EGU in Jerome County did not show as significant an impact for nitrate as for sulfate. The combined graphs in figure 9-7 show the change in estimated emissions between the 2018 Base18b and the 2018 Prp18b emissions inventories. The 2018 Base 18b emissions inventory includes the once-anticipated power plant in Jerome County and is the emissions inventory that was used for the PSAT analysis. The 2018 Prp18b emissions inventory does not include the power plant in Jerome County due to the governor's moratorium. (As with sulfate, the emissions projected in the 2018 Prp18b emissions inventory are too low to show at the scale of the chart.)

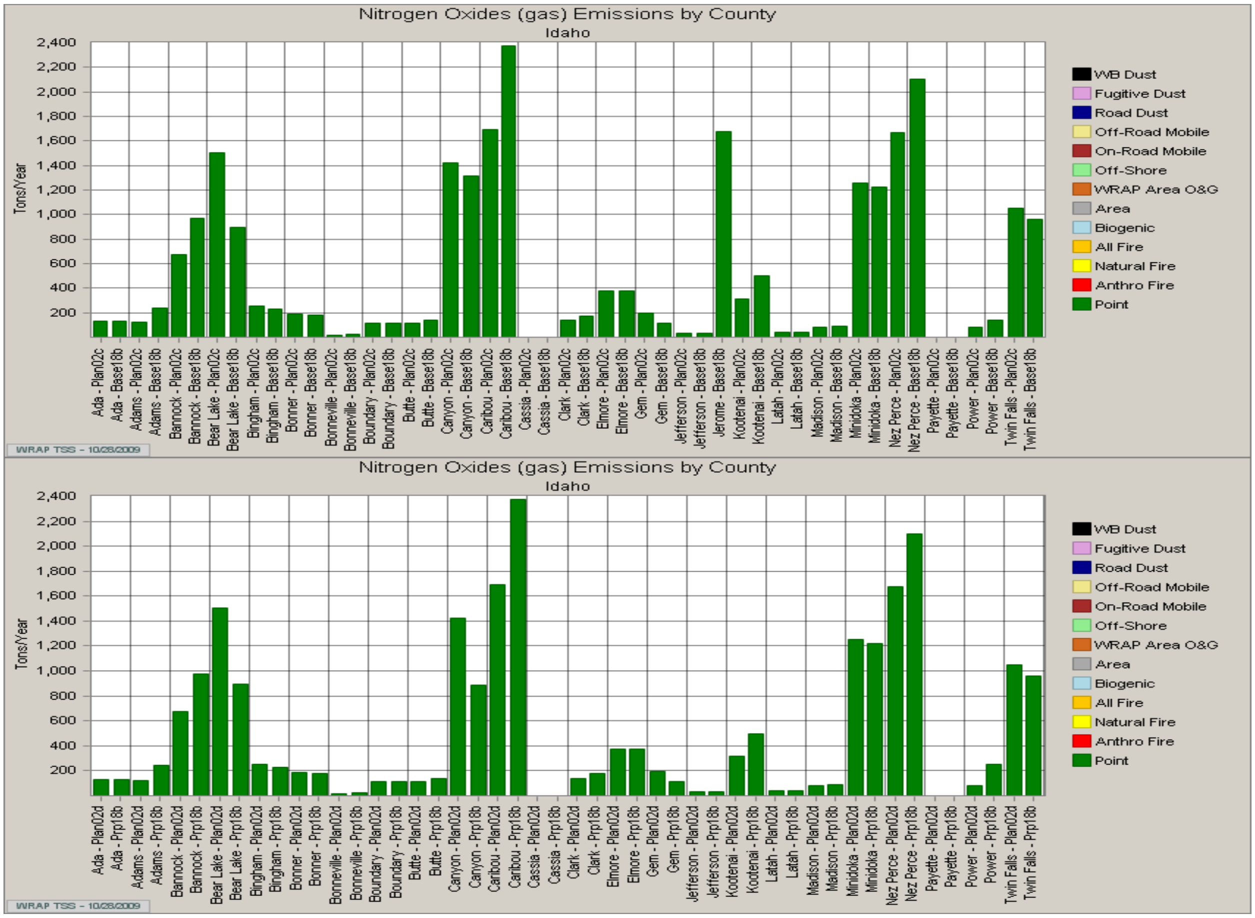


Figure 9-7 SOx Emissions Difference Between 2002 Plan02c and 2018base18b and Difference Between 2002 Plan02d and 2018base Prp18b

Figure 9-8 shows improvement in nitrate contributions coming from all states on the 20% best days at Craters of the Moon National Monument.

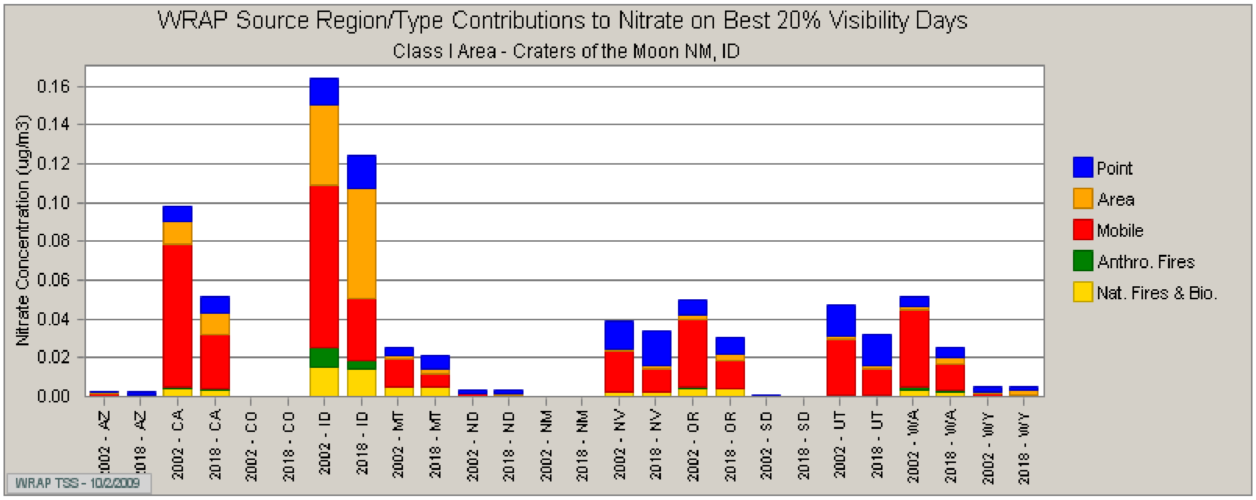


Figure 9-8 PSAT Nitrate Concentrations at Craters of the Moon National Monument 20% Best Days

Primary Organic Aerosol at Craters of the Moon National Monument Based on WEP

For the 20% worst days at Craters of the Moon National Monument, the chart in figure 9-9 shows Idaho as the largest contributor of primary organic aerosol, with almost all of of that contribution coming from natural fire. Reductions from anthropogenic fire are expected to reduce primary organic aerosol in the future.

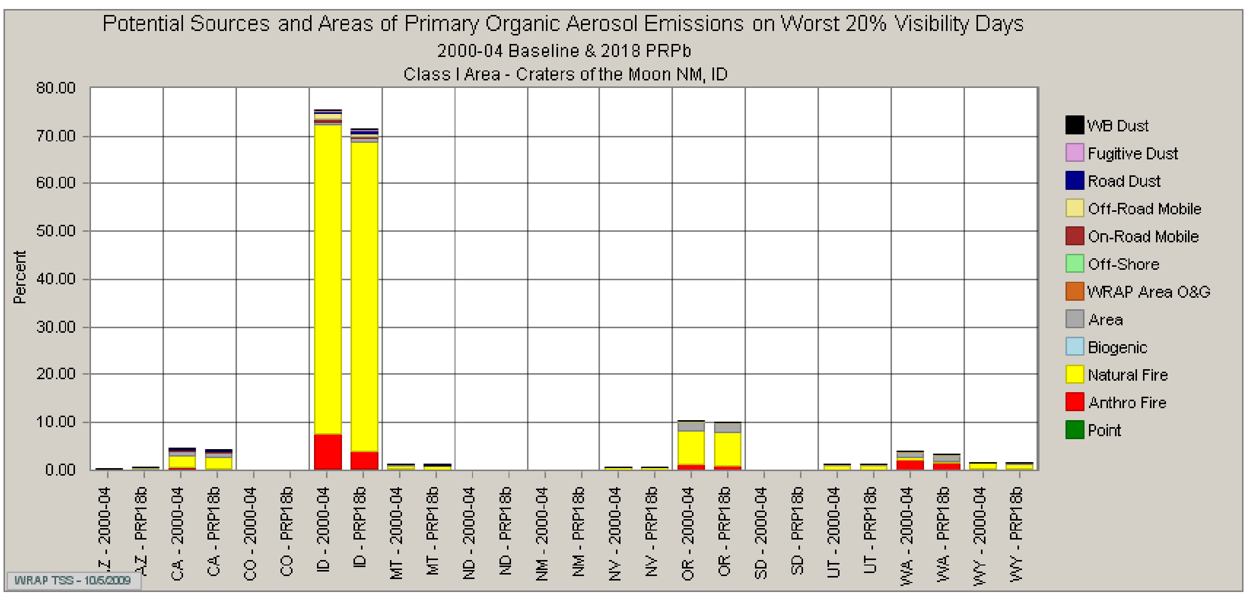


Figure 9-9 WEP Primary Organic Aerosol at Craters of the Moon NM 20% Worst Days

Figure 9-10 shows the largest percentage of primary organic aerosol on the 20% best days at Craters of the Moon National Monument is attributed to Idaho. Idaho's natural fire is the largest source, dwarfing all other sources. Overall, anticipated reductions from anthropogenic fire are the reasons for the expected improvement in most states.

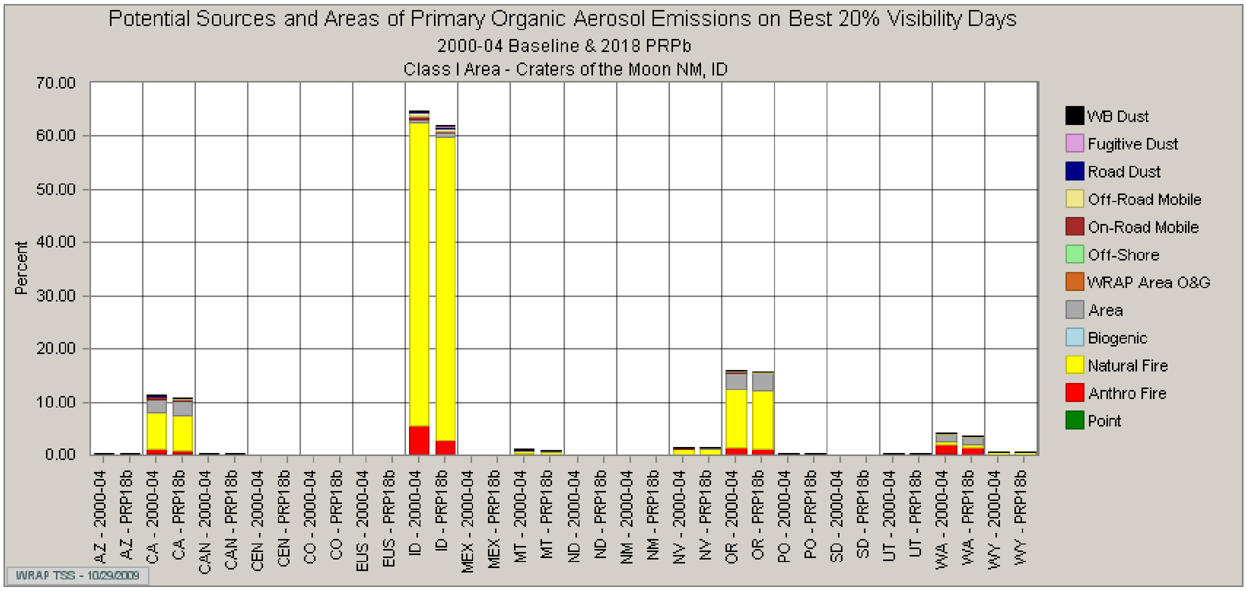


Figure 9-10 WEP Primary Organic Aerosol at Craters of the Moon NM 20% Best Days

Elemental Carbon at Craters of the Moon National Monument Based on WEP

For the 20% worst visibility days at Craters of the Moon National Monument, Idaho, there is a sizeable contribution of elemental carbon from natural fire. Idaho's overall elemental carbon contribution is expected to decline due to reductions from off-road mobile and anthropogenic fire as shown in figure 9-11.

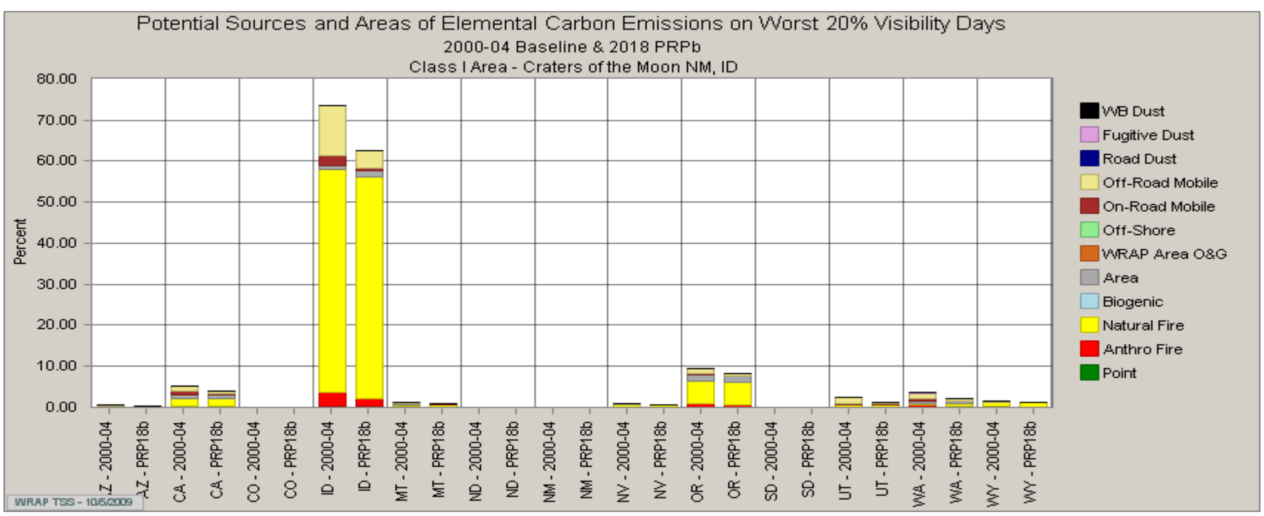


Figure 9-11 WEP Elemental Carbon at Craters of the Moon NM 20% Worst Days

For the 20% best visibility days at Craters of the Moon National Monument, Idaho also shows a sizeable contribution of elemental carbon from natural fire. Idaho's overall elemental carbon contribution is declining due to reductions from off-road mobile and anthropogenic fire. All WRAP states showing an expected reduction in elemental carbon contributions over the first planning period as shown in figure 9-12.

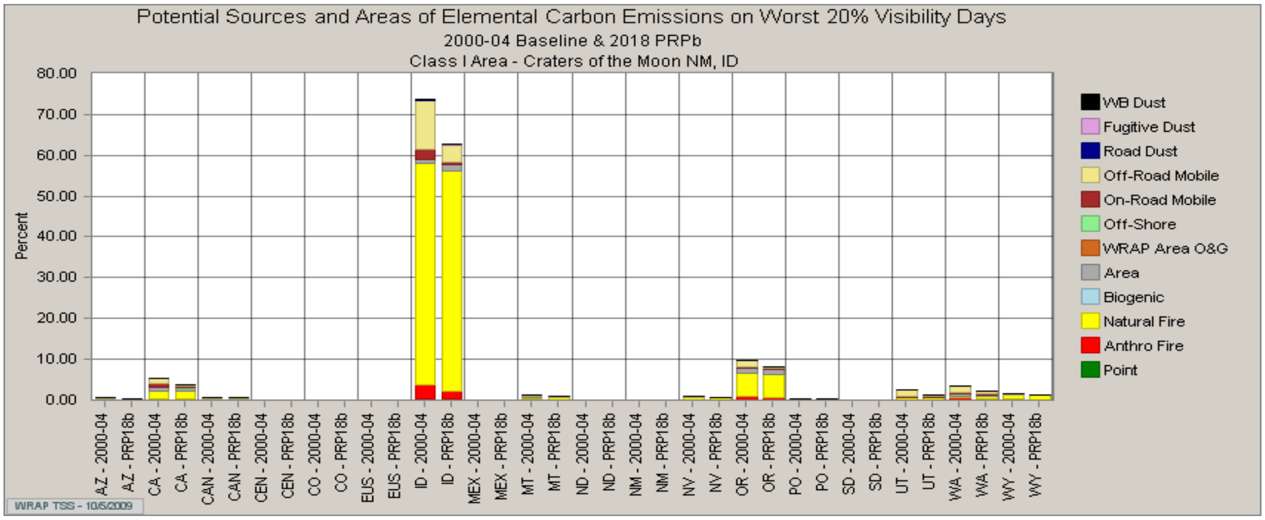


Figure 9-12 WEP Elemental Carbon at Craters of the Moon NM 20% Best Days

Fine Particulate Matter at Craters of the Moon National Monument Based on WEP

Figure 9-13 shows Idaho is by far the largest contributor of fine particulate matter at Craters of the Moon National Monument. The graph shows that future growth in area sources coming from Idaho is expected to outpace reductions from anthropogenic fire.

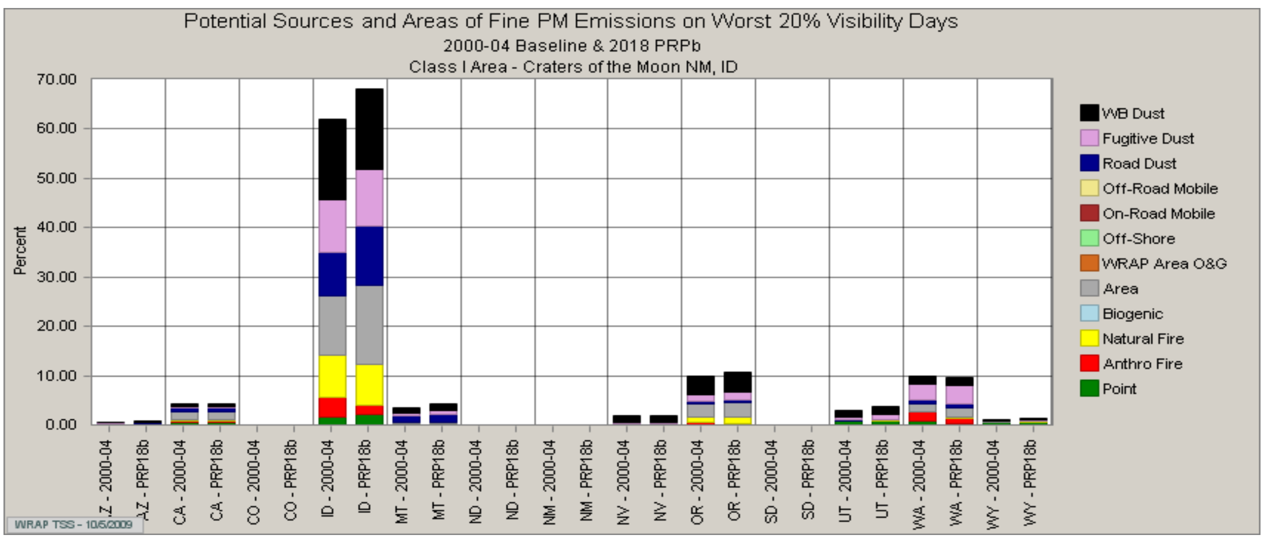


Figure 9-13 WEP Fine Particulate Matter at Craters of the Moon NM Worst 20% Days

Figure 9-14 shows expected future growth in fine particulate matter contributions on the 20% best visibility days at Craters of the Moon National Monument from the Idaho source categories of area and road dust.

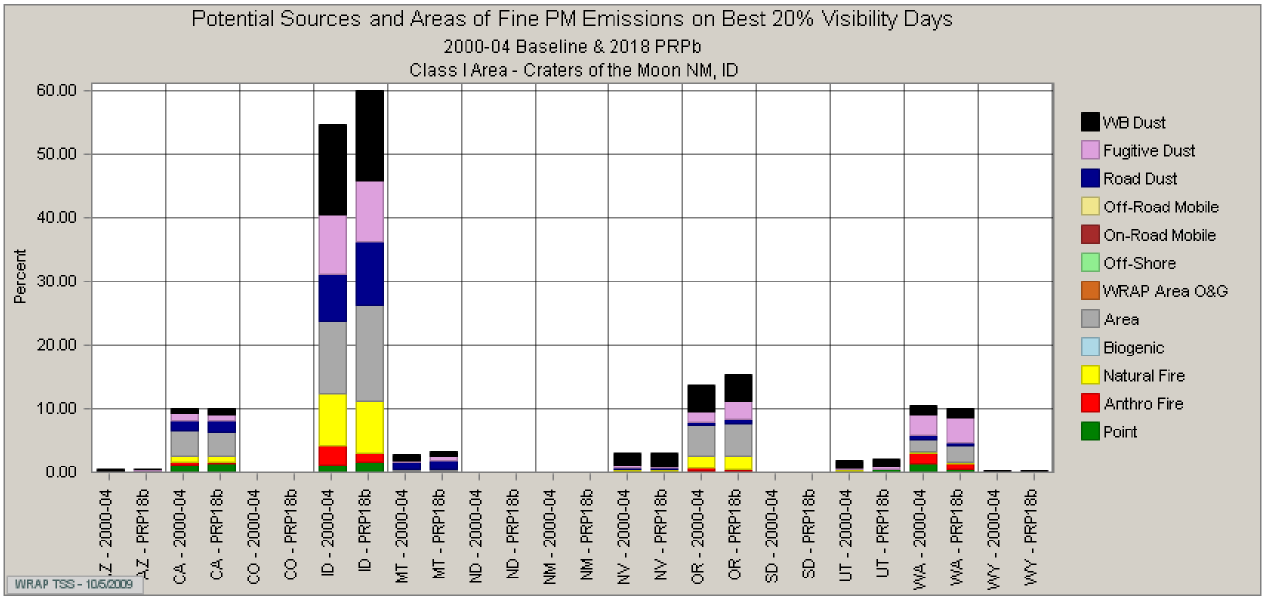


Figure 9-14 WEP Fine Particulate Matter at Craters of the Moon NM Best 20% Days

Coarse Particulate Matter at Craters of the Moon National Monument Based on WEP

As shown in Figure 9-15, for the 20% worst visibility days at Craters of the Moon National Monument, Idaho shows future growth in fine particulate matter contributions from vehicle miles traveled and the associated road dust. The increase is attributed to population growth that will be reflected in both area and road dust sources.

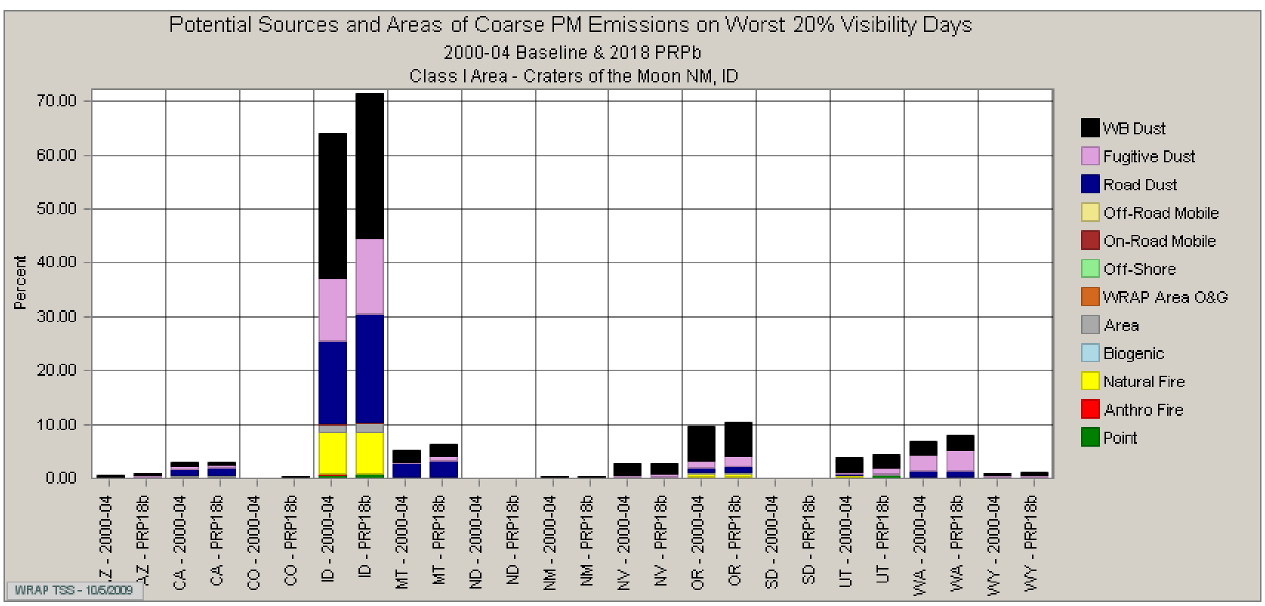


Figure 9-15 WEP Coarse Particulate Matter at Craters of the Moon NM 20% Worst Days

Figure 9-16 shows similar expected increases in coarse particulate matter from road dust on the 20% best visibility days.

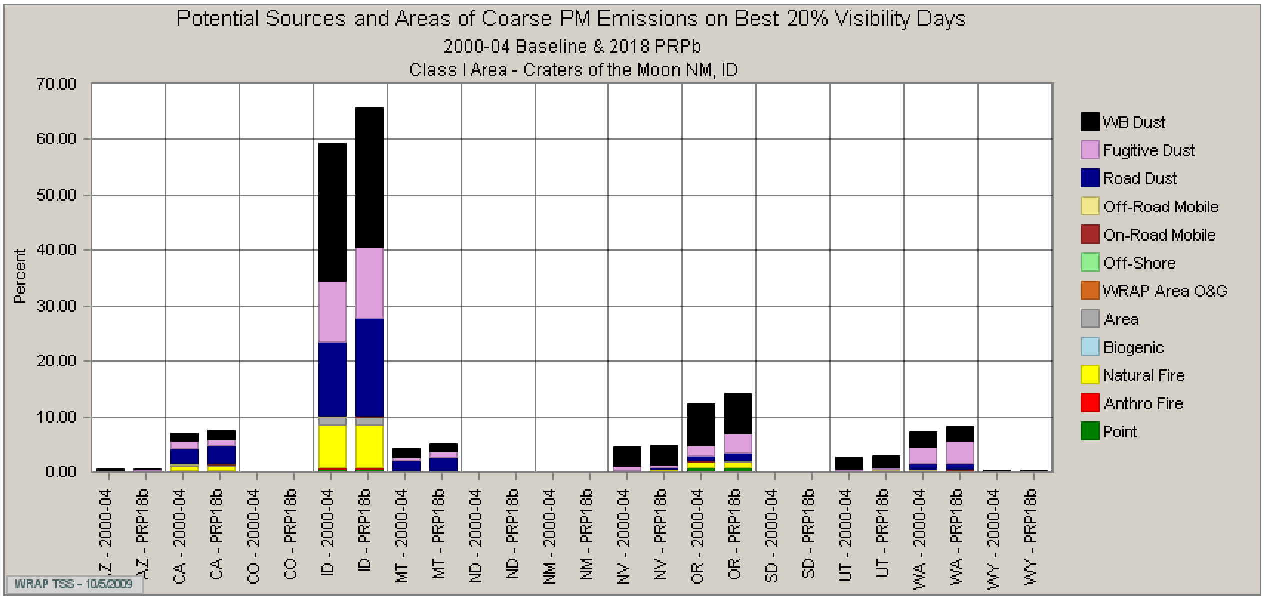


Figure 9-16 WEP Coarse Particulate Matter at Craters of the Moon National NM 20% Best Days

9.2.2 Hells Canyon Wilderness Source Apportionment

Sulfate at Hells Canyon Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-17 show the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-17 shows Idaho as the largest contributor of sulfate at Hells Canyon Wilderness with Oregon a close second. Overall, the concentration levels attributed to all the WRAP states is fairly low and decreasing over time due to reductions primarily from mobile sources. Idaho shows an overall reduction of roughly 6% expected over the first planning period and that is without the emissions from the EGU anticipated in Jerome County having been removed yet. (As discussed elsewhere in this plan, this EGU was a once-anticipated coal-fired power plant that is now unlikely to be built, so the anticipated emissions for it were removed from later projected emissions inventories.) The expected 6% reduction also does not include emission reductions expected from subject-to-BART sources. Idaho's anthropogenic sources will be contributing only 8% of the total sulfate at Hells Canyon Wilderness in 2018.

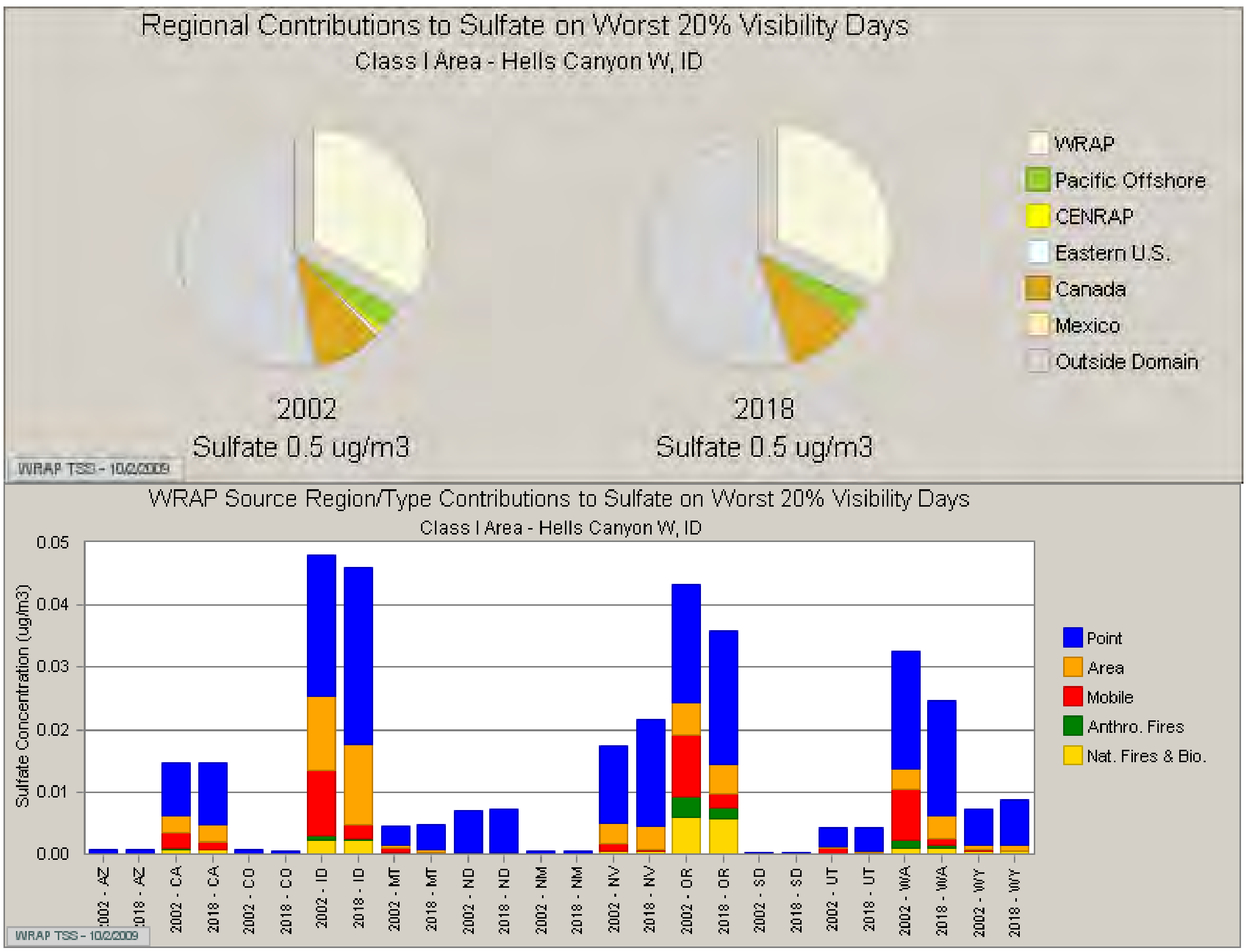


Figure 9-17 PSAT Sulfate Concentrations at Hells Canyon Wilderness 20% Worst Days

Figure 9-18 shows an overall expected improvement in sulfate concentrations attributed to all the WRAP states with the exception of Nevada. Future sulfate concentrations for the 20% best days are expected to drop during the first planning period.

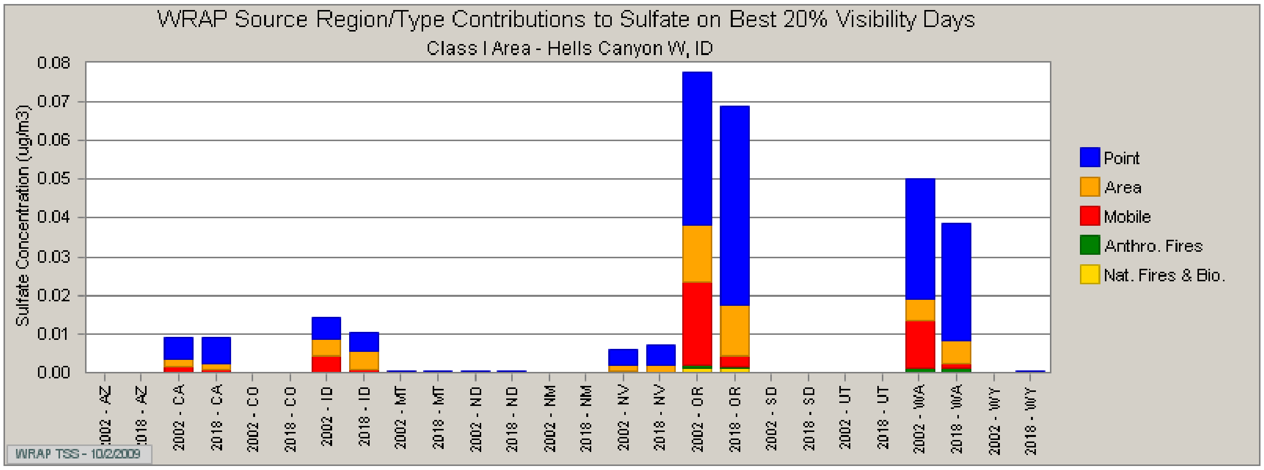


Figure 9-18 PSAT Sulfate Concentrations at Hells Canyon Wilderness 20% Best days

Nitrate at Hells Canyon Wilderness Based on PSAT Modeling

Figure 9-19 shows that overall expected concentrations of nitrates are much higher than for sulfates with a greater concentration of nitrates than sulfates coming from WRAP states. This is important to note because having higher concentrations and higher contributions from WRAP states offers the opportunity for more control over future visibility improvements.

Figure 9-19 also shows Idaho is expected to contribute 35% of the nitrates followed by Oregon with 12%. Idaho's higher expected concentrations are projected to occur during high stagnation periods where the air mass is slowly moving from the Treasure Valley and Snake River plain toward Hells Canyon. This is explained in the BART modeling analysis in Chapter 10. During the first planning period, Idaho is expecting to reduce nitrate concentration contributions to Hells Canyon Wilderness by roughly 20%. Overall, a 21% improvement from WRAP states is anticipated. See Appendix E (Hells Canyon Wilderness) for details.

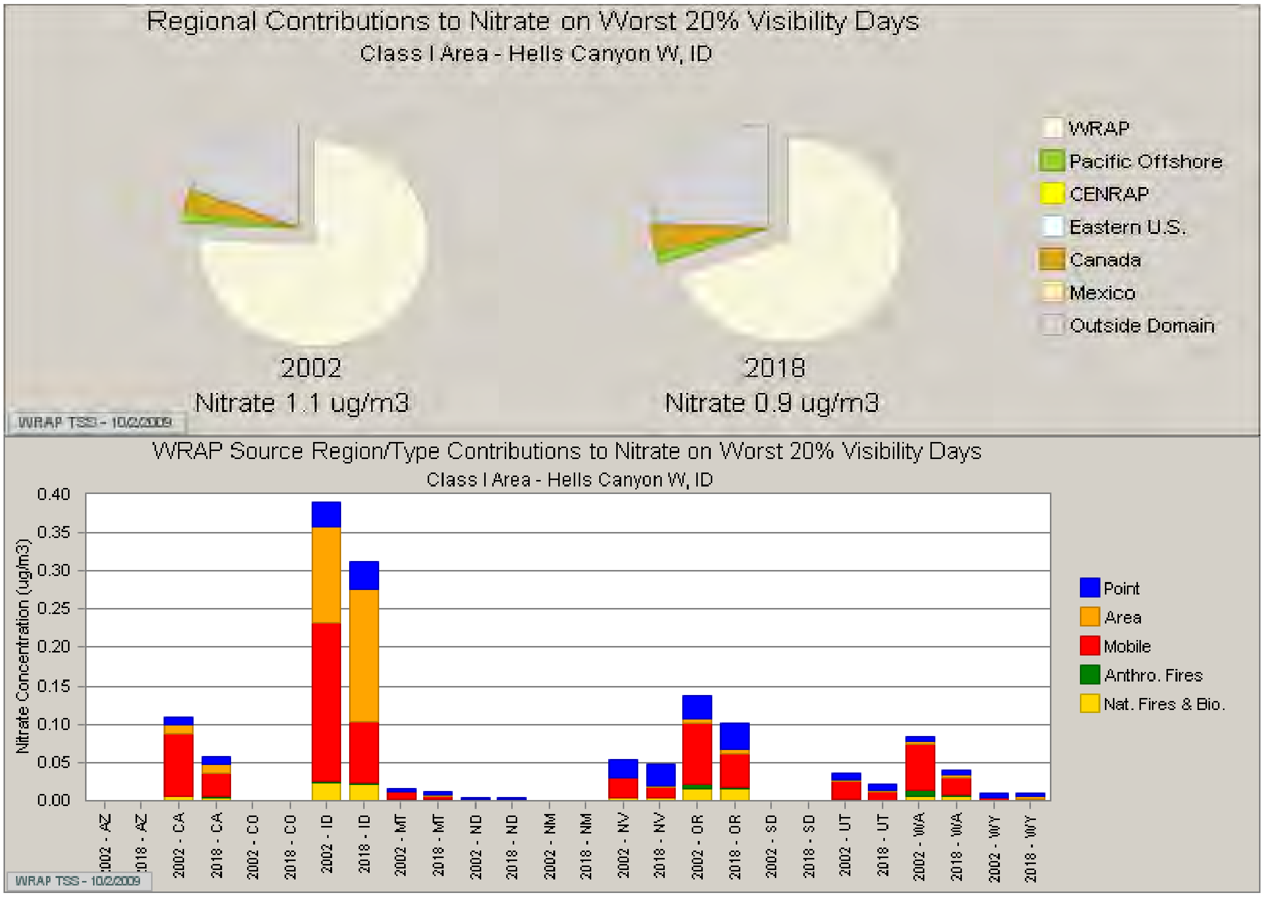


Figure 9-19 PSAT Nitrate Concentrations at Hells Canyon Wilderness 20% Worst Days

Figure 9-20 shows an expected decrease in nitrate concentrations from all WRAP states at Hells Canyon Wilderness on the 20% best visibility days.

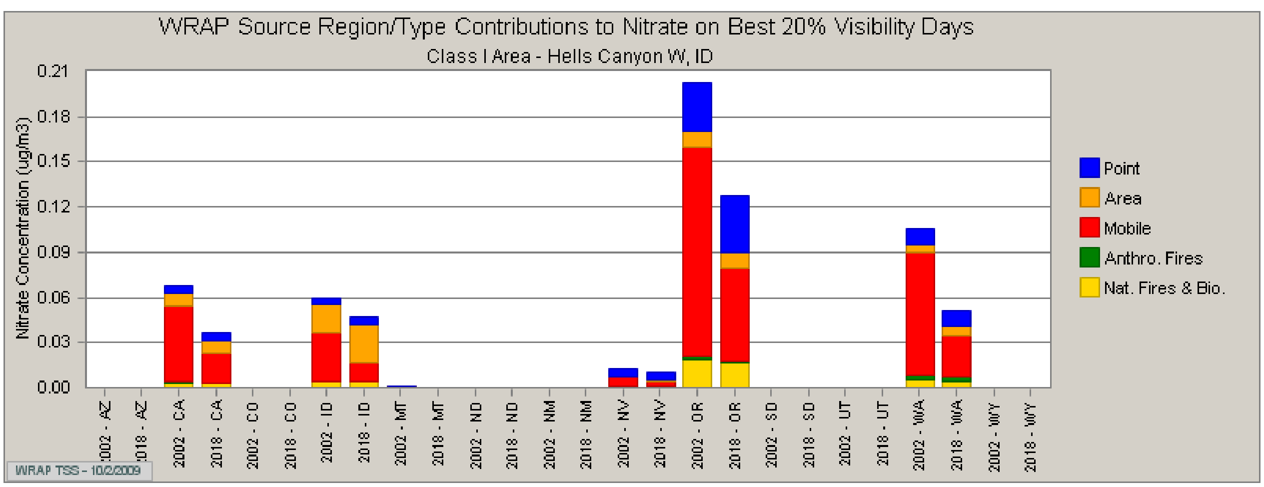


Figure 9-20 PSAT Nitrate Concentrations at Hells Canyon Wilderness 20% Best Days

Primary Organic Aerosol at Hells Canyon Wilderness Based on WEP

For the 20% worst visibility days at Hells Canyon Wilderness, Idaho shows a sizeable expected contribution of primary organic aerosol from natural fire as shown in figure 9-21. Idaho's overall contribution is expected to decline over time due to reductions from anthropogenic fire. Oregon shows less impact and similar reductions expected over time.

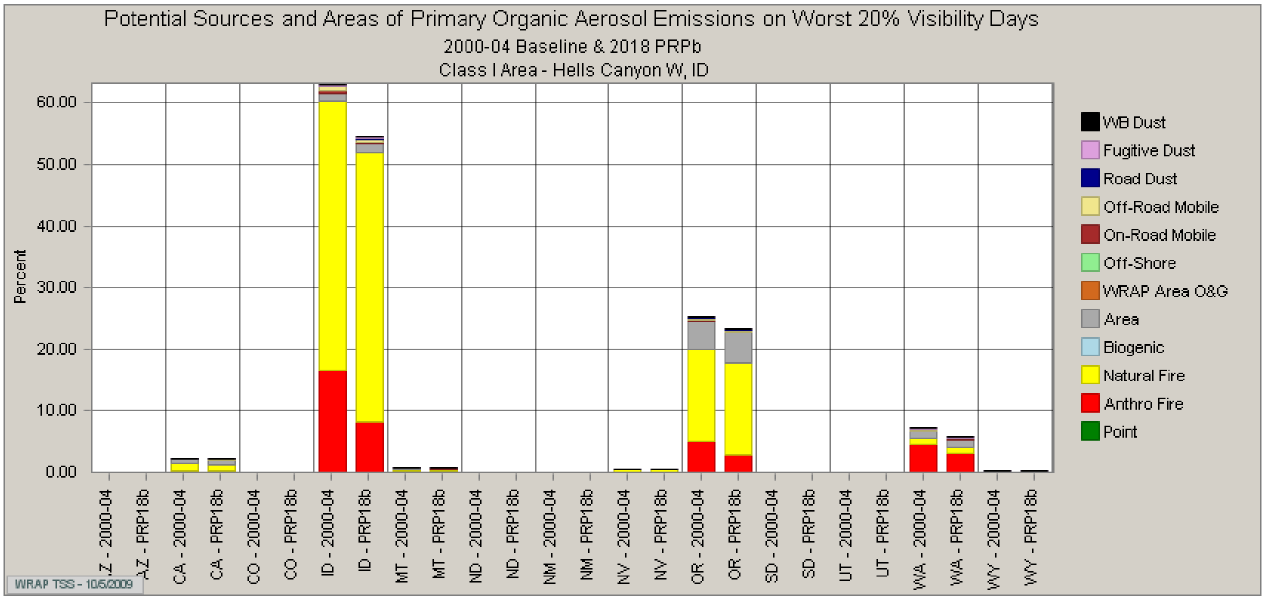


Figure 9-21 WEP Primary Organic Aerosol at Hells Canyon Wilderness 20% Worst Days

Figure 9-22 shows expected improvements in primary organic aerosols from all WRAP states on the 20% best visibility days.

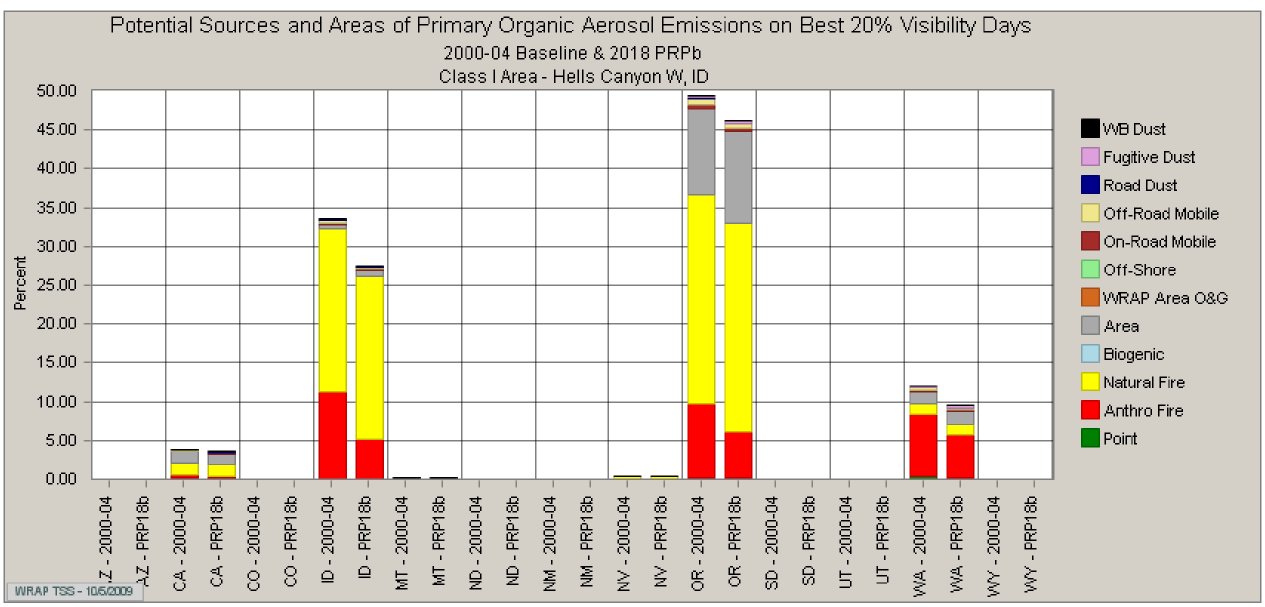


Figure 9-22 WEP Primary Organic Aerosol at Hells Canyon Wilderness20% Best Days

Elemental Carbon at Hells Canyon Wilderness Based on WEP

For the 20% worst visibility days at Hells Canyon Wilderness, Idaho shows a sizeable contribution of elemental carbon from natural fire is expected. Idaho's overall elemental carbon contribution is expected to decline due to reductions from off-road mobile and anthropogenic fire as shown in figure 9-23. Oregon shows less impact but similar results expected.

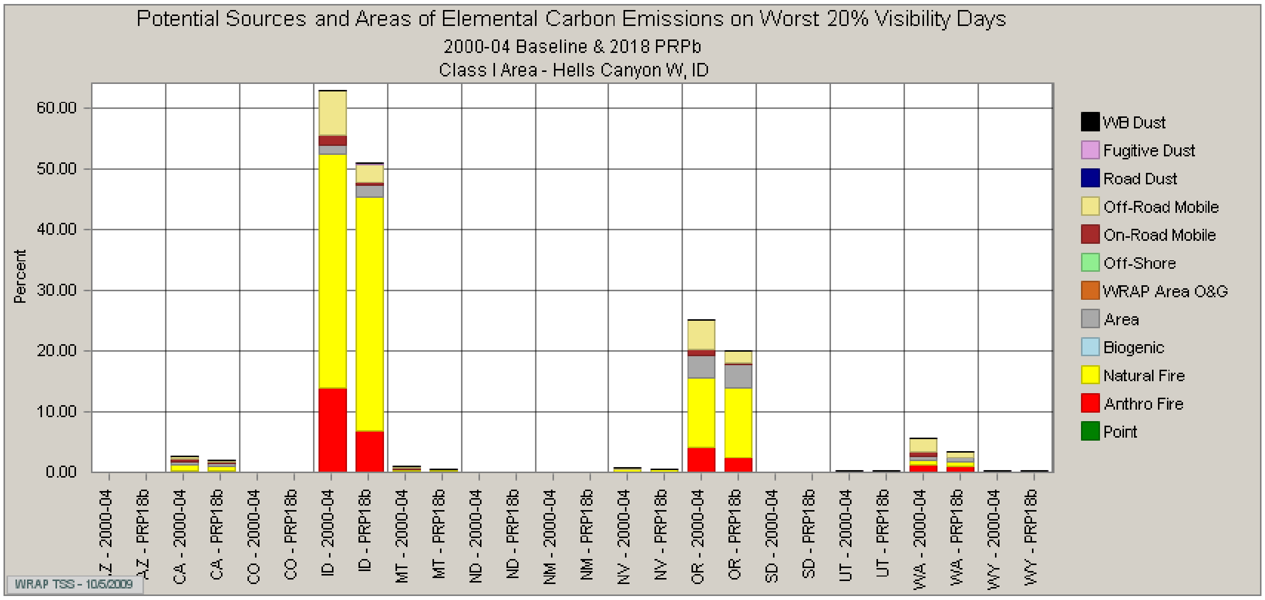


Figure 9-23 WEP Elemental Carbon at Hells Canyon Wilderness 20% Worst Days

Figure 9-24 shows expected improvements in elemental carbon from all WRAP states on the 20% best visibility days.

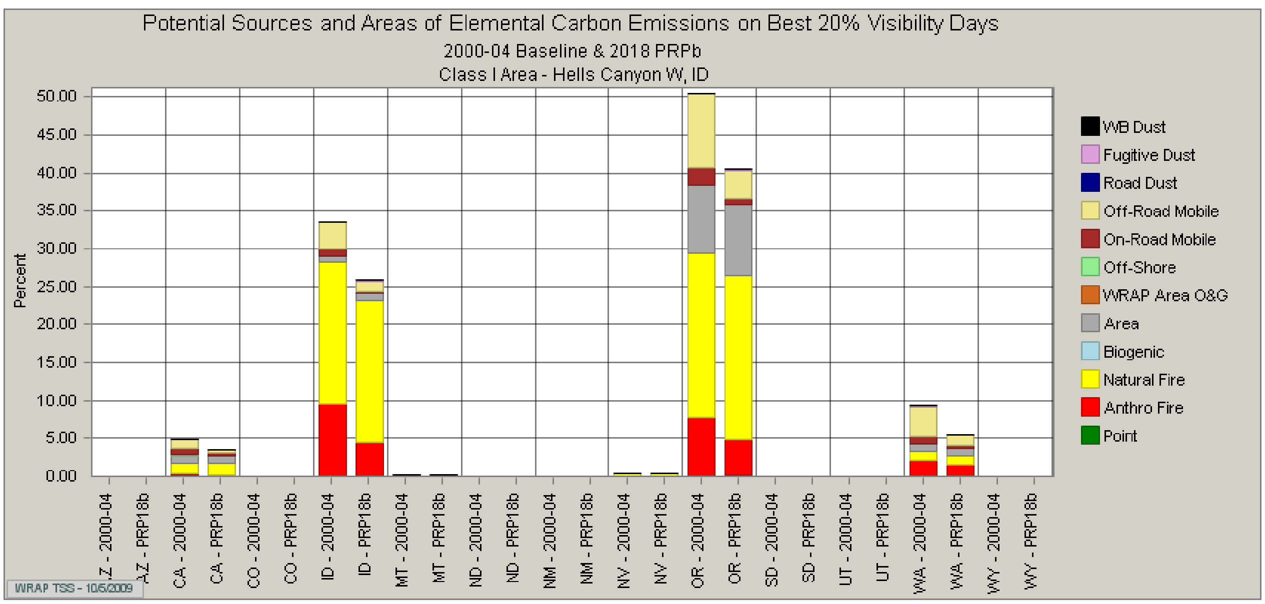


Figure 9-24 WEP Elemental Carbon at Hells Canyon Wilderness 20% Best Days

Fine Particulate Matter at Hells Canyon Wilderness Based on WEP

Figure 9-25 shows Idaho followed by Oregon are the largest contributors of fine particulate matter to Hells Canyon Wilderness on the 20% worst visibility days. Overall, Oregon and Idaho show increased contributions expected in the future due to growth in road dust even though there are slight decreases expected from anthropogenic fire.

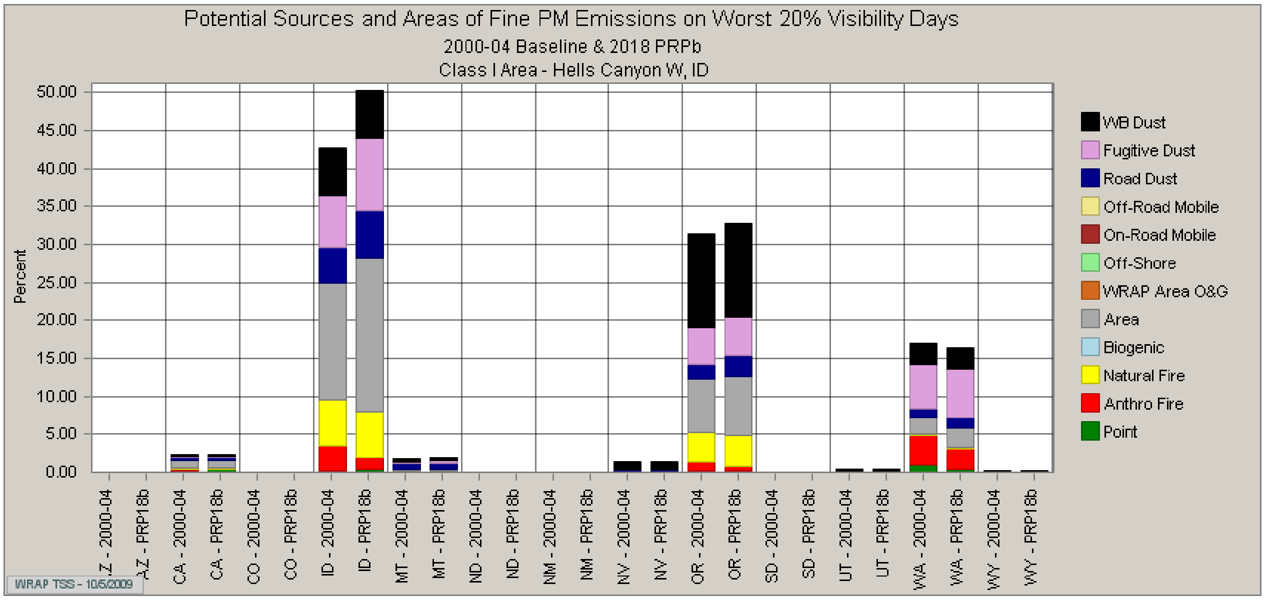


Figure 9-25 WEP Fine Particulate Matter at Hells Canyon Wilderness Worst 20% Days

On the 20% best visibility days at Hells Canyon Wilderness area, growth in contributions from both Idaho and Oregon and decreases coming from Washington are expected, as shown in Figure 9-26. The increases are expected to come from the source categories of area and point sources. Overall, Oregon and Washington are showing a greater impact than Idaho.

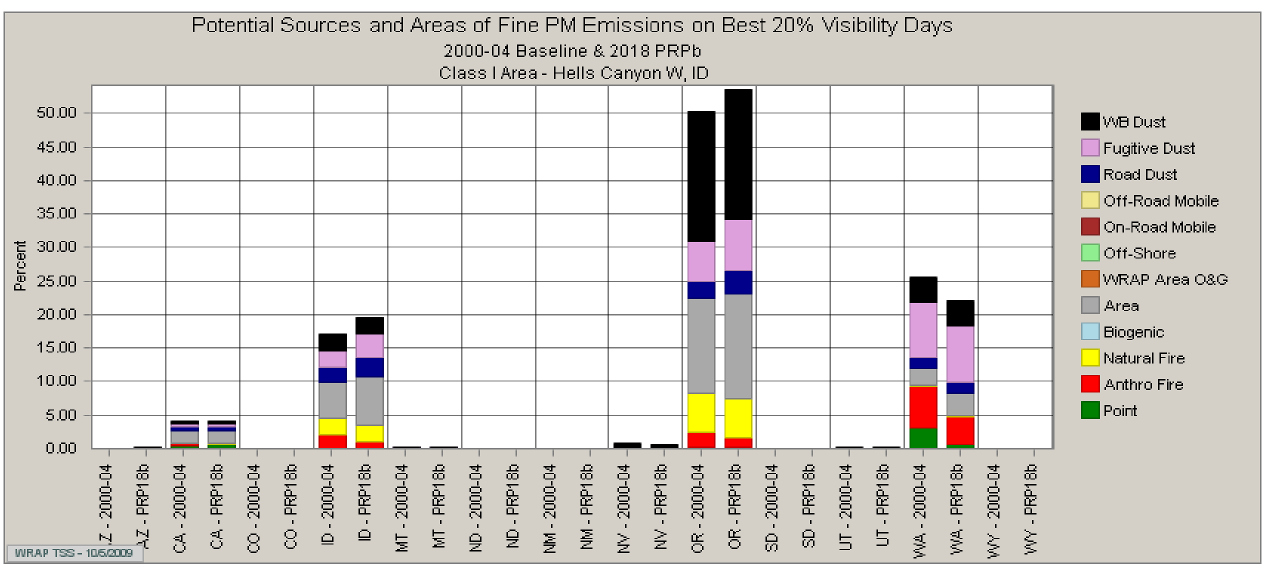


Figure 9-26 WEP Fine Particulate Matter at Hells Canyon Wilderness Best 20% Days

Coarse Particulate Matter at Hells Canyon Wilderness Based on WEP

Figure 9-27 shows the largest impact of coarse particulate on the 20% worst visibility days is coming from Idaho, followed by Oregon and then Washington. All three states are expecting future growth from fugitive dust and Idaho and Washington from road dust.

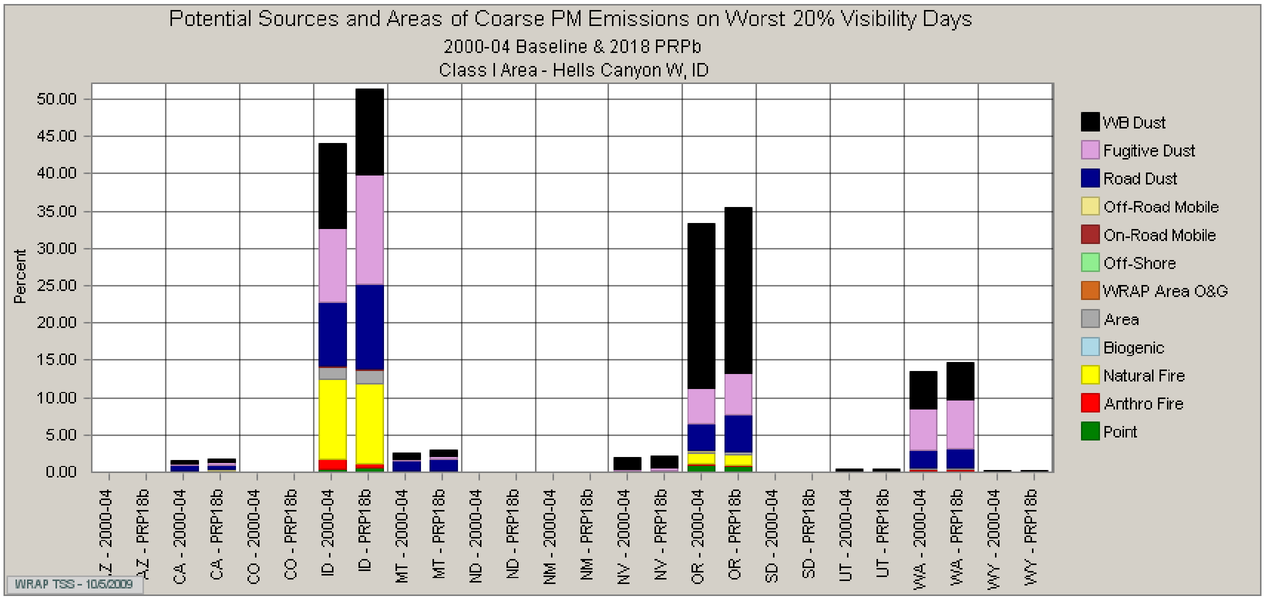


Figure 9-27 WEP Coarse Particulate Matter at Hells Canyon Wilderness 20% Worst Days

During the 20% best visibility days at Hells Canyon Wilderness, the air mass is primarily expected to come from the west as shown by the change in states' contributions with Oregon showing the greatest expected impact followed by Idaho and Washington. Figure 9-28 shows all three states are expecting growth in fugitive dust emissions. Idaho and Washington are also expecting to have slight increases in road dust.

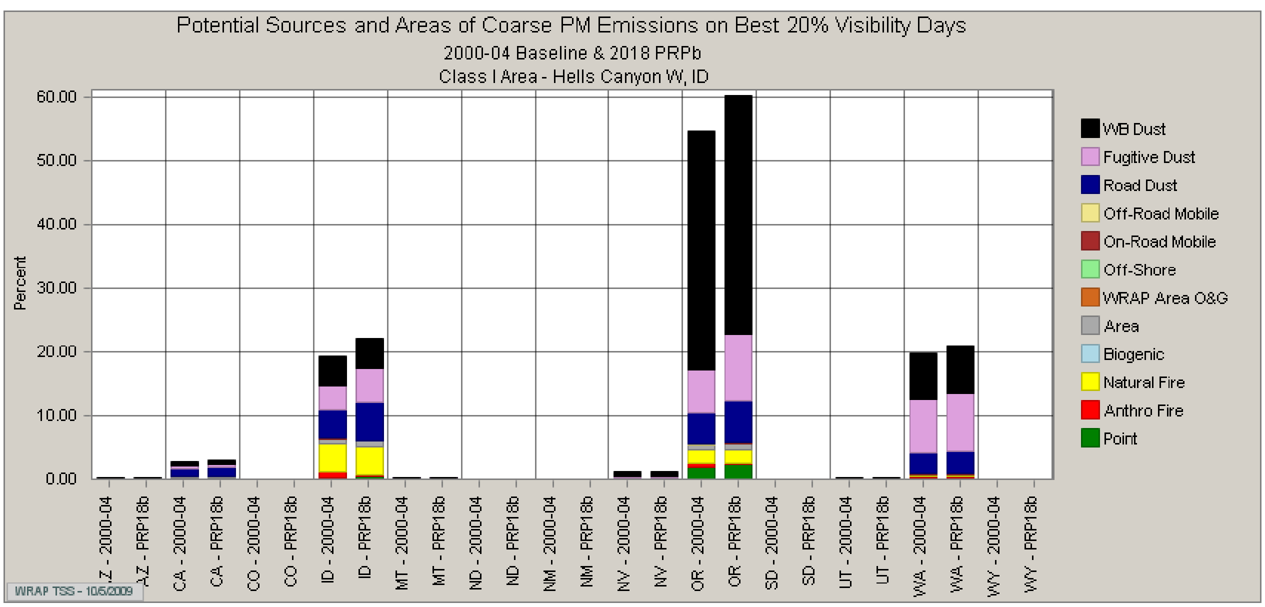


Figure 9-28 WEP Coarse Particulate Matter at Hells Canyon Wilderness20% Best Days

9.2.3 Sawtooth Wilderness Source Apportionment

Sulfate at Sawtooth Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-29 show the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-29 shows Oregon and then Idaho are the largest contributors of sulfate at Sawtooth Wilderness; from these two states, contributions from anthropogenic sources are 5%, which is slightly more than Pacific offshore contributions. See Appendix E (Sawtooth Wilderness) for details. Overall, the expected concentration levels attributed to all the WRAP states are fairly low and decreasing over time due to reductions expected primarily from mobile sources. Idaho shows an expected overall reduction of roughly 15% over the first planning period and that is without the emissions from the EGU anticipated in Jerome County having been removed yet. (As discussed elsewhere in this plan, this EGU was a once-anticipated coal-fired power plant that is now unlikely to be built, so the anticipated emissions for it were removed from later projected emissions inventories.) The expected 15% reduction also does not include emissions reductions expected from subject-to-BART sources. It is also worth noting that Idaho point sources are expected to contribute less emissions than the combination of areas that are offshore and outside the modeling domain.

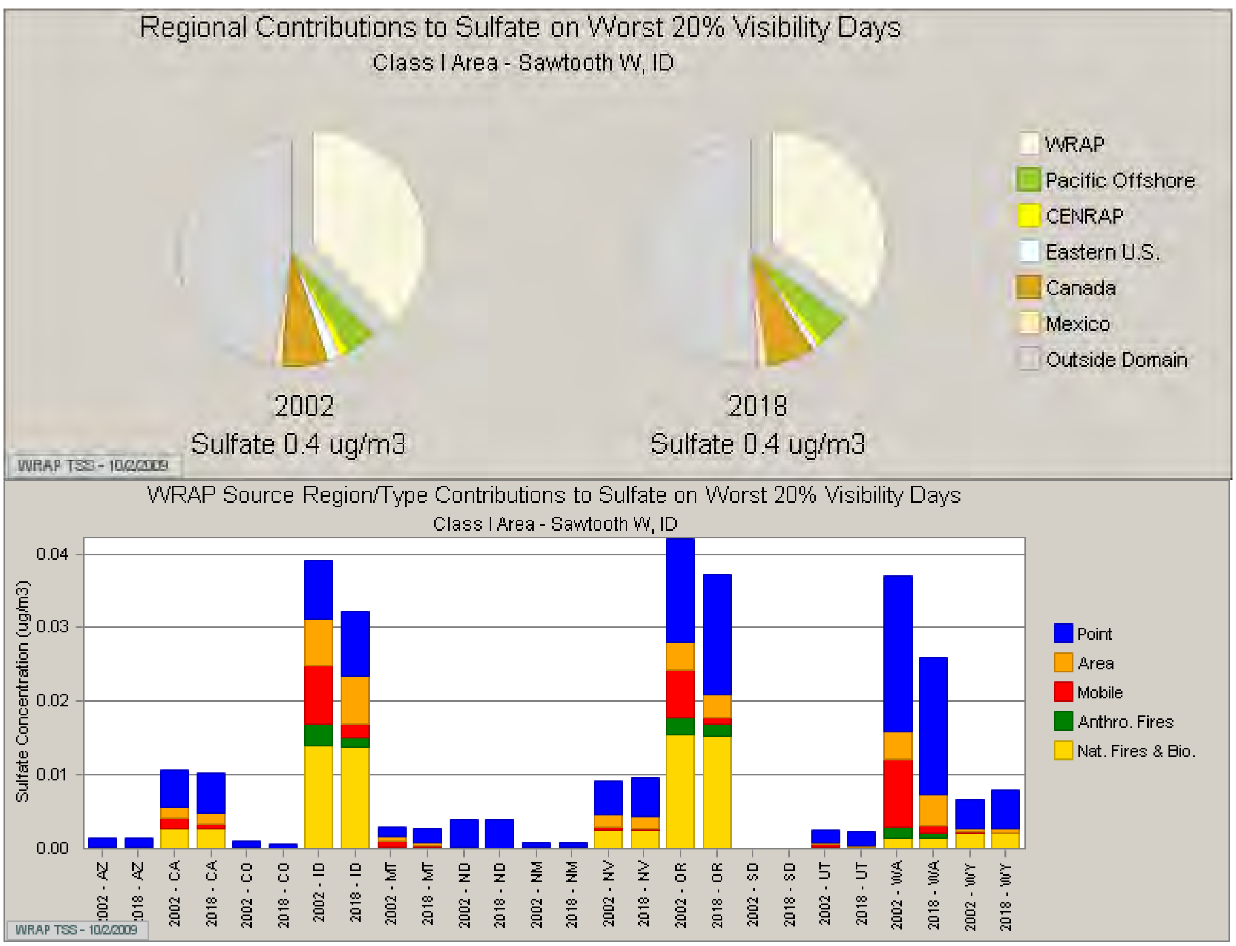


Figure 9-29 PSAT Sulfate Concentrations at Sawtooth Wilderness 20% Worst Days

Figure 9-30 shows very low concentrations of sulfate expected to come from all WRAP states during the 20% best visibility days. Overall, concentrations are expected to go down with only a slight increase expected from Nevada.

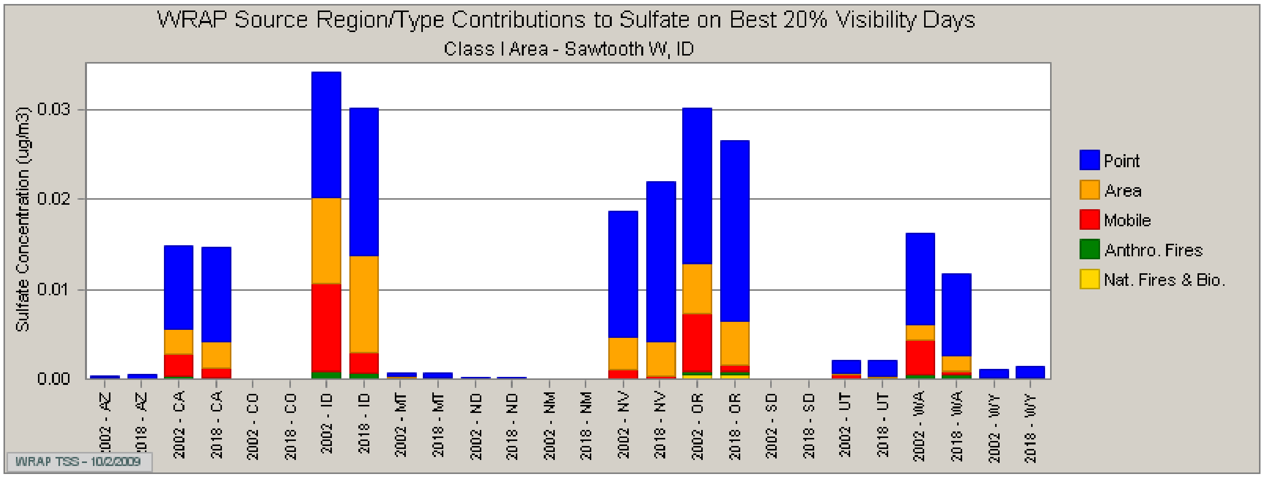


Figure 9-30 PSAT Sulfate Concentrations at Sawtooth 20% Best Days

Nitrate at Sawtooth Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-31 show the WRAP states are expected to contribute roughly two thirds of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-31 shows Idaho and then Washington and Oregon as the largest expected contributors of nitrate at Sawtooth Wilderness. Overall, the concentration levels attributed to all the WRAP states are very low and decreasing over time due to reductions primarily from mobile sources. Idaho shows an overall reduction of roughly 17% over the first planning period and that is without the emissions from the EGU anticipated in Jerome County having been removed yet (see discussion of the once-anticipated EGU on the previous page). The expected 17% reduction also does not include emissions reductions expected from subject-to-BART sources.

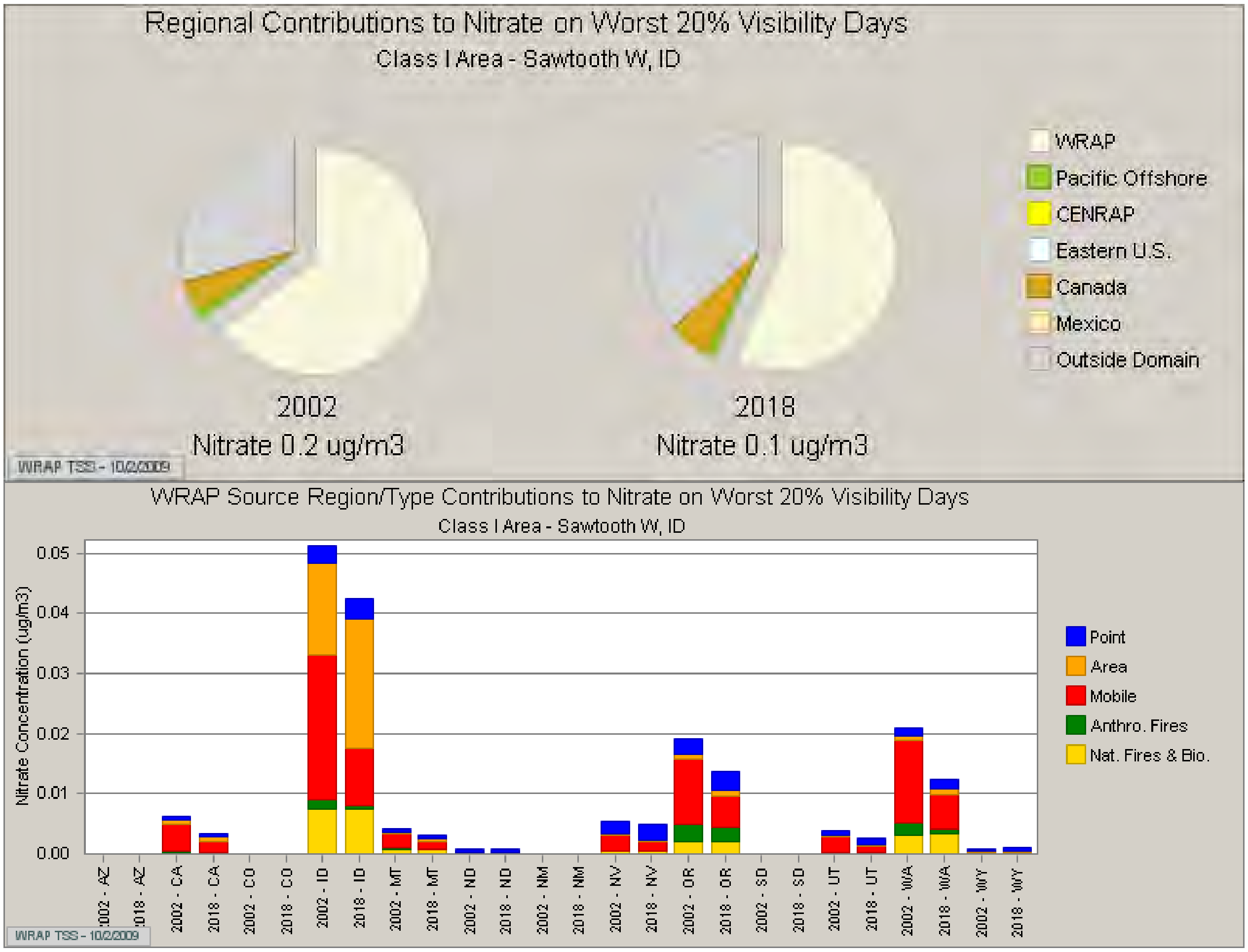


Figure 9-31 PSAT Nitrate Concentrations at Sawtooth 20% Worst Days

Figure 9-32 shows very low concentrations of nitrate expected from all WRAP states on the 20% best visibility days at Sawtooth Wilderness. All the WRAP states are expecting reductions in future contributions, so overall the 20% best days should be improving.

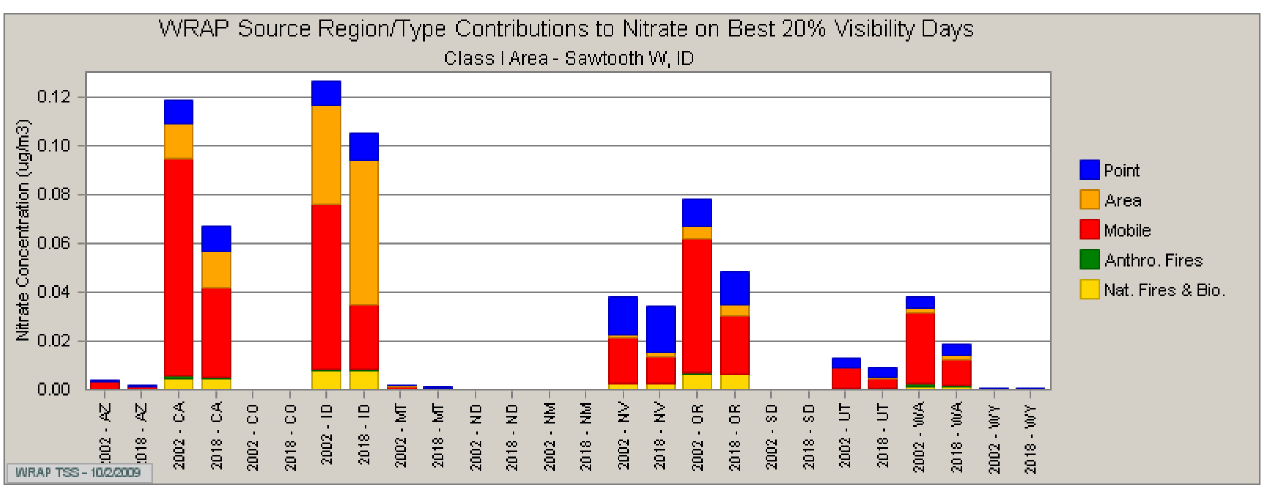


Figure 9-32 PSAT Nitrate Concentrations at Sawtooth 20% Best Days

Primary Organic Aerosol at Sawtooth Wilderness Based on WEP

For the 20% worst visibility days at Sawtooth Wilderness, Idaho shows a sizeable contribution of primary elemental aerosol coming from natural fire as shown in figure 9-33. Idaho's overall contribution is expected to decline over time due to reductions from anthropogenic fire as shown. Oregon is showing a small contribution and similar reductions expected over time.

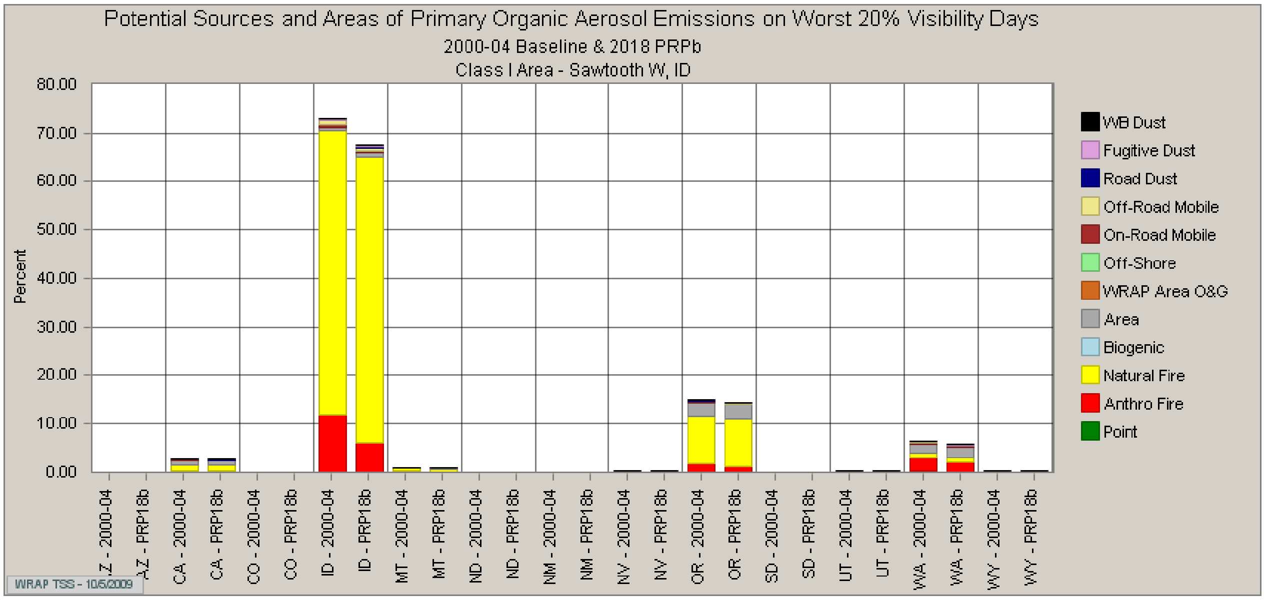


Figure 9-33 WEP Primary Organic Aerosol at Sawtooth Wilderness 20% Worst Days

Idaho is expected to contribute a large contribution of the primary organic aerosol at the Sawtooth Wilderness area on the 20% best visibility days as shown in figure 9-34. Overall, the primary organic aerosol is expected to go down at the Sawtooth Wilderness area on the 20% best visibility days.

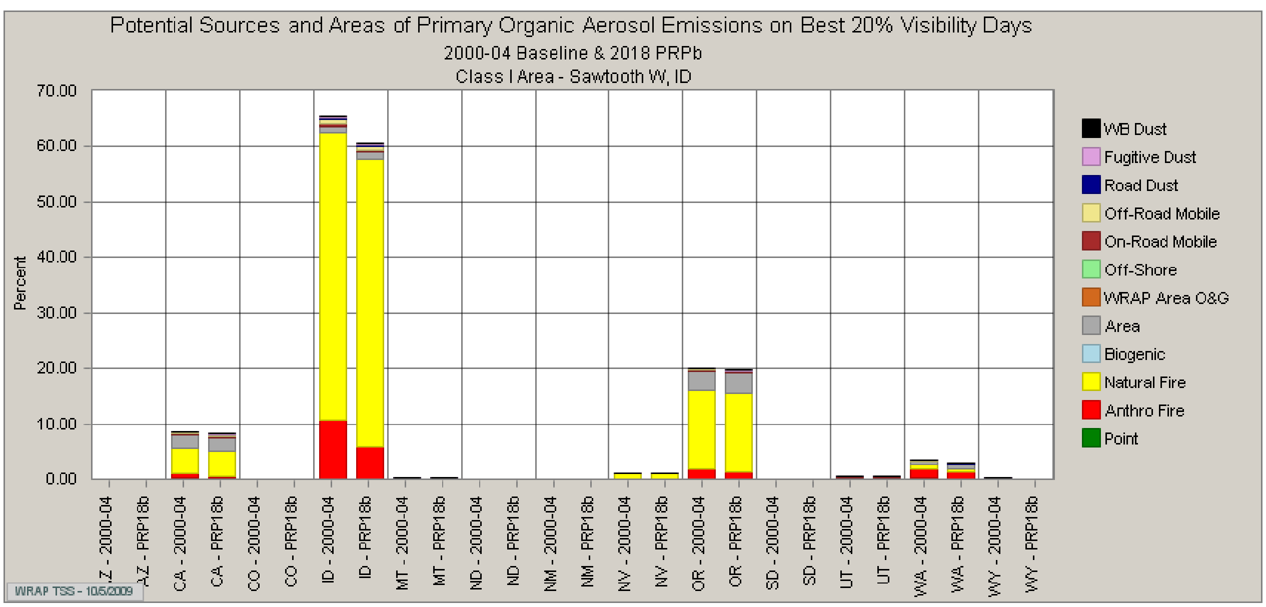


Figure 9-34 WEP Primary Organic Aerosol at Sawtooth Wilderness 20% Best Days

Elemental Carbon at Sawtooth Wilderness Based on WEP

For the 20% worst visibility days at Sawtooth Wilderness, Idaho shows a sizeable contribution to elemental carbon expected to come from natural fire as shown in Figure 9-35. Idaho and the other WRAP states' overall contribution is expected to decline over time due to reductions from anthropogenic fire.

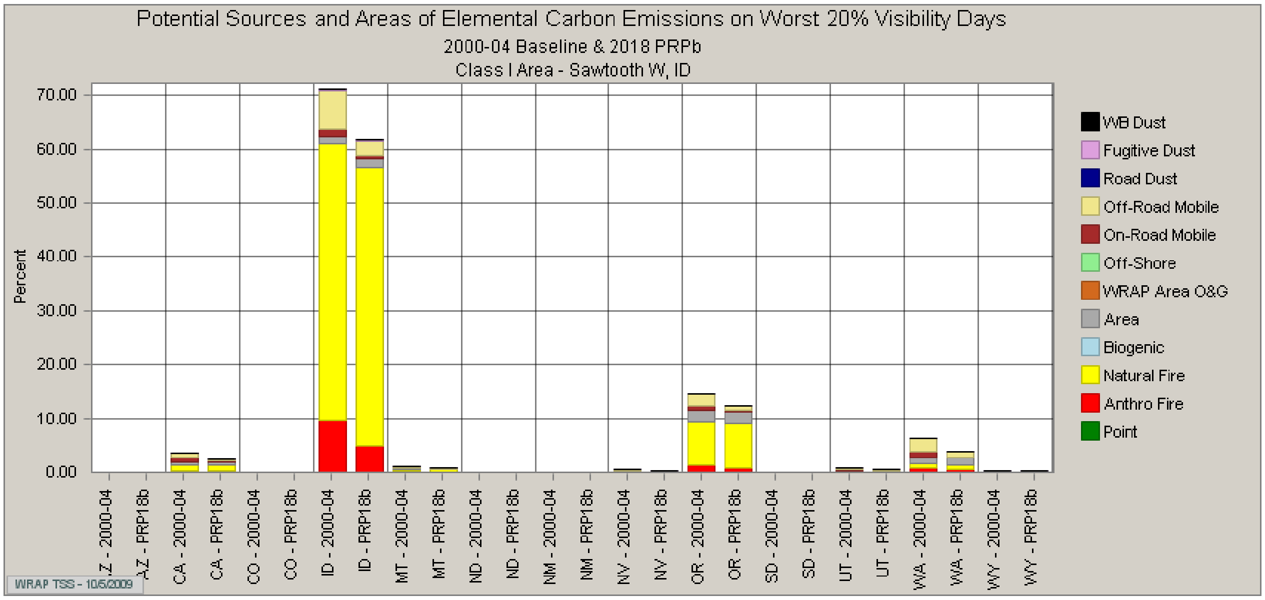


Figure 9-35 WEP Elemental Carbon at Sawtooth Wilderness 20% Worst Days

Figure 9-36 shows a large percentage of the contribution of elemental carbon in the Sawtooth Wilderness area on the 20% best visibility days is expected to come from Idaho natural fire. Overall, the WRAP states are expected to reduce elemental carbon on the 20% best visibility days in the Sawtooth Wilderness due to reductions from anthropogenic fire and mobile sources.

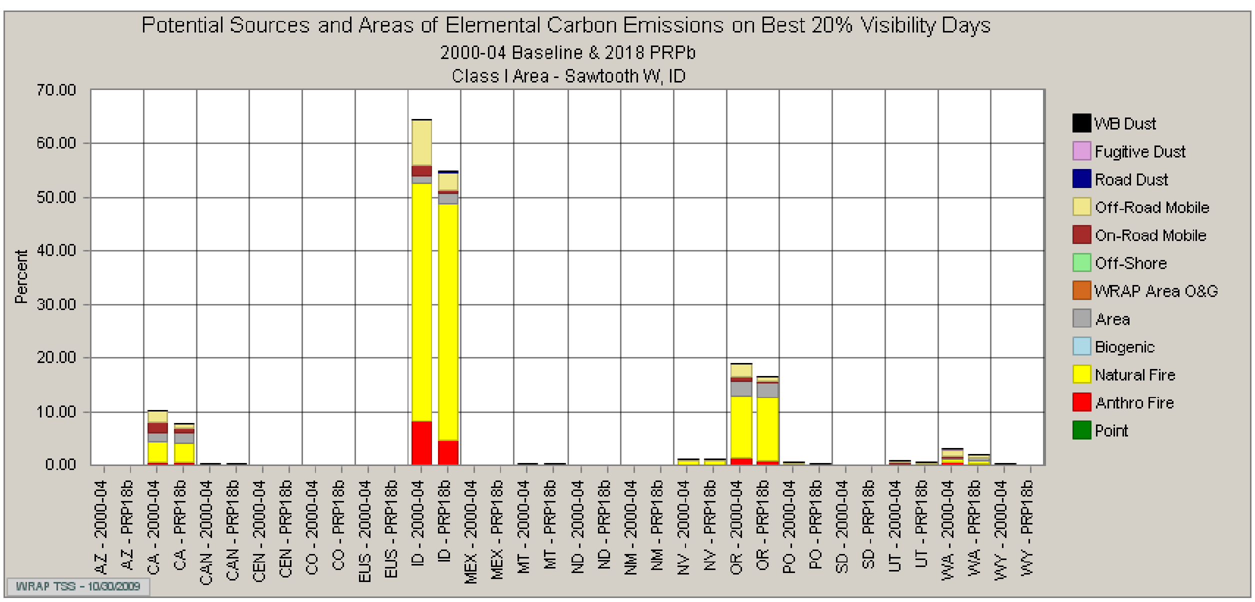


Figure 9-36 WEP Elemental Carbon at Sawtooth Wilderness 20% Best Days

Fine Particulate Matter at Sawtooth Wilderness Based on WEP

Figure 9-37 shows Idaho is expected to contribute roughly 50% of the fine particulate matter to Sawtooth Wilderness during the 20% worst visibility days. Oregon and Washington are showing almost equal contributions at around 20% of the fine particulate matter. Idaho's area source and road dust are expected to increase during the first planning period. Increases in Oregon's fugitive dust are also expected to cause future fine particulate matter increases. Overall, fine particulate should slightly increase over time.

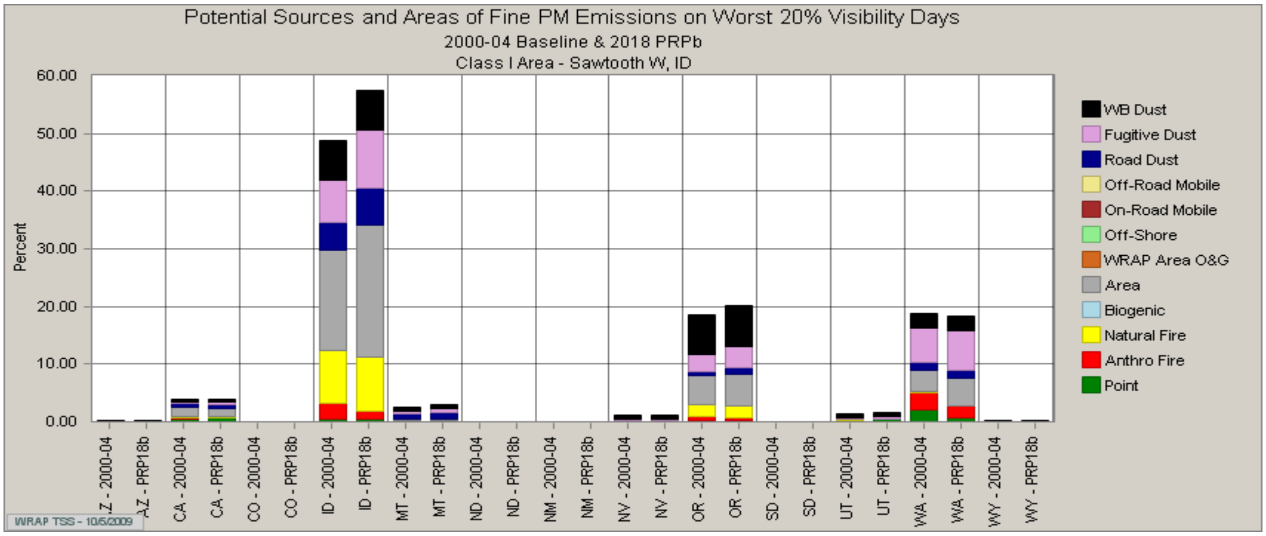


Figure 9-37 WEP Fine Particulate Matter at Sawtooth Wilderness Worst 20% Days

Figure 9-38 shows the same expected trends in fine particulate on the best visibility days as on the worst visibility days at the Sawtooth Wilderness.

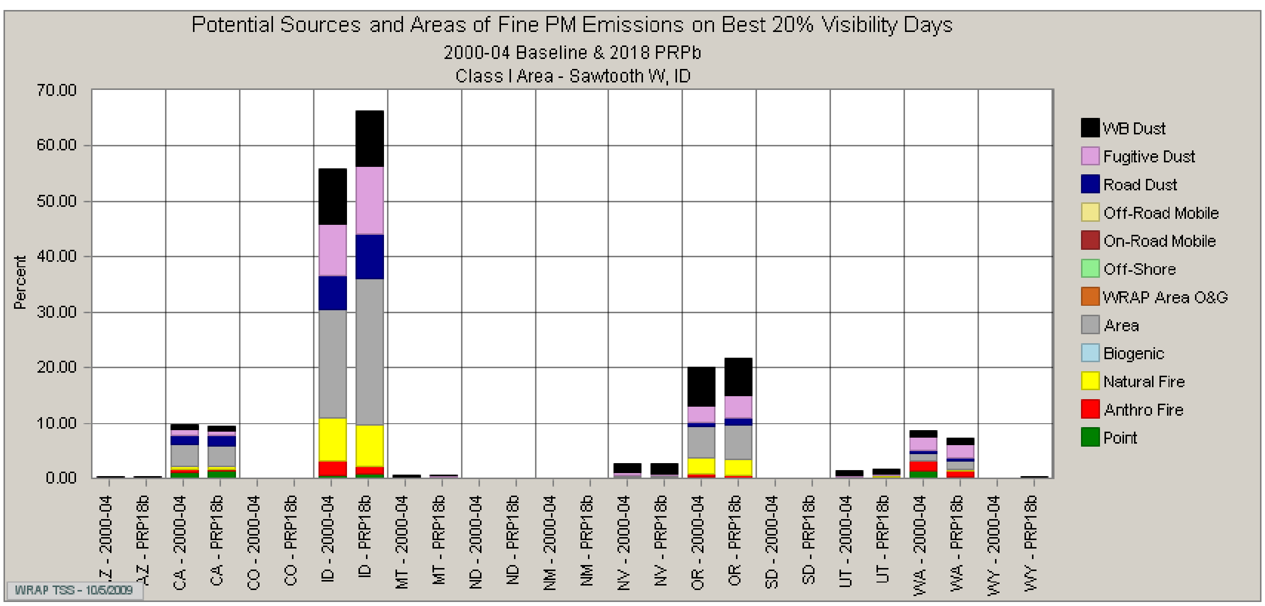


Figure 9-38 WEP Fine Particulate Matter at Sawtooth Wilderness Best 20% Days

Coarse Particulate Matter at Sawtooth Wilderness Based on WEP

Figure 9-39 shows coarse particulate on the 20% worst visibility days is expected to trend similar to fine particulate on the best visibility days at the Sawtooth Wilderness, with Idaho being the largest contributor. Idaho, Washington, and Oregon are all projecting increases in area fugitive dust with a slight decrease in anthropogenic fire. Overall, coarse particulate is expected to increase at Sawtooth Wilderness.

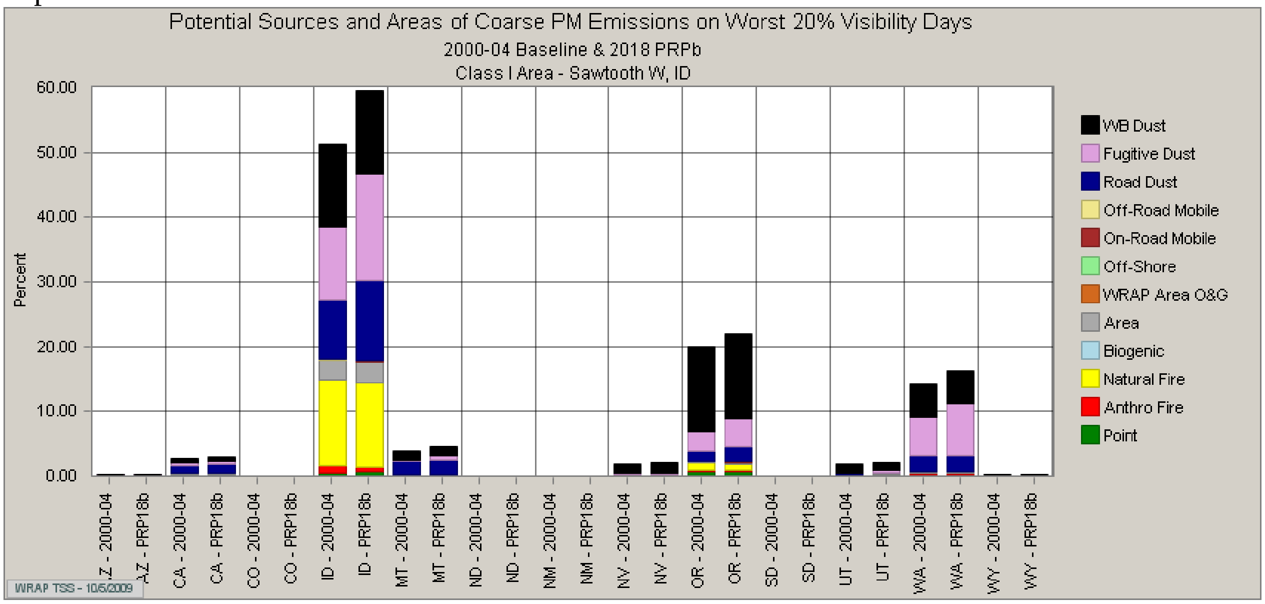


Figure 9-39 WEP Coarse Particulate Matter at Sawtooth Wilderness 20% Worst Days

Figure 9-40 shows 20% best visibility days at Sawtooth Wilderness are trending the same as the 20% worst visibility days at Sawtooth Wilderness, with similar contributions from Idaho, Oregon and Washington as for the 20% worst days. Coarse particulate is expected to increase at the Sawtooth Wilderness on the 20% worst days.

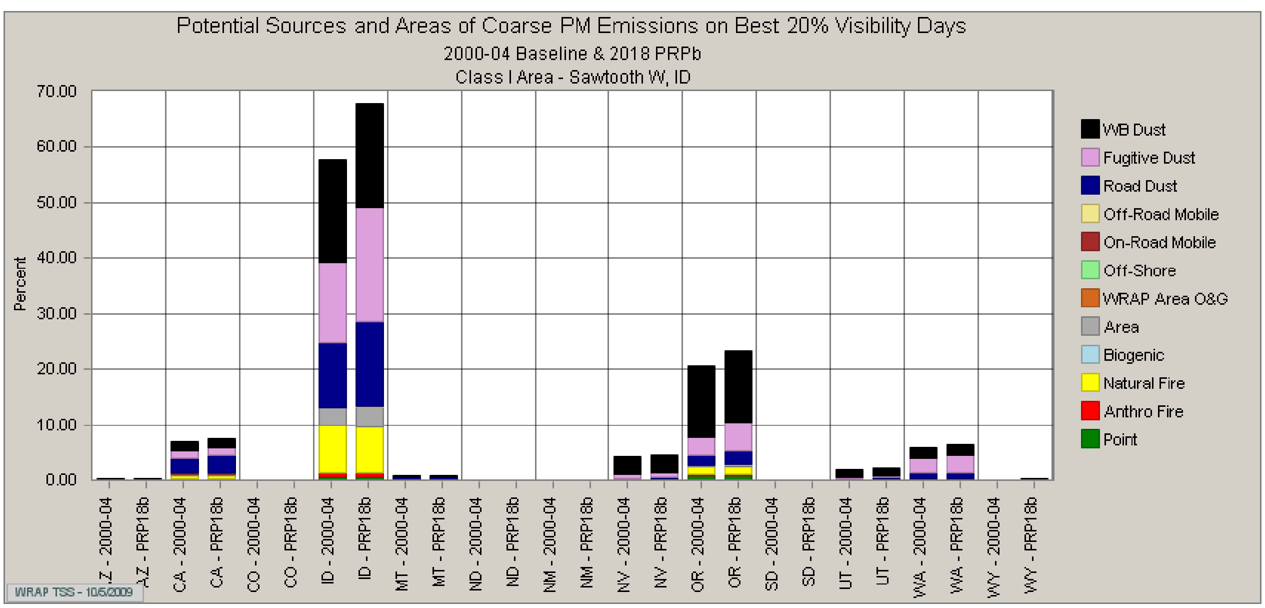


Figure 9-40 WEP Coarse Particulate Matter at Sawtooth Wilderness 20% Best Days

9.2.4 Selway – Bitterroot Wilderness Source Apportionment[7]

Sulfate at Selway-Bitterroot Wilderness Based on PSAT

The regional source contribution pie charts in Figure 9-41 show the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-41 shows Idaho and then Washington and Oregon as the largest contributors of sulfate at Selway Bitterroot Wilderness. Overall, the expected concentration levels attributed to all the WRAP states are fairly low and decreasing over time due to reductions expected primarily from mobile sources. Idaho shows an overall reduction of roughly 4 % expected over the first planning period. Idaho is contributing 12% of the total contribution of sulfate at Selway Bitterroot Wilderness. Natural fire from Idaho is projected to account for 10% of the sulfate and only roughly 2% of the total contribution will be from Idaho anthropogenic sources. This does not include emissions reductions expected from subject-to-BART sources. The large contribution of natural fire will make it difficult to show much progress in visibility improvement from Idaho's area, point, and mobile sources.

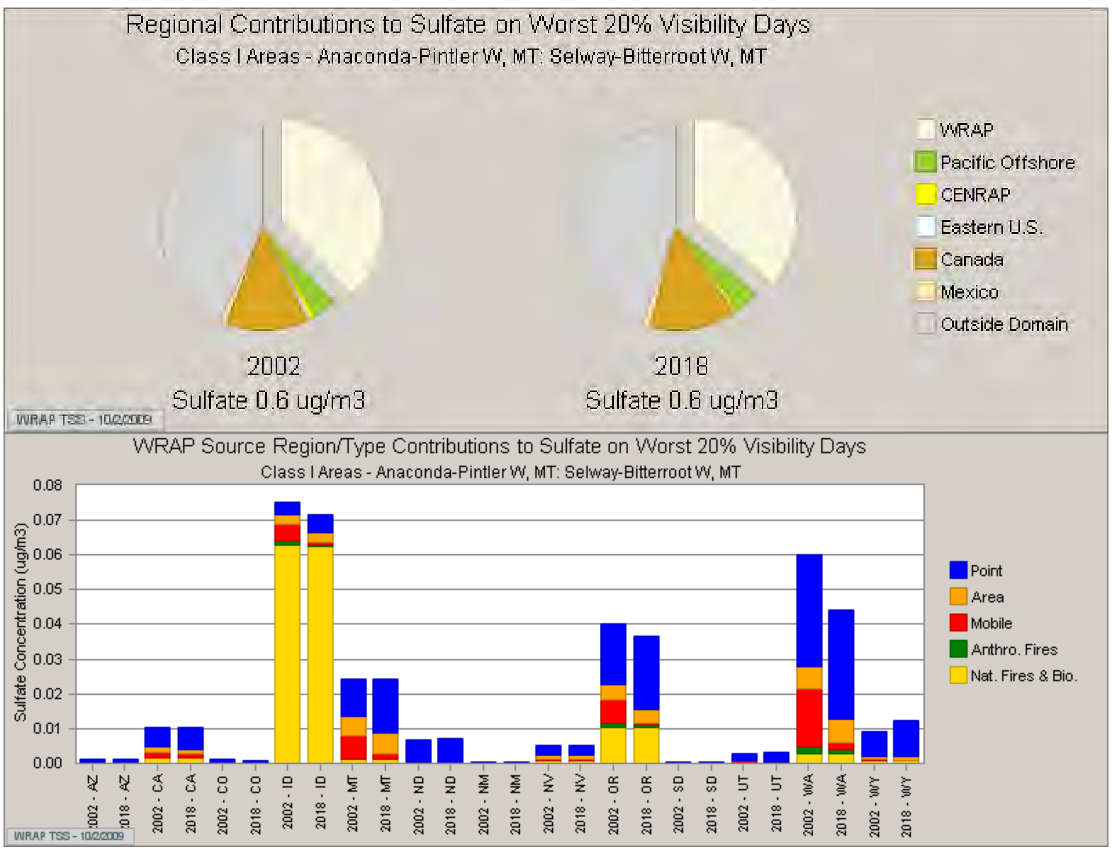


Figure 9-41 PSAT Sulfate Concentrations at Selway Bitterroot 20% Worst Days

7 Throughout the remainder of this document the Selway-Bitterroot Wilderness and Anaconda-Pintler Wilderness will be represented by the "Selway-Bitterroot" since they all share the same IMPROVE monitoring site.

Figure 9-42 shows an overall improvement expected in future sulfate contributions. The improvements are primarily expected to come from the mobile source category.

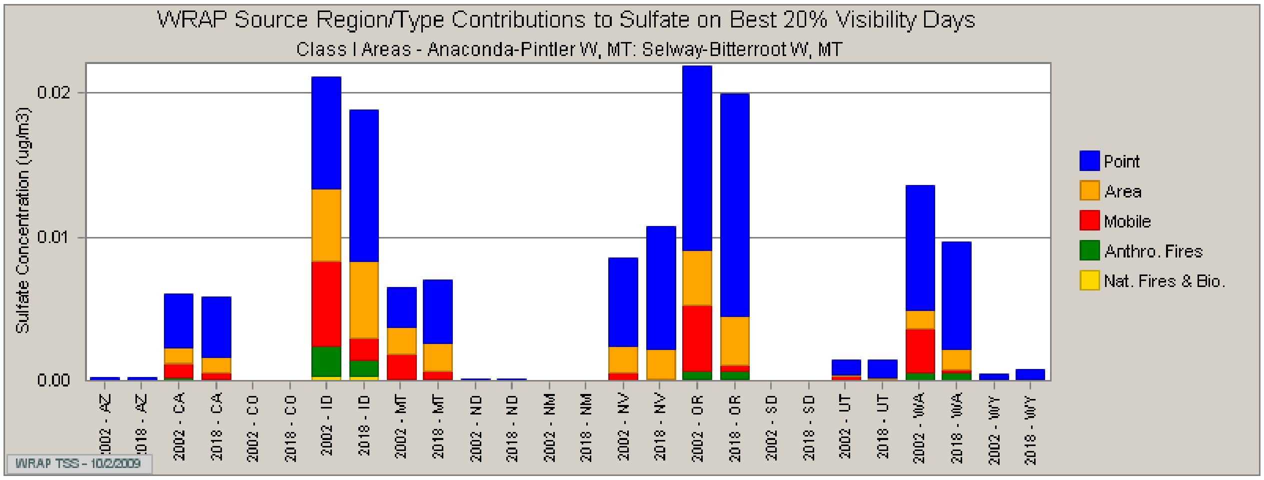


Figure 9-42 PSAT Sulfate Concentrations at Selway Bitterroot 20% Best Days

__Nitrate at Selway-Bitterroot Wilderness Based on PSAT Modeling__

The regional source contribution pie charts in Figure 9-43 show the WRAP states are only expected to contribute roughly two thirds of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-43 shows Montana then Washington and Idaho as the largest contributors of nitrate at Sawtooth Wilderness in 2002. Overall, the concentration levels attributed to all the WRAP states are expected to decrease over time due to reductions primarily from mobile sources. The overall contribution from Idaho is expected to be roughly 28% expected over the first planning period. The future Idaho anthropogenic contribution of the total nitrate concentrations is expected to be around 8%. This does not include all the emissions reductions expected from subject-to-BART sources.

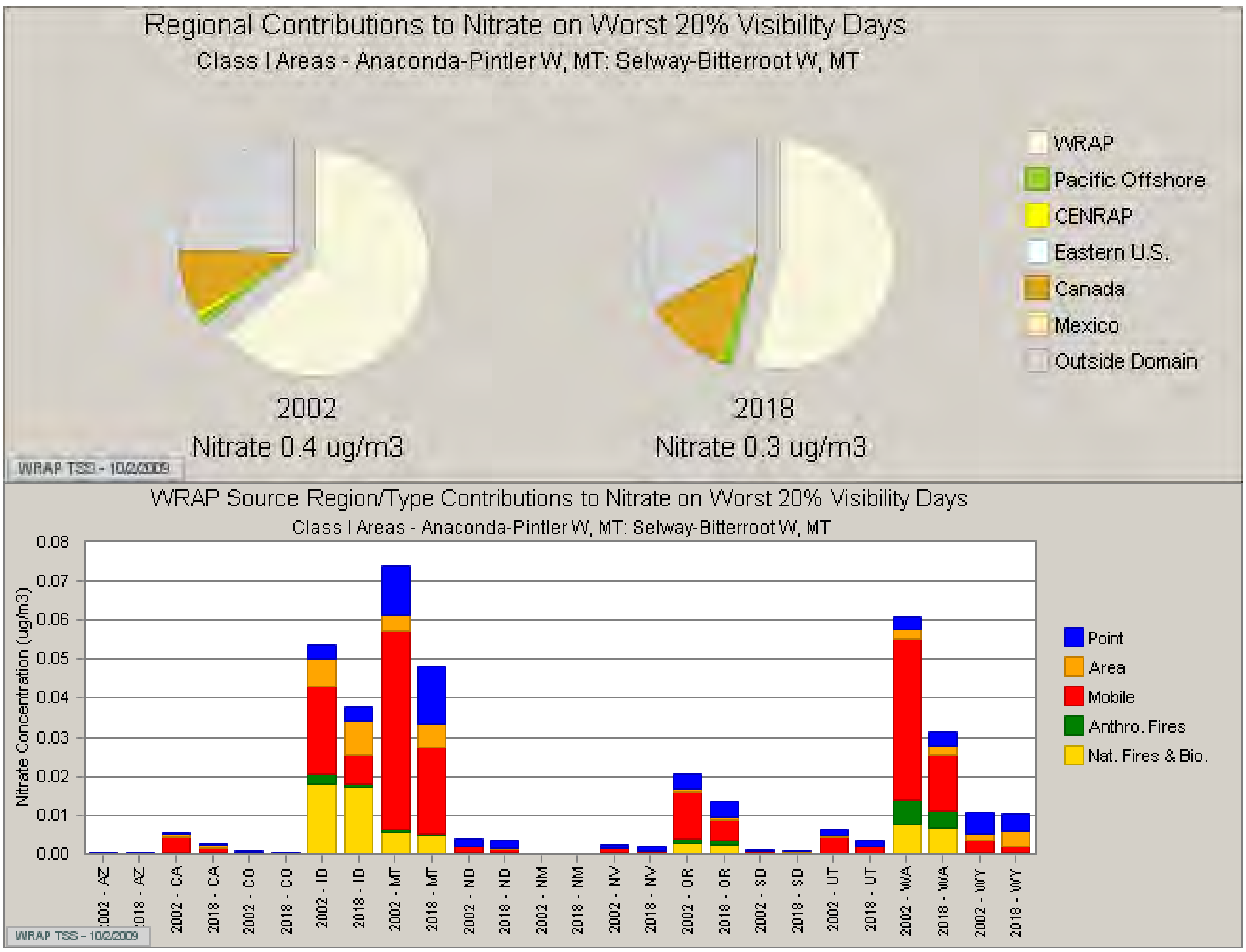


Figure 9-43 PSAT Nitrate Concentrations at Selway Bitterroot 20% Worst Days

Figure 9-44 shows an overall improvement in future nitrate contributions expected to come from all states. The improvements are primarily expected to come from the mobile source category.

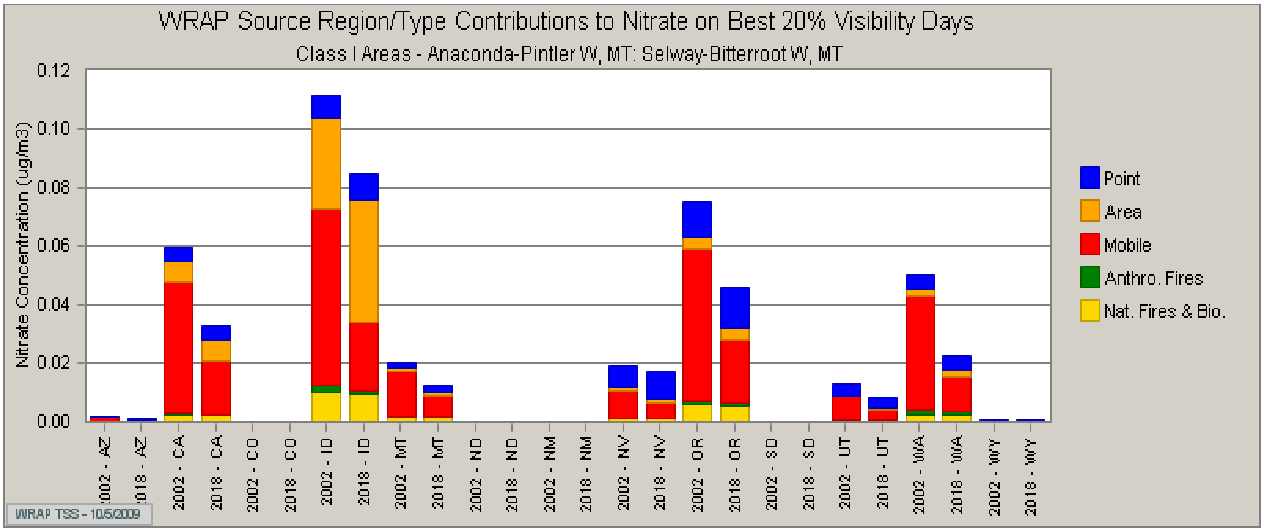


Figure 9-44 PSAT Nitrate Concentrations at Selway Bitterroot 20% Best Days

9.2.5

Primary Organic Aerosol at Selway-Bitterroot Wilderness Based on WEP

Figure 9-45 shows the preponderance of organic aerosol on the 20% worst days in the Selway-Bitterroot Wilderness is expected to come from Idaho natural fire. There are decreases anticipated from anthropogenic sources from most states but these are dwarfed by expected impacts from natural fire.

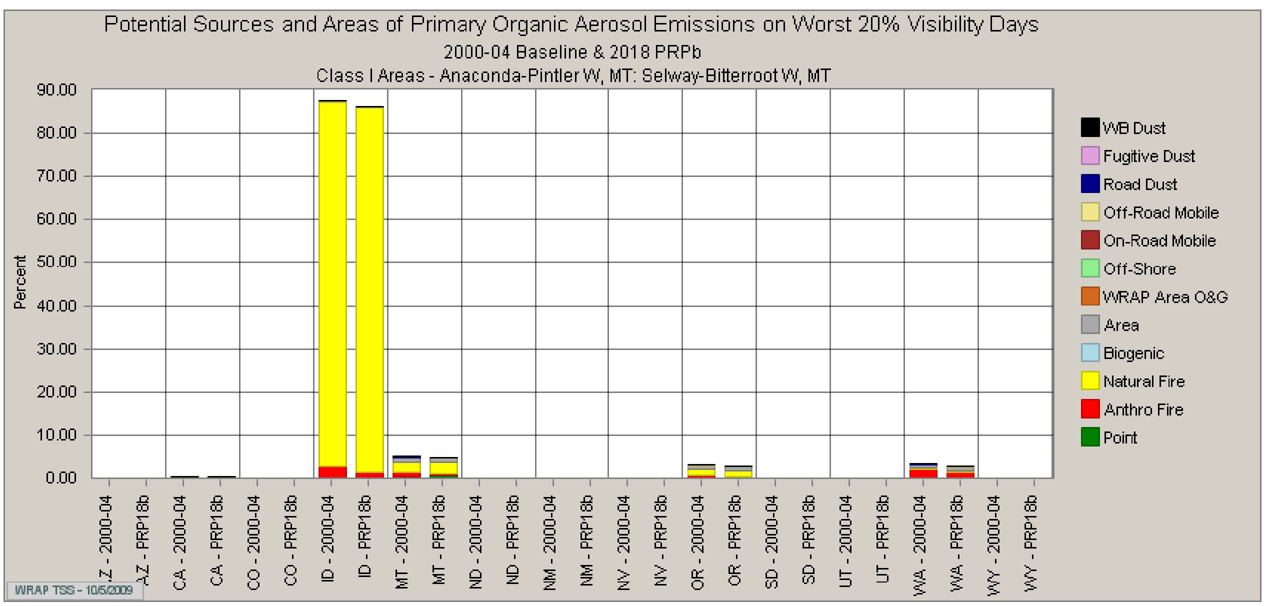


Figure 9-45 WEP Primary Organic Aerosol at Selway-Bitterroot Wilderness 20% Worst Days

Figure 9-46 shows similar results expected on the 20% best days in the Selway-Bitterroot Wilderness as on the 20% worst days. Natural fire from Idaho is by far the largest expected source.

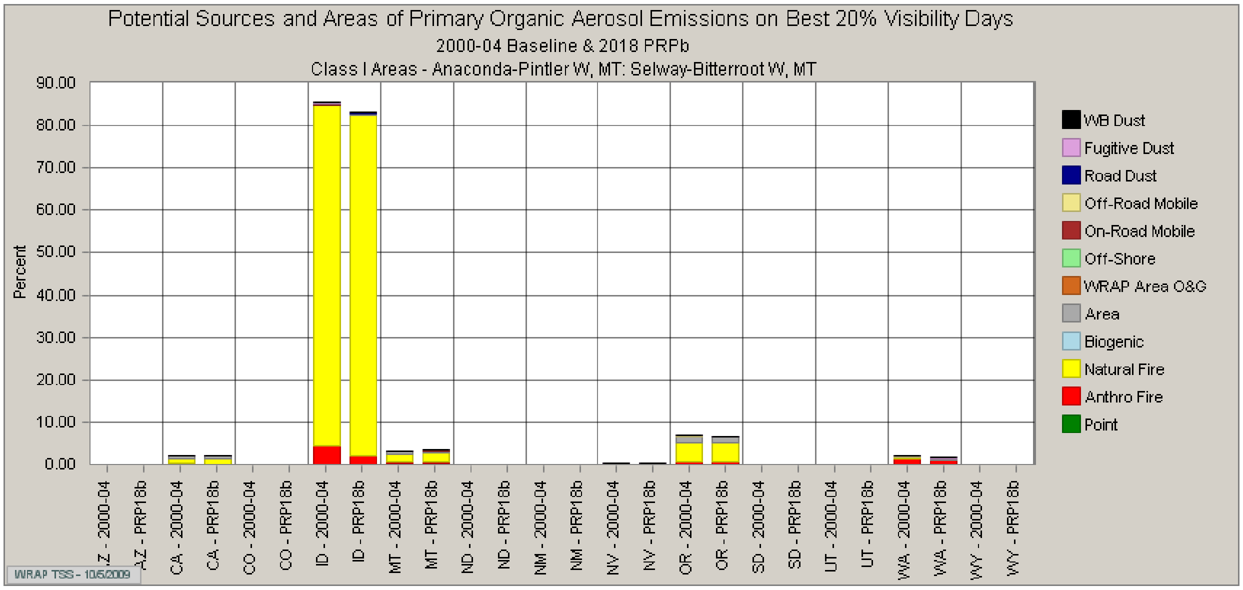


Figure 9-46 WEP Primary Organic Aerosol at Selway-Bitterroot Wilderness 20% Best Days

Elemental Carbon at Selway-Bitterroot Wilderness Based on WEP

Figure 9-47 shows natural fire from Idaho is the largest expected contributor to visibility impairment due to elemental carbon on the 20% worst days in the Selway-Bitterroot Wilderness. It is anticipated there will be future reductions from anthropogenic fire and an overall improvement in visibility impairment from elemental carbon on the 20% worst days.

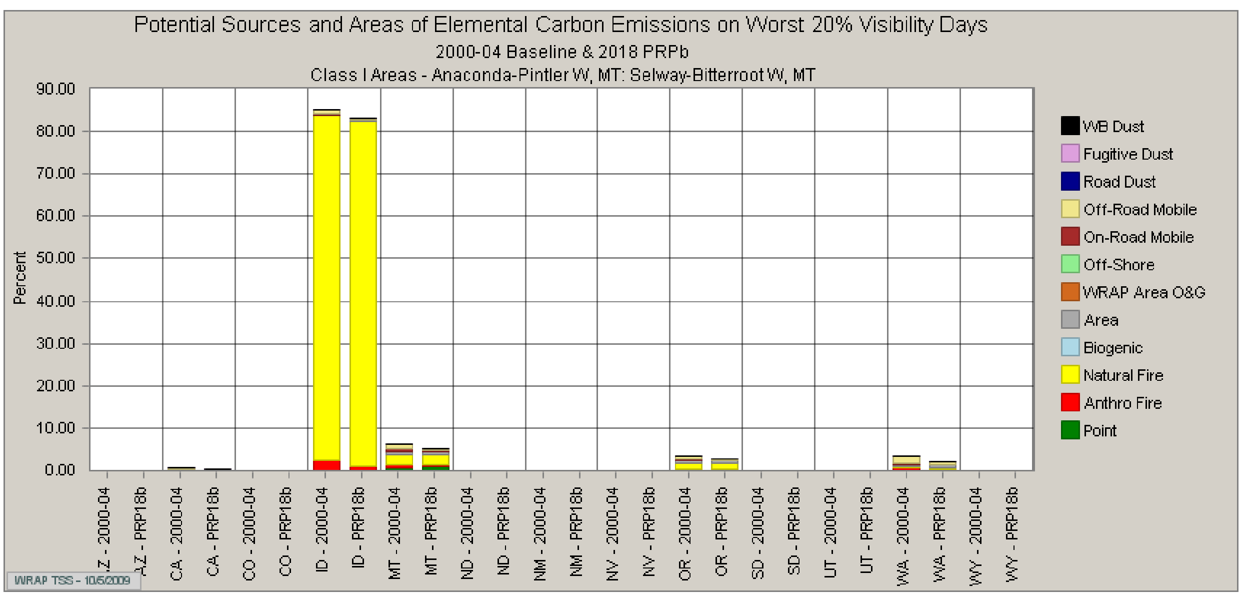


Figure 9-47 WEP Elemental Carbon at Selway-Bitterroot Wilderness 20% Worst Days

Figure 9-48 shows similar expected results on the 20% best days in the Selway-Bitterroot Wilderness as on the 20% worst days. Natural fire from Idaho is by far the largest source of elemental carbon expected in the Selway-Bitterroot Wilderness. It is expected elemental carbon will decrease in the future on the 20% best days due to improvements in smoke management programs and impacts from anthropogenic fire.

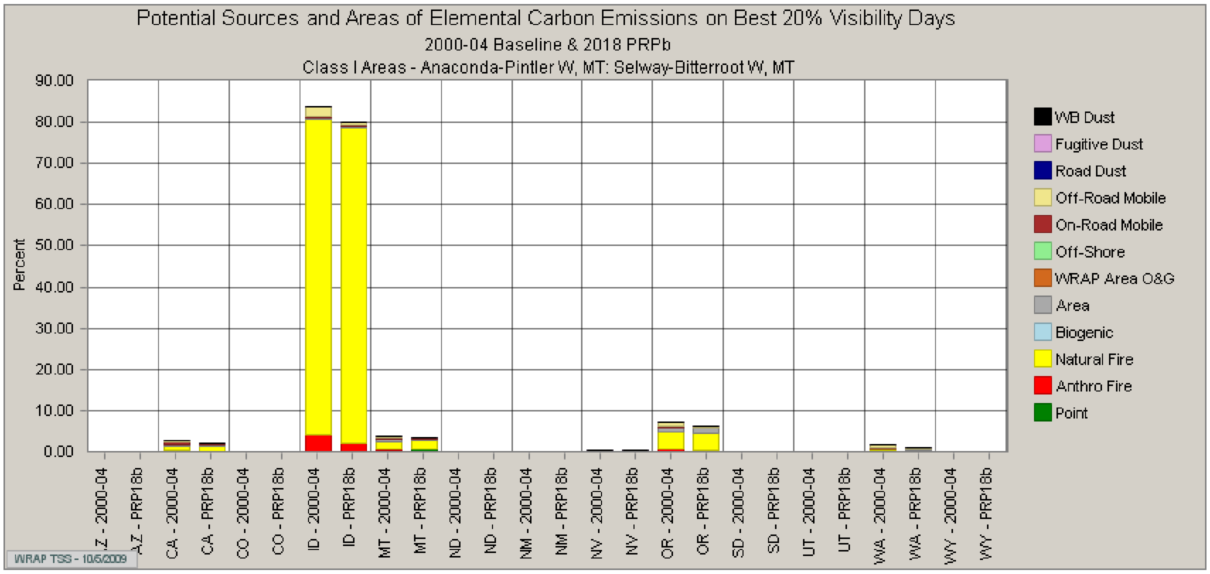


Figure 9-48 WEP Elemental Carbon at Selway-Bitterroot Wilderness 20% Best Days

Fine Particulate Matter at Selway-Bitterroot Wilderness Based on WEP

Figure 9-49 shows Idaho contributing roughly 36% of the fine particulate matter to Selway-Bitterroot Wilderness during the 20% worst visibility days in 2002. Montana and Washington are showing almost equal contributions at around 20% of the fine particulate matter. Idaho's area source and road dust emissions are expected to increase during the first planning period and outpace expected reductions from anthropogenic fire. Increases in Montana's fugitive dust and point sources are also expected to cause future fine particulate matter to increase. Overall, fine particulate should slightly increase over time.

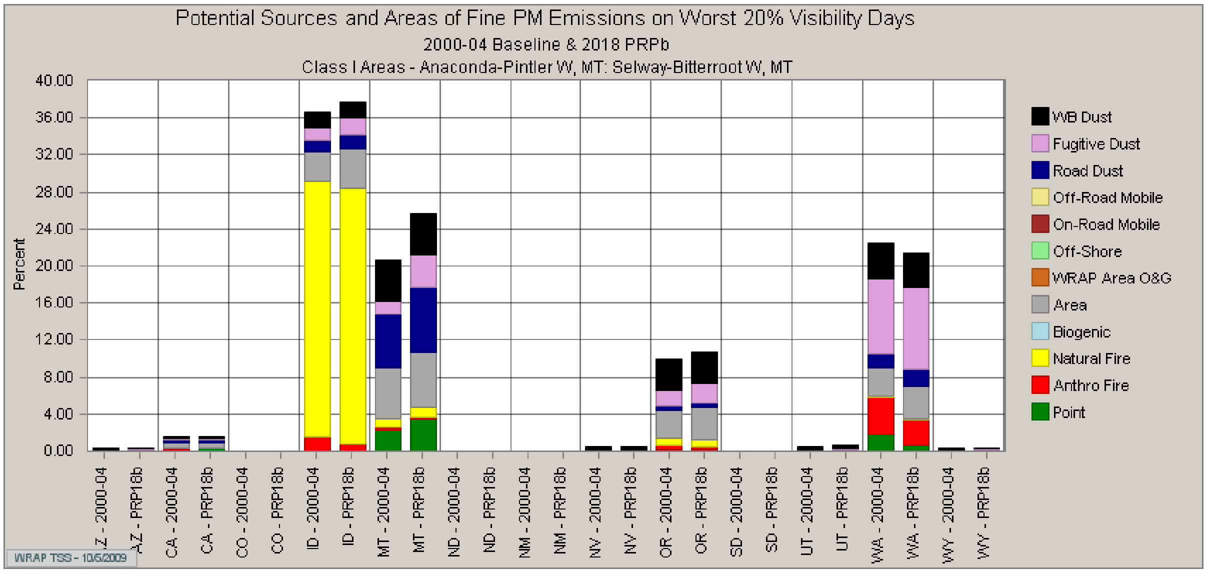


Figure 9-49 WEP Fine Particulate Matter at Selway-Bitterroot Wilderness Worst 20% Days

Figure 9-50 shows the same trends in fine particulate on the 20% best visibility days as on the 20% worst days in the Selway-Bitterroot Wilderness.

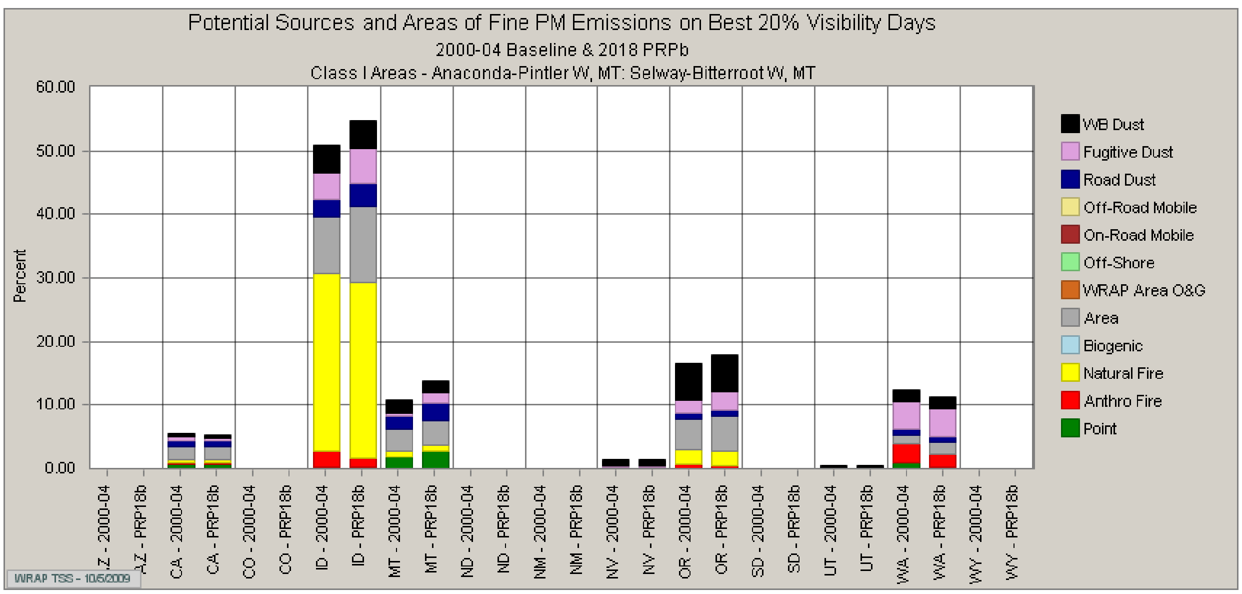


Figure 9-50 WEP Fine Particulate Matter at Selway-Bitterroot Wilderness Best 20% Days

Coarse Particulate Matter at Selway-Bitterroot Wilderness Based on WEP

Figure 9-51 shows coarse particulate is trending similar to fine particulate in the Selway-Bitterroot Wilderness on the 20% worst visibility days, with Idaho being the largest contributor. Idaho, Montana, Washington and Oregon are all projecting increases in fugitive dust and road dust with a slight decrease in anthropogenic fire. Overall, coarse particulate is expected to increase in the Selway-Bitterroot Wilderness.

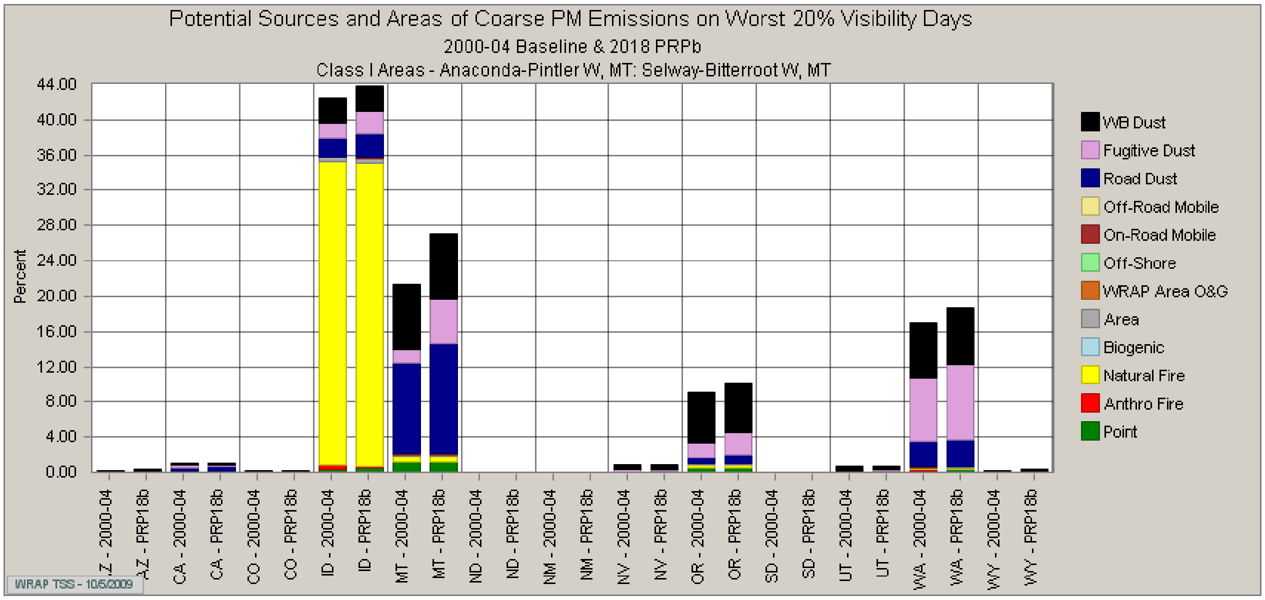


Figure 9-51 WEP Coarse Particulate Matter at Selway-Bitterroot Wilderness 20% Worst Days

Figure 9-52 shows an expected increase in coarse particulate on the 20% best days in the Selway-Bitterroot Wilderness due to expected increases in fugitive dust and road dust.

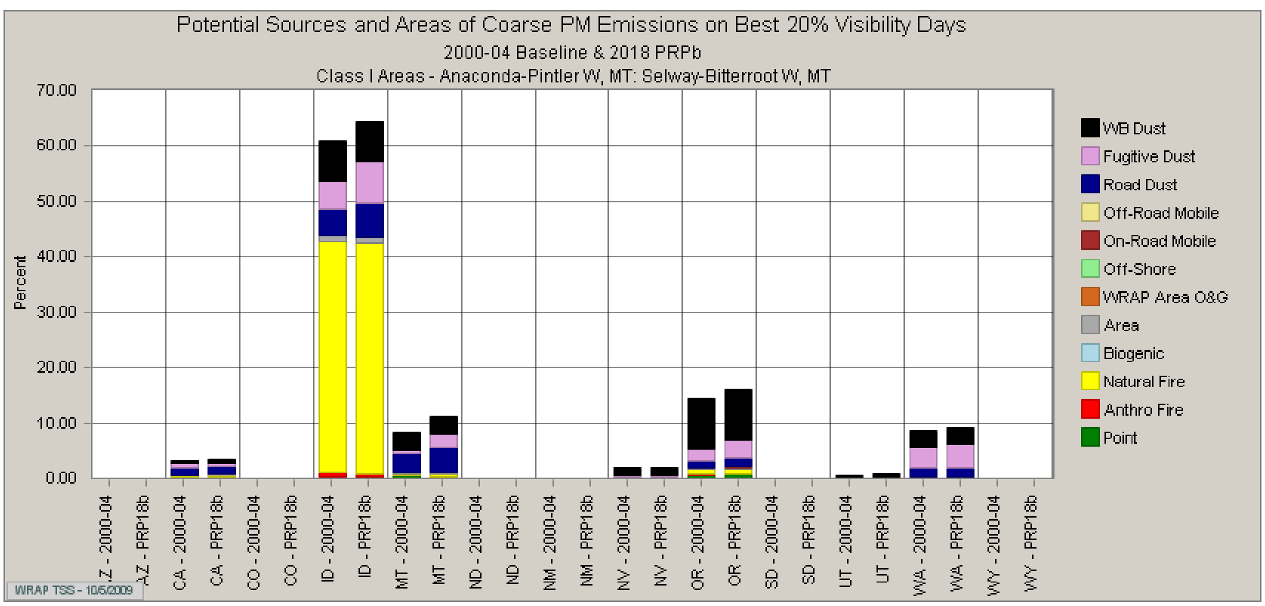


Figure 9-52 WEP Coarse Particulate Matter at Selway-Bitterroot Wilderness 20% Best Days

9.2.6 Yellowstone National Park Source Apportionment[8]

Sulfate at Yellowstone National Park Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-53 show the WRAP states are only expected to contribute roughly a third of the sulfate visibility impairment in Yellowstone National Park on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-53 shows Idaho and then Wyoming and Oregon as the largest contributors of sulfate in Yellowstone National Park. Idaho is expected to contribute roughly 9% of the sulfate with only 6% coming from Idaho anthropogenic sources. The PSAT modeling shows a 7% increase coming from Idaho but this does not include the emissions reductions of roughly 9,000 tons per year expected from P4 Production (formerly Monsanto) in Southeast Idaho. Also, these estimates include the emissions from a once-anticipated EGU, as mentioned before, that had not yet been removed from the emissions inventory used for this modeling. It is expected Idaho's contribution will actually drop when these emission reductions occur.

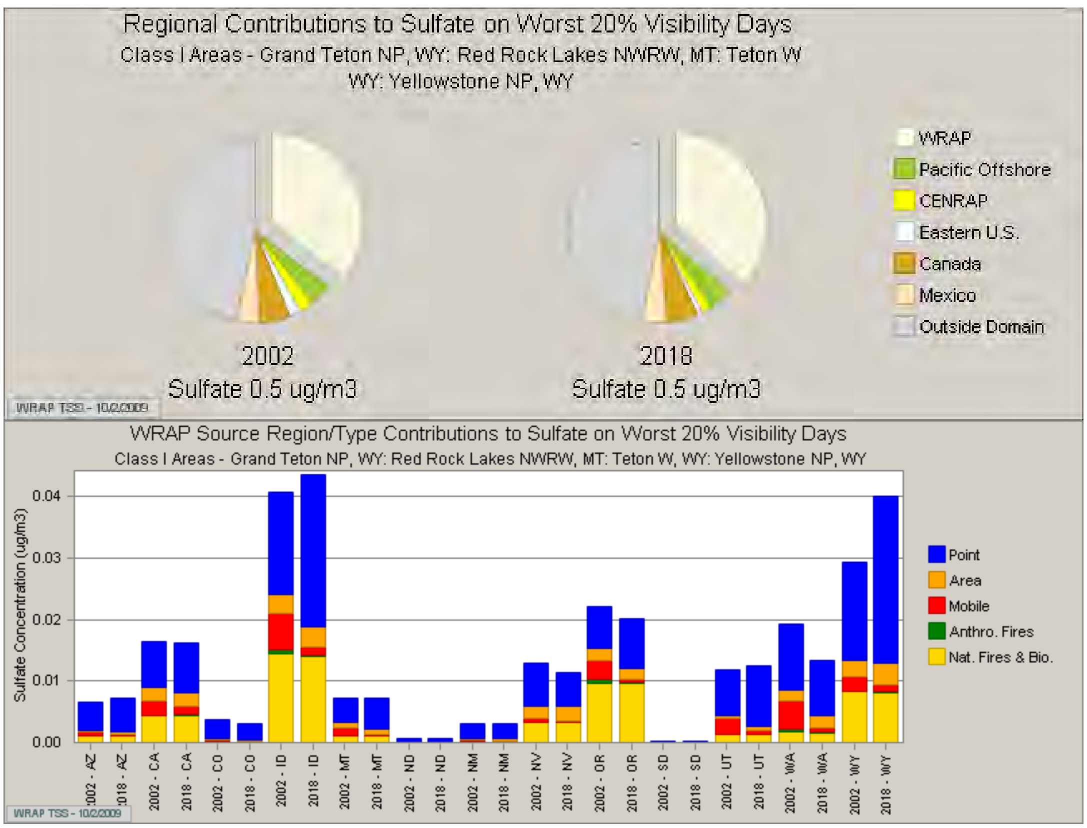


Figure 9-53 PSAT Sulfate Concentrations at Yellowstone National Park 20% Worst Days

8 Throughout the remainder of this document the Yellowstone National Park, Grand Teton National Park, Red Rock Lakes Wilderness and Teton Wilderness will be represented by the "Yellowstone National Park" since they all share the same IMPROVE monitoring site.

The graph in Figure 9-54 shows an expected decrease in emissions from Idaho point sources in 2018. Using WEP updated emissions inventory and back trajectories, Figure 9-54 shows sulfate emissions from point and mobile sources expected to decrease for Idaho and all other WRAP states.

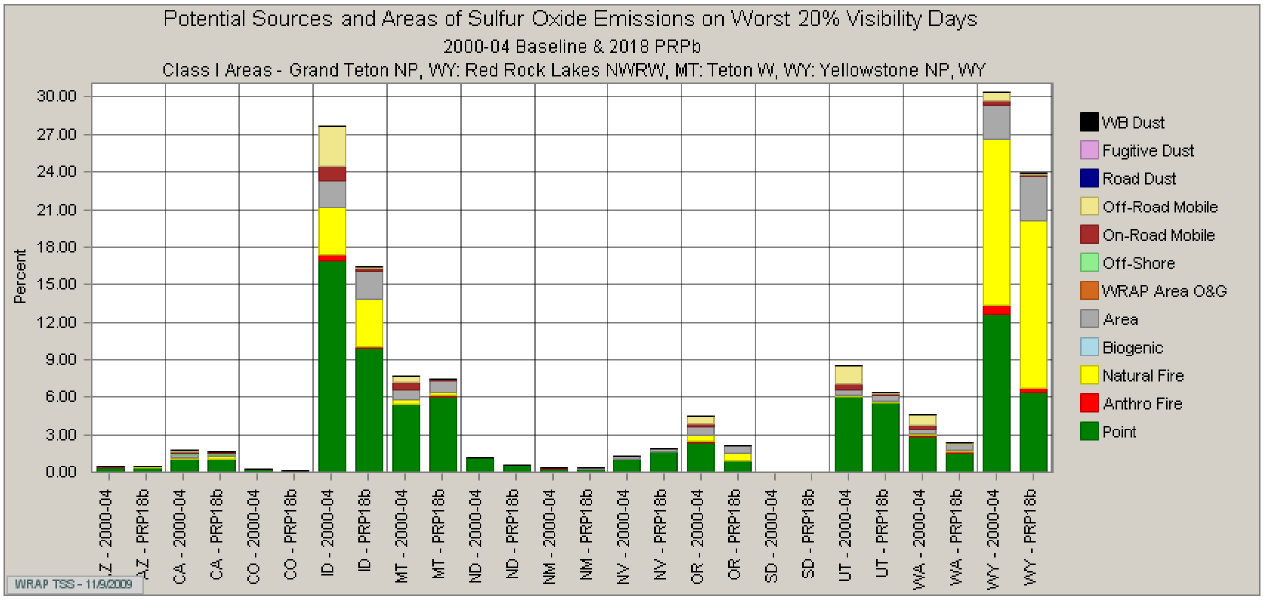


Figure 9-54 WEP Sulfate Concentrations at Yellowstone National Park 20% Worst Days

The PSAT results show an expected increase in visibility impairment form sulfate on the 20% best days at Yellowstone National Park. The updated emissions inventory used by the WEP shows an improvement in future sulfate visibility impacts on the best days. Figures 9-55 and 9-56 show the differences in expected visibility impacts based on using different emissions inventories.

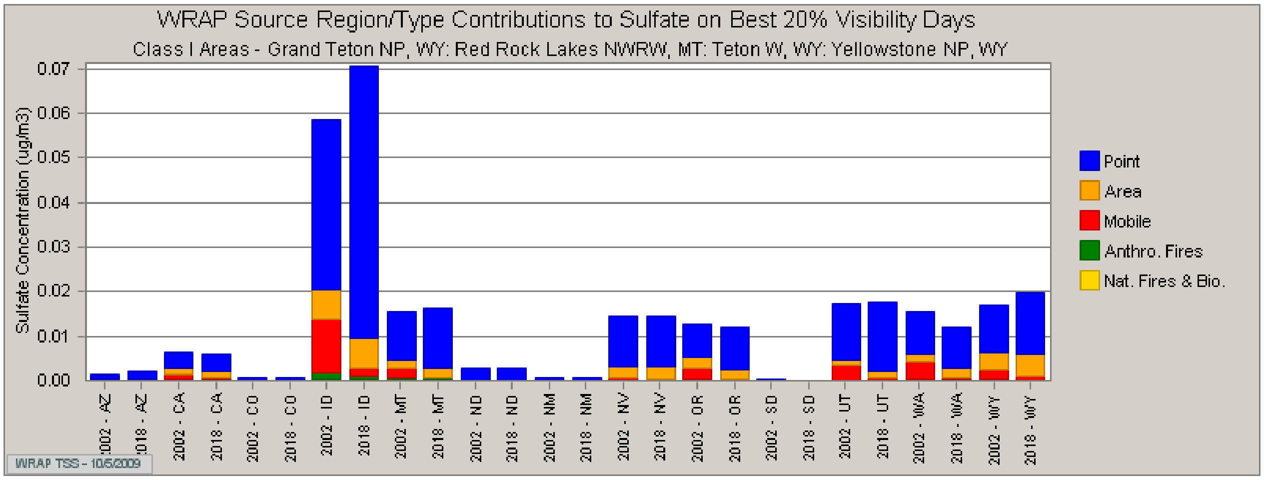


Figure 9-55 PSAT Sulfate Concentrations at Yellowstone National Park 20% Best Days

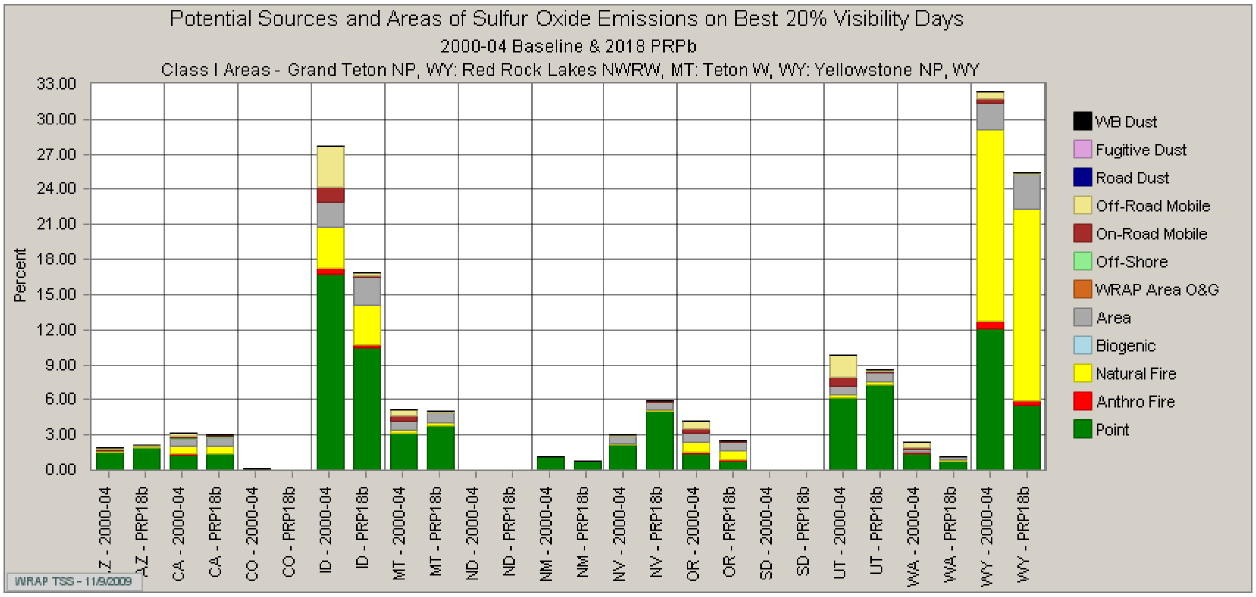


Figure 9-56 WEP Sulfate Concentrations at Yellowstone National Park 20% Best Days

Nitrate at Yellowstone National Park Based on PSAT Modeling

Figure 9-57 shows the WRAP States are expected to contribute roughly two thirds of the nitrates on the 20% worst days. As WRAP states reduce nitrate contributions over the first planning period ending in 2018, the contributions coming from outside the domain, Pacific offshore (shipping), and Canadian emissions will have a greater impact. This will require regulator actions and negotiations outside the WRAP states' control.

Figure 9-57 also shows Idaho as the largest expected contributor to nitrate concentrations at the Yellowstone National Park on the 20% worst days. Overall, Idaho's nitrate emissions are expected to decline by 26% over time primarily due to reductions in mobile emissions.

Because the point source contributions from Idaho are not as large as other categories, the impact from adding an EGU in Jerome County as mentioned above does not show such a significant impact. Overall, most WRAP states are expected to improve future visibility impairment due to nitrates on the 20% worst days in Yellowstone National Park.

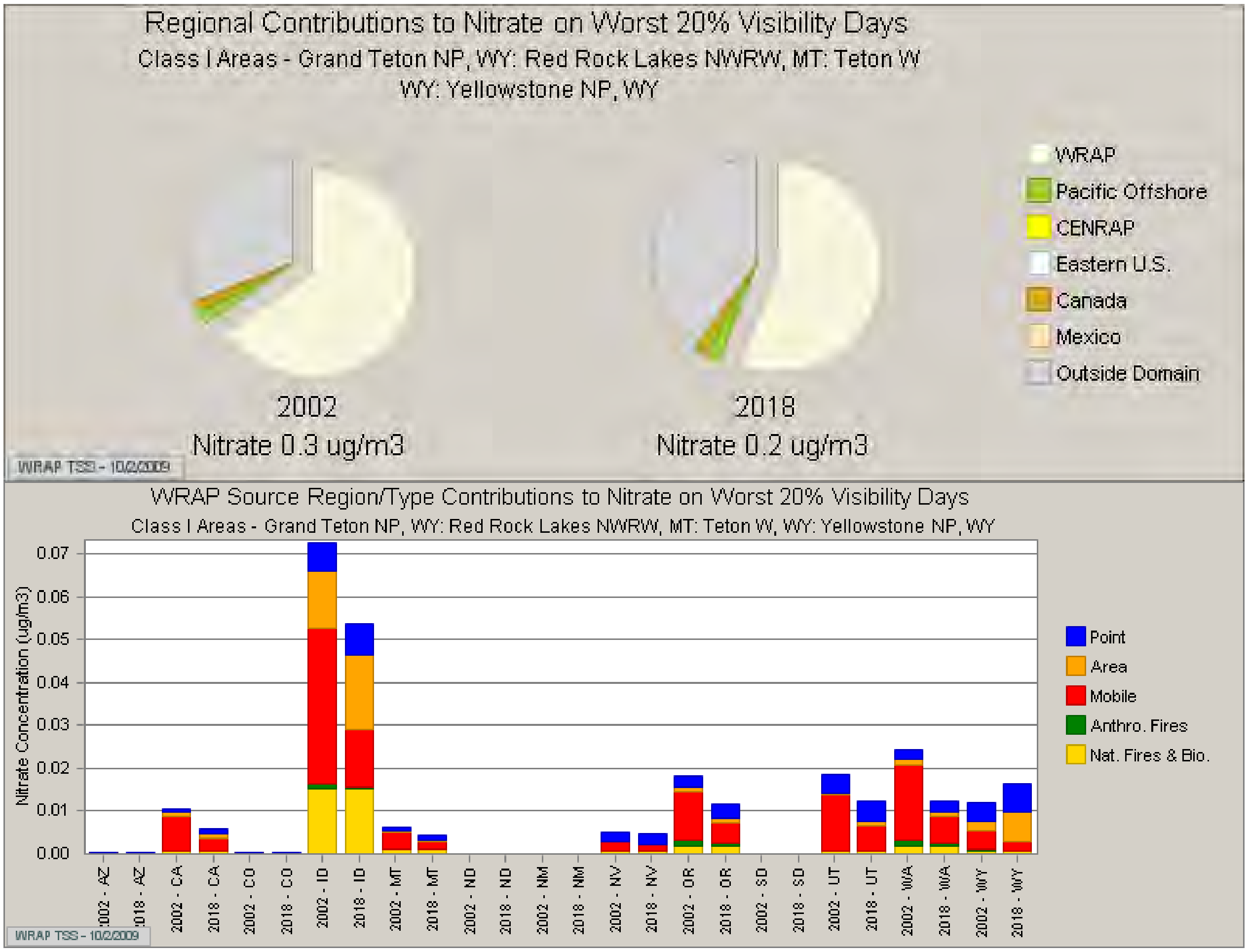


Figure 9-57 PSAT Nitrate Concentrations at Yellowstone National Park20% Worst Days

Figure 9-58 shows all WRAP states are expected to improve the visibility impairment due to nitrates on the 20% best days in Yellowstone National Park.

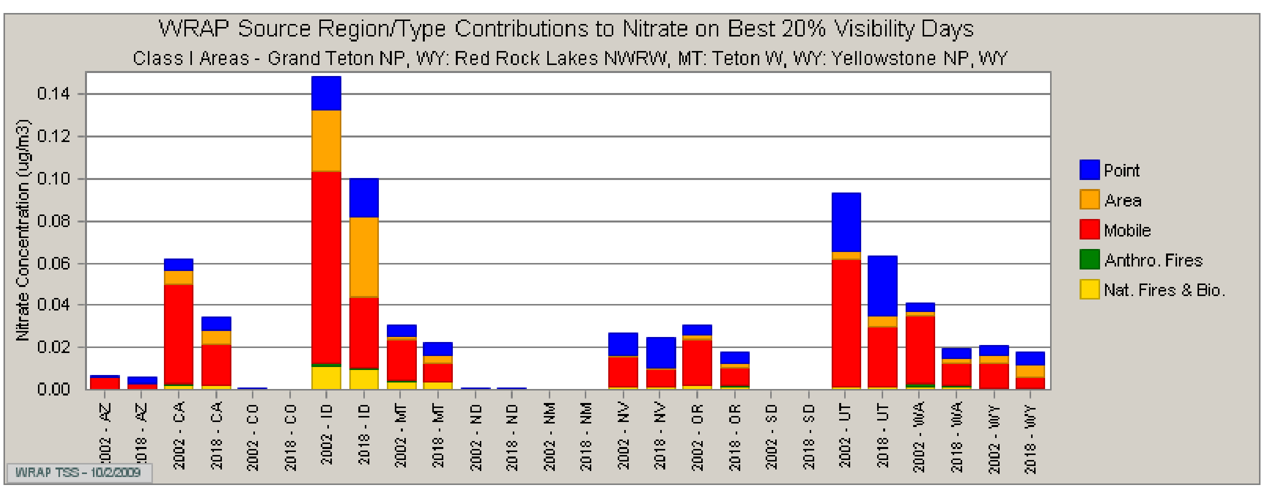


Figure 9-58 PSAT Nitrate Concentrations at Yellowstone National Park 20% Best Days

Primary Organic Aerosol at Yellowstone National Park Based on WEP

Figure 9-59 shows the preponderance of organic aerosol on the 20% worst days in Yellowstone National Park is coming from natural fire primarily from Wyoming. This is very similar to the organic mass carbon findings in Chapter 7, Figure 7-44. There are decreases anticipated from anthropogenic sources from most states but these are dwarfed by expected emissions from natural fire.

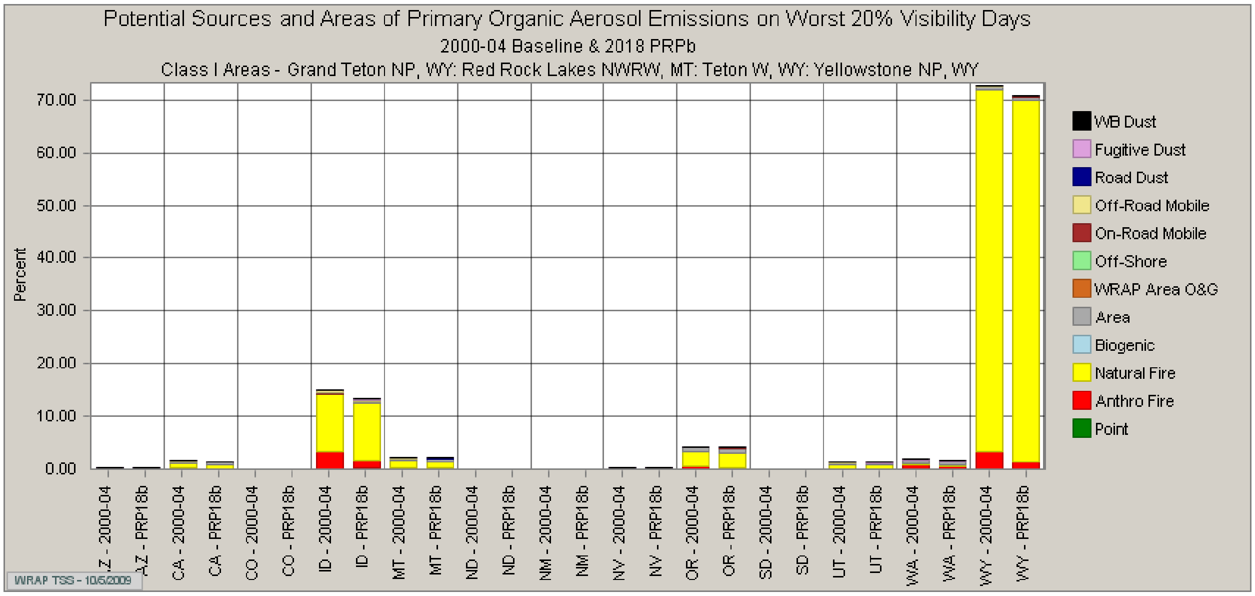


Figure 9-59 WEP Primary Organic Aerosol at Yellowstone National Park 20% Worst Days

Primary Organic Aerosol in Yellowstone National Park shows an overall improvement expected on the 20% best visibility days. Figure 9-60 shows an improvement on the best visibility days primarily coming from anthropogenic fire and better smoke management techniques anticipated in the future.

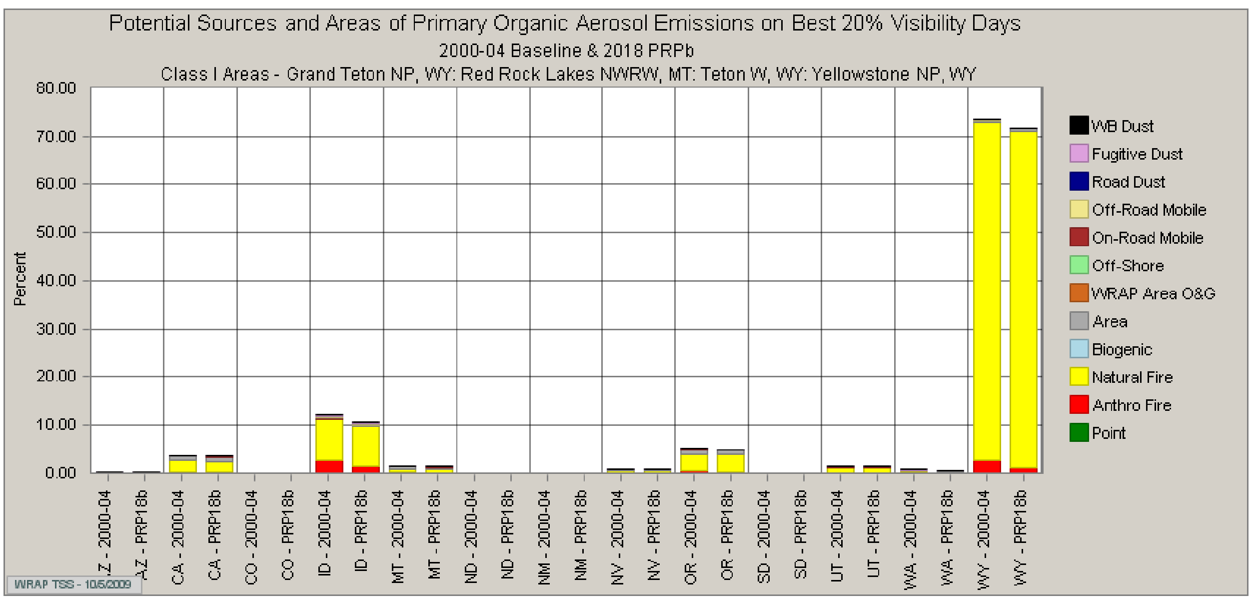


Figure 9-60 WEP Primary Organic Aerosol at Yellowstone National Park 20% Best Days

Elemental Carbon at Yellowstone National Park Based on WEP

Figure 9-61 shows natural fire from Wyoming is the largest expected contributor to elemental carbon visibility impairment on the 20% worst visibility days in Yellowstone National Park. According to the WEP analysis, Idaho is expected to contribute less than 2% of the visibility impairment associated with elemental carbon. They analysis shows all WRAP states are expected to make improvements to visibility impairments attributed to elemental carbon.

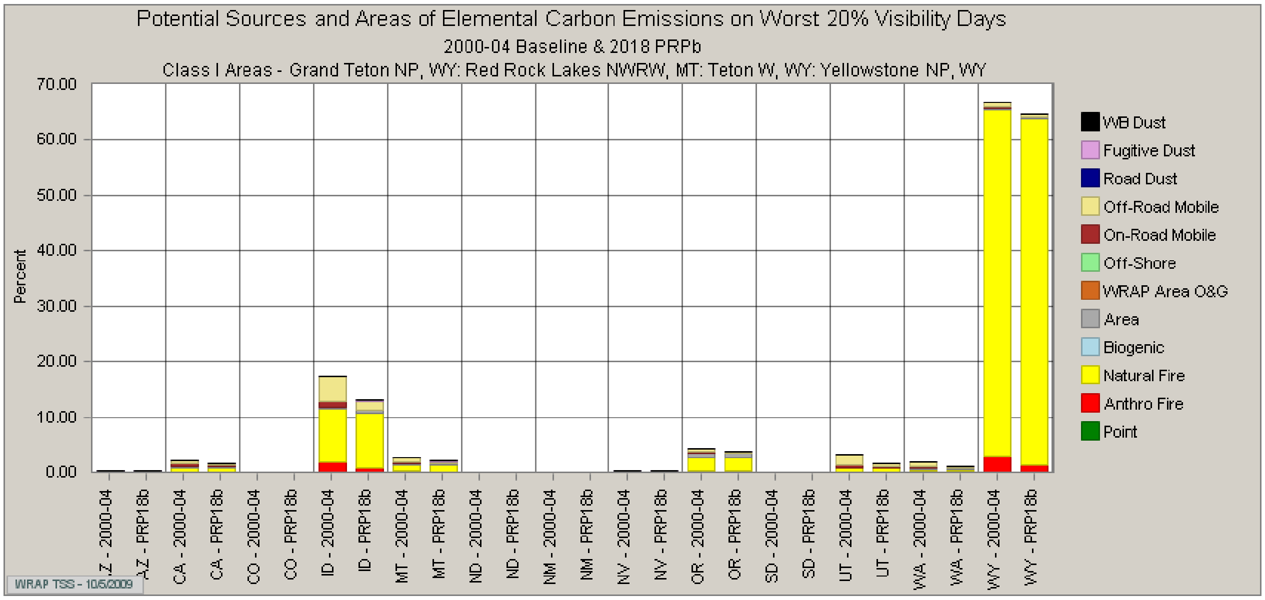


Figure 9-61 WEP Elemental Carbon at Yellowstone National Park 20% Worst Days

Figure 9-62 shows expected improvement to elemental carbon visibility impairment from all WRAP states on the 20% best days. Most of the improvement is expected to come from changes in smoke management and impacts from anthropogenic fire.

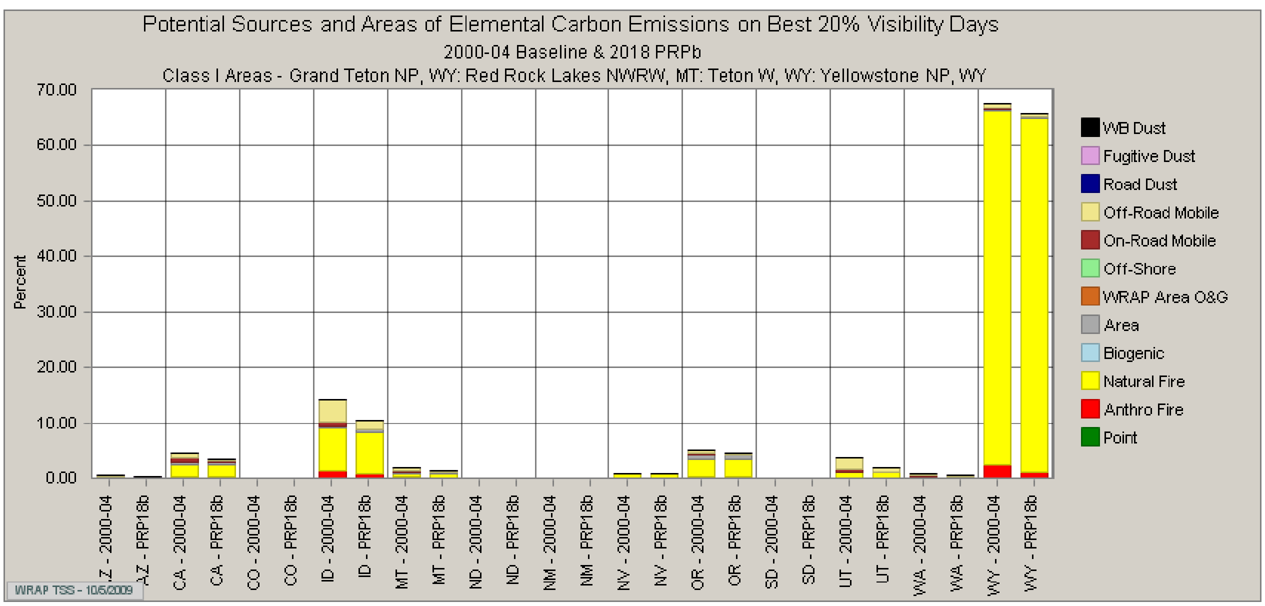


Figure 9-62 WEP Elemental Carbon at Yellowstone National Park 20% Best Days

Fine Particulate Matter at Yellowstone National Park Based on WEP

Figure 9-63 shows Idaho then Wyoming and Montana as the greatest expected contributors of fine particulate on the 20% worst visibility days in Yellowstone National Park. Idaho and Wyoming showing expected improvements in future contributions from anthropogenic fire but increases in area, road and fugitive dust are expected to cause overall future increases.

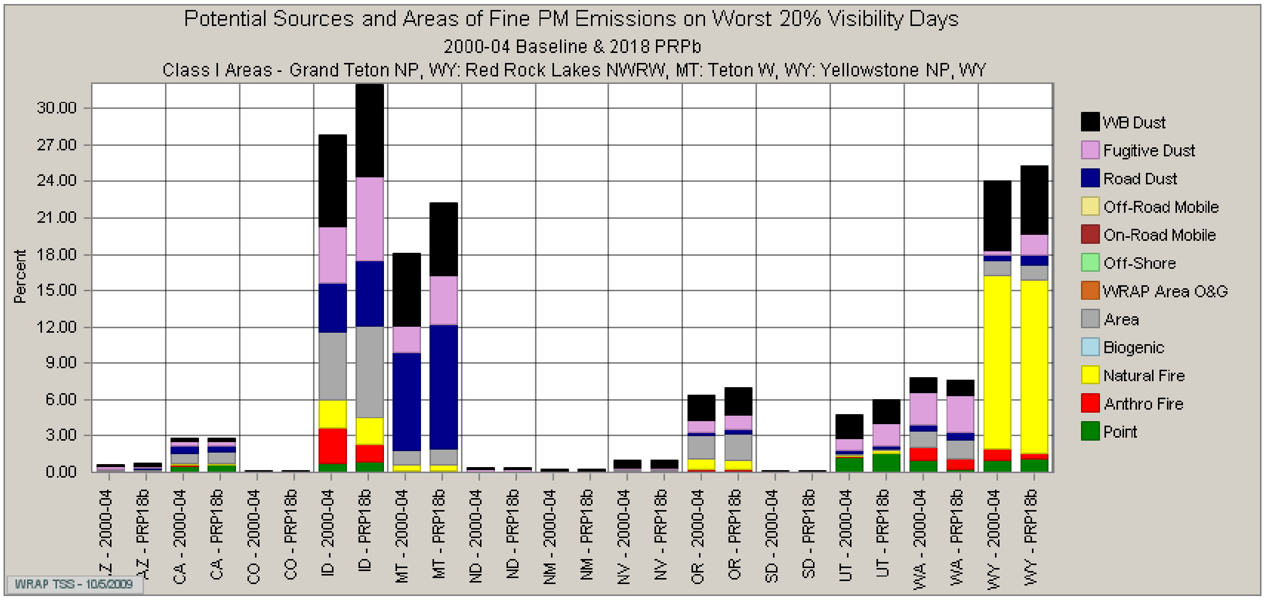


Figure 9-63 WEP Fine Particulate Matter at Yellowstone National Park Worst 20% Days

Figure 9-64 shows similar visibility impacts expected from fine particulate on the 20% best days in Yellowstone National Park. Future increases in area, road dust and fugitive dust are expected to outpace improvements from anthropogenic fire.

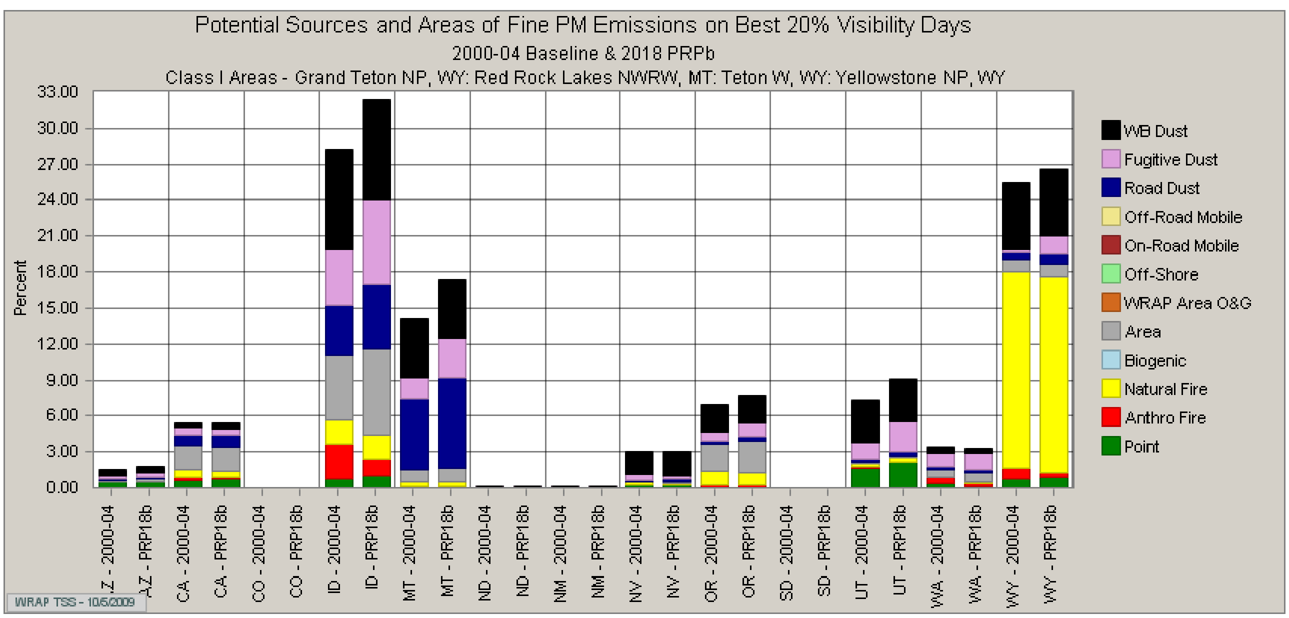


Figure 9-64 WEP Fine Particulate Matter at Yellowstone National Park Best 20% Days

Coarse Particulate Matter at Yellowstone National Park Based on WEP

Figure 9-65 shows Idaho and Montana having almost equal expected impacts of coarse particulate followed by Wyoming on the 20% worst visibility days at Yellowstone National Park. Based on WEP modeling, increases in fugitive dust and road dust are expected from most states.

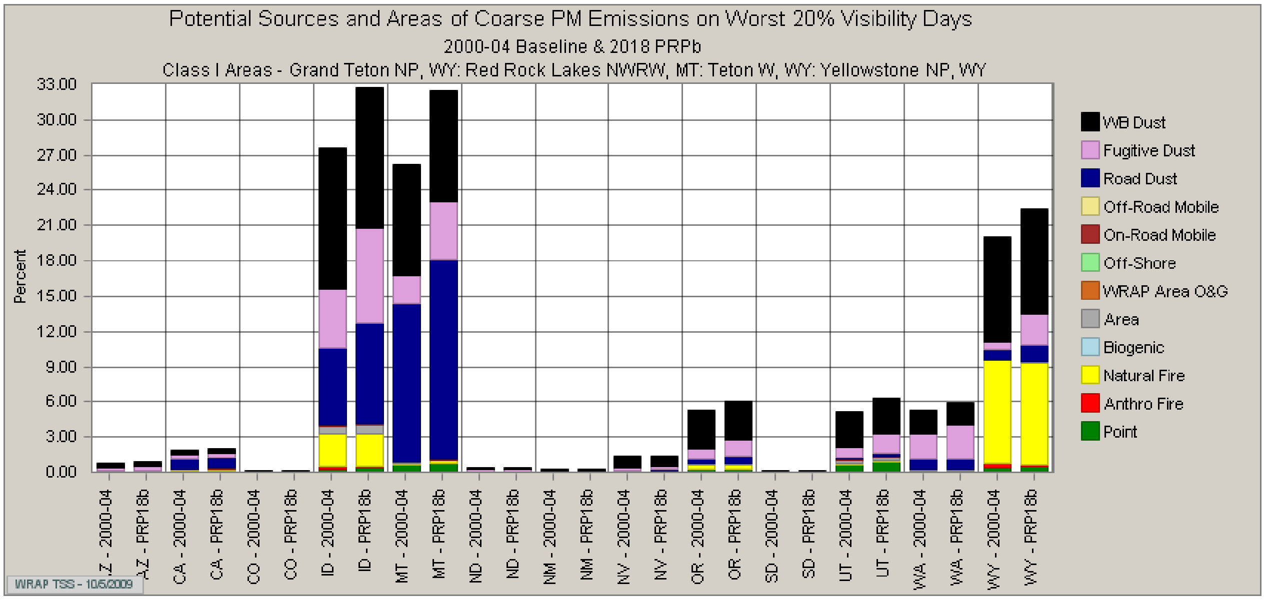


Figure 9-65 WEP Coarse Particulate Matter at Yellowstone National Park 20% Worst Days

Figure 9-66 shows an expected increase in contributions from coarse particulate coming from WRAP states on the 20% best days.

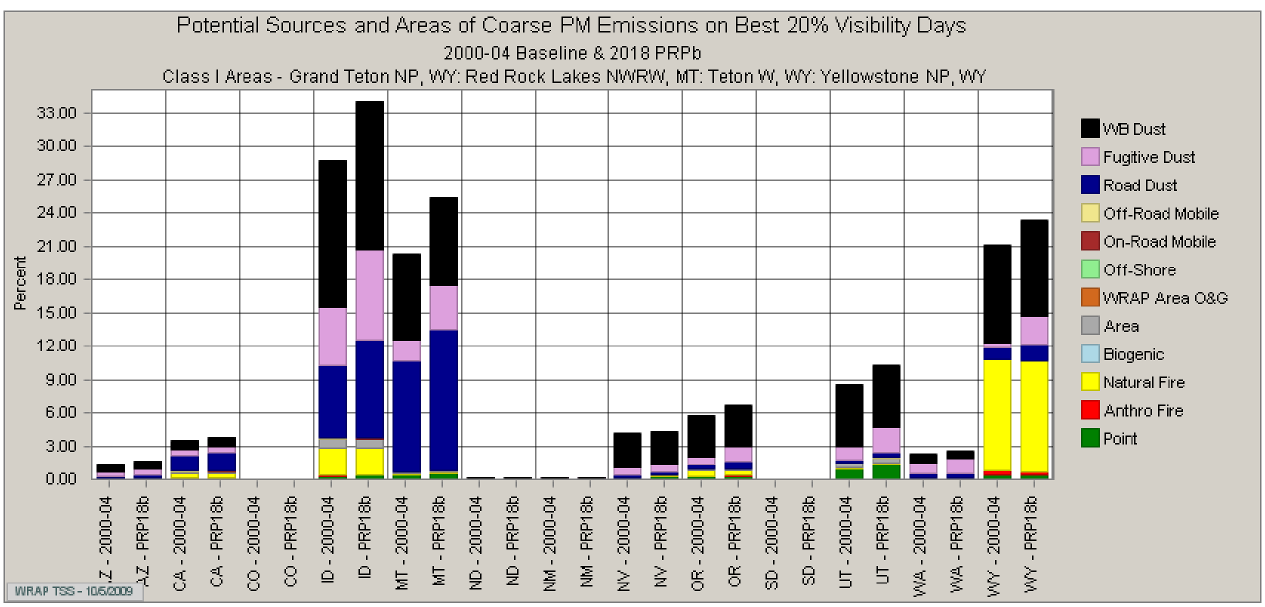


Figure 9-66 Coarse Particulate Matter at Yellowstone National Park 20% Best Days

9.3 Source Apportionment for Class I Areas Outside Idaho

As mentioned at the beginning of this chapter, Idaho is not only responsible for Class I areas residing within the state but must also be concerned with Idaho's impacts on Class I areas outside the state. Idaho is in a unique situation in that several Class I areas share borders with Idaho. The Class I areas of Selway-Bitterroot Wilderness, Hells Canyon Wilderness, and Yellowstone National Park all reside partially in Idaho and partially in other states. Idaho is responsible for setting reasonable progress goals (RPGs) for Craters of the Moon National Monument, Sawtooth Wilderness, and the Selway Bitterroot Wilderness. Hells Canyon Wilderness RPGs are set by Oregon and Yellowstone National Park goals are set by Wyoming. The responsible state is the one in which the largest portion of the Class I area resides. Although Idaho will not be setting the RPGs in the Class I areas discussed in this section, they are still very important in looking at Idaho's impact on Class I areas surrounding the state.

Idaho's source apportionment includes consideration of the Class I areas surrounding the state that have the potential to be impacted by Idaho emissions; specifically, the following Class I areas:

- Glacier National Park – represented by the Glacier I IMPROVE monitoring site.
- Anaconda-Pintler Wilderness – represented by the Sula-Selway IMPROVE monitoring site.
- The Cabinet Mountains Wilderness – represented by the Cabinet I IMPROVE monitoring site.
- The Bob Marshall Wilderness, Mission Mountain Wilderness, and Scapegoat Mountain Wilderness – represented by the Montur IMPROVE monitoring site.
- Gates of the Mountain Wilderness – represented by the Gates IMPROVE monitoring site.
- Red Rock Lakes Wilderness, Grand Teton National Park, and Teton Wilderness – represented by the Yellowstone IMPROVE monitoring site.
- Bridger Wilderness and Fitzpatrick Wilderness – represented by the Bridger IMPROVE monitoring site.
- North Absaroka Wilderness and Washakie Wilderness – represented by the North Absaroka IMPROVE monitoring site.
- Jarbidge Wilderness – represented by the Jarbidge IMPROVE monitoring site.
- Eagle Cap Wilderness and Strawberry Mountain Wilderness – represented by the Starky IMPROVE monitoring site.

As suggested by the information in the bullet items above there are some instances in which several Class I areas are represented by one IMPROVE monitoring site. Since the data from IMPROVE monitoring sites will be used to track progress, the same Reasonable Progress Goals have been established for all Class I areas sharing the same IMPROVE monitoring station. The source attribution for this Regional Haze plan follows the same logic in grouping together all Class I areas that are represented by the same IMPROVE monitoring site.

The source apportionment for Anaconda-Pintler Wilderness is included with the apportionment done for the Selway-Bitterroot Wilderness. Red Rock Lakes Wilderness, Grand Teton National Park, and Teton Wilderness is included with the source apportionment done for Yellowstone. For ease of review, the remainder of the Class I areas bulleted above will be based on the first Class I area listed for each IMPROVE monitoring station.

Washington is being excluded from this review based on the potential—the apparent lack of potential—for Idaho to impact the Class I areas within Washington. Looking at the WEP-based back-trajectory analysis for Pasayten Wilderness (located in the center of Washington), it appears that the air mass carrying visibility-impairing pollutants into that wilderness on the 20% worst days does not include any impact from Idaho. Figure 9-67 shows the residence time of the air mass carrying the pollutants is spent primarily over Washington.

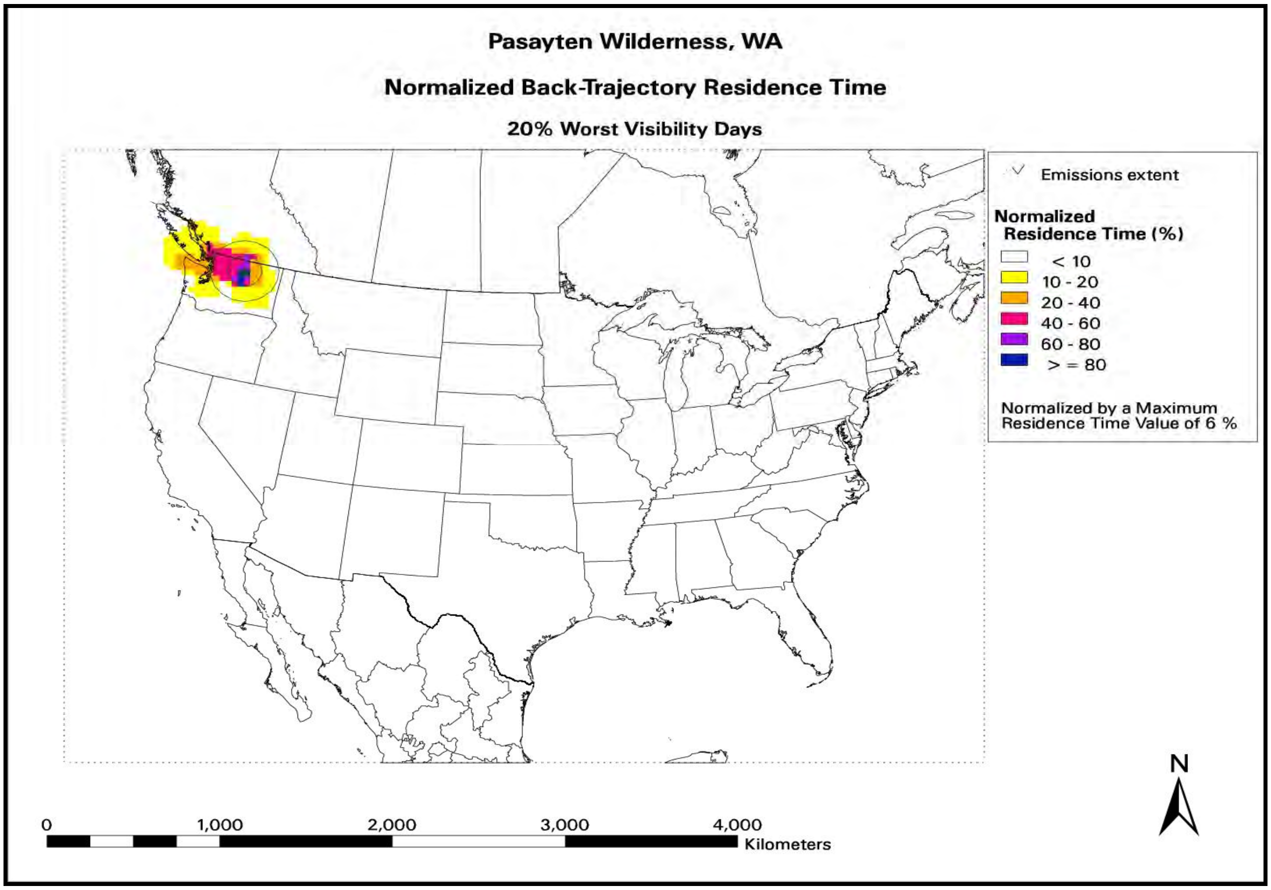


Figure 9-67 WEP Back Trajectory for Pasayten Wilderness on 20% Worst Days

9.3.1 Glacier National Park Source Apportionment

Sulfate at Glacier National Park Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-68 show the WRAP states are only expected to contribute roughly a quarter of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-68 shows Montana and then Washington and Oregon as the largest contributors of sulfate at Glacier National Park. Overall, the concentration levels attributed to all the WRAP states is fairly low and decreasing over time due to expected reductions primarily from mobile sources. Idaho's overall contribution is expected to be reduced by roughly 16% over the first planning period.

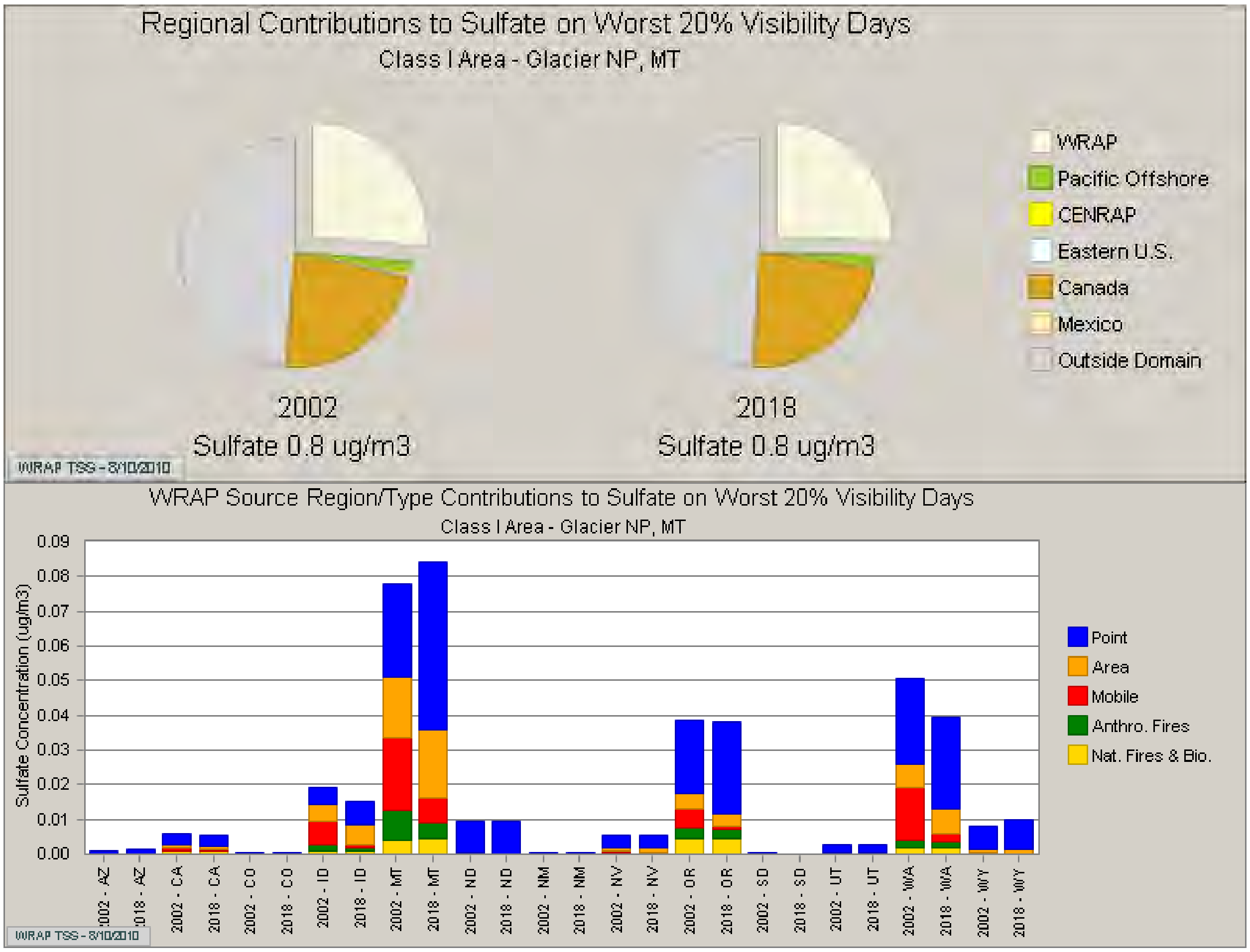


Figure 9-68 PSAT Sulfate Concentrations at Glacier National Park 20% Worst Days

Figure 9-69 shows that overall improvement in future sulfate contributions on the 20% best days from Idaho are due to expected improvements from mobile sources.

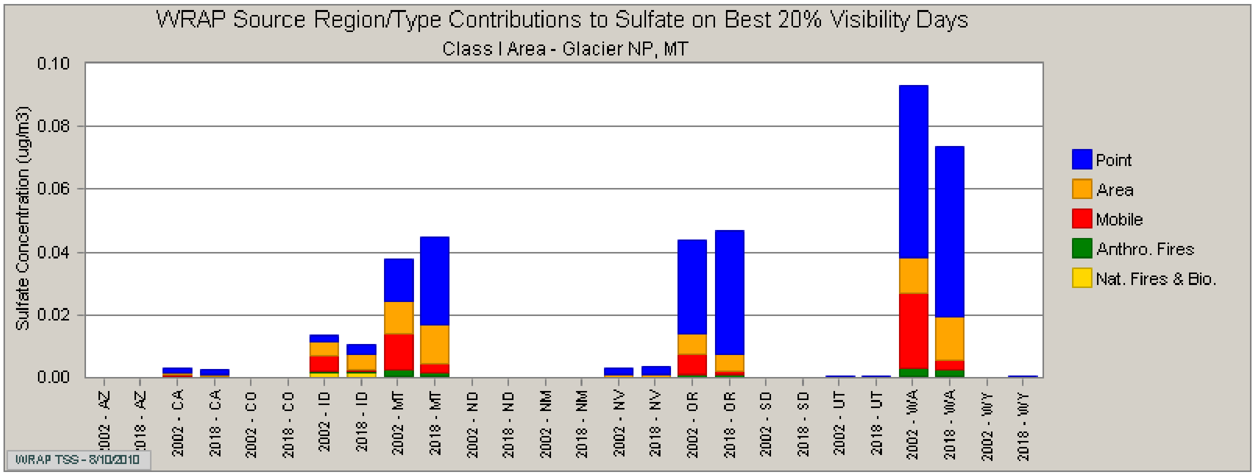


Figure 9-69 PSAT Sulfate Concentrations at Glacier National Park 20% Best Days

Nitrate at Glacier National Park Based on PSAT Modeling

The regional source contribution pie charts in figure 9-70 show the WRAP states are contributing roughly half of the visibility impairment on the 20% worst days in the Glacier National Park. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution and the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-70 shows Montana then Washington and Idaho as the largest contributors of nitrate in 2002. Overall, the concentration levels attributed to all the WRAP states is expected to decrease over time due to reductions primarily from mobile sources. Idaho's contribution is expected to show an overall reduction of roughly 35% over the first planning period with a future contribution of 8% of the total nitrate concentrations. This does not include emissions reductions expected from all the subject-to-BART sources.

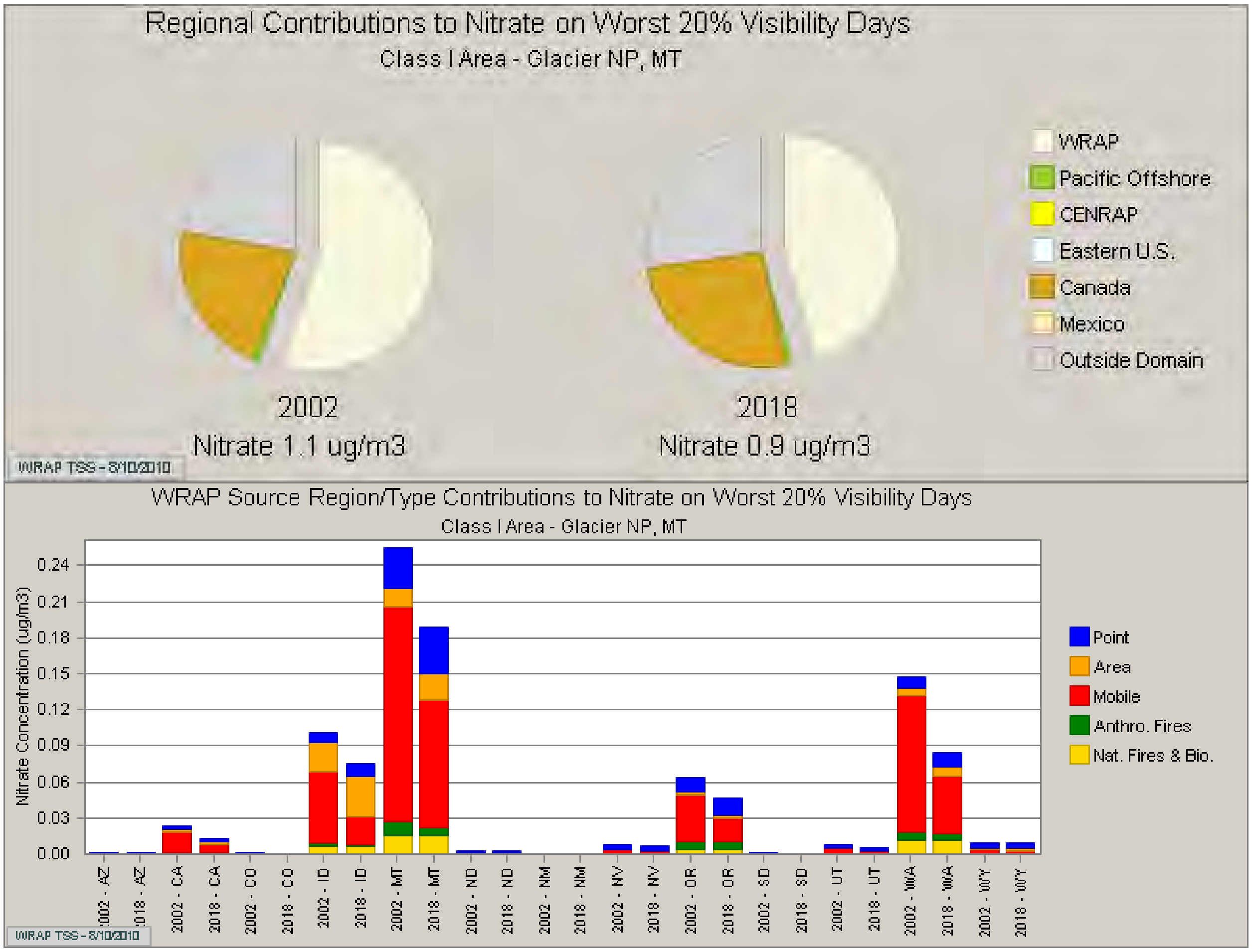


Figure 9-70 PSAT Nitrate Concentrations at Glacier National Park 20% Worst Days

Figure 9-71 shows an overall improvement in future nitrate contributions coming from all WRAP states on the 20% best days at Glacier National Park. The expected improvements are primarily from the mobile source category.

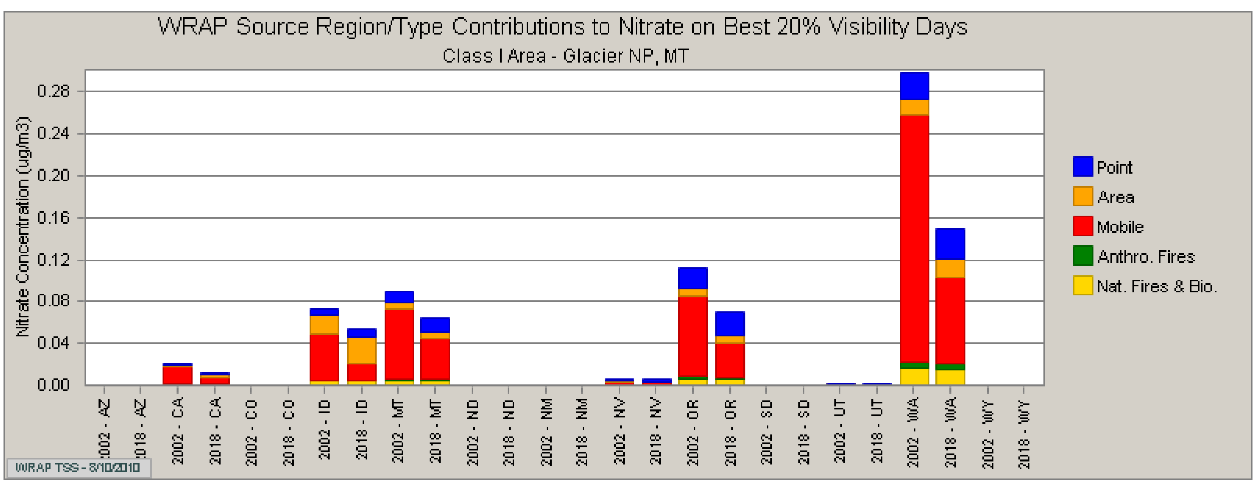


Figure 1-71 PSAT Nitrate Concentrations at Glacier National Park 20% Best Days

Primary Organic Aerosol at Glacier National Park Based on WEP

Figure 9-72 shows that the preponderance of organic aerosol on the 20% worst days in the Glacier National Park from Idaho is from natural fire with overall decreases expected primarily from anthropogenic fire. There are decreases anticipated from anthropogenic sources from most states. Overall, primary organic aerosol is expected to decrease because of reductions from anthropogenic fire.

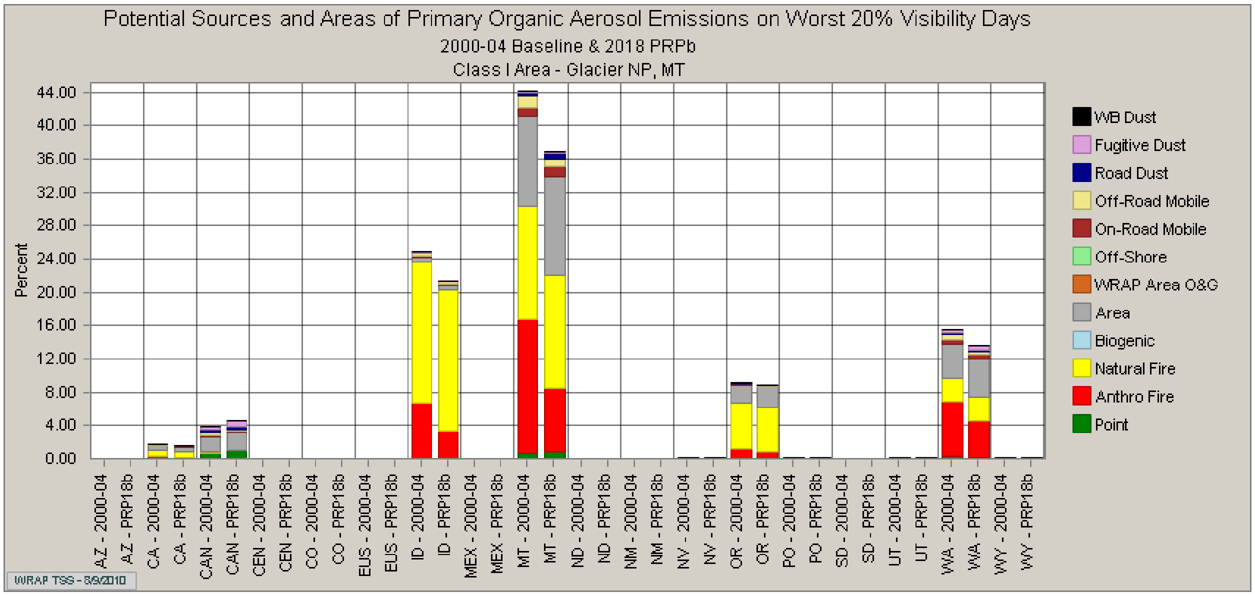


Figure 9-72 WEP Primary Organic Aerosol at Glacier National Park 20% Worst Days

Figure 9-73 shows similar results expected for the 20% best days in Glacier National Park as for the 20% worst days. Natural fire is by far the largest source. Overall, most states including Idaho are anticipating reductions coming from anthropogenic fire.

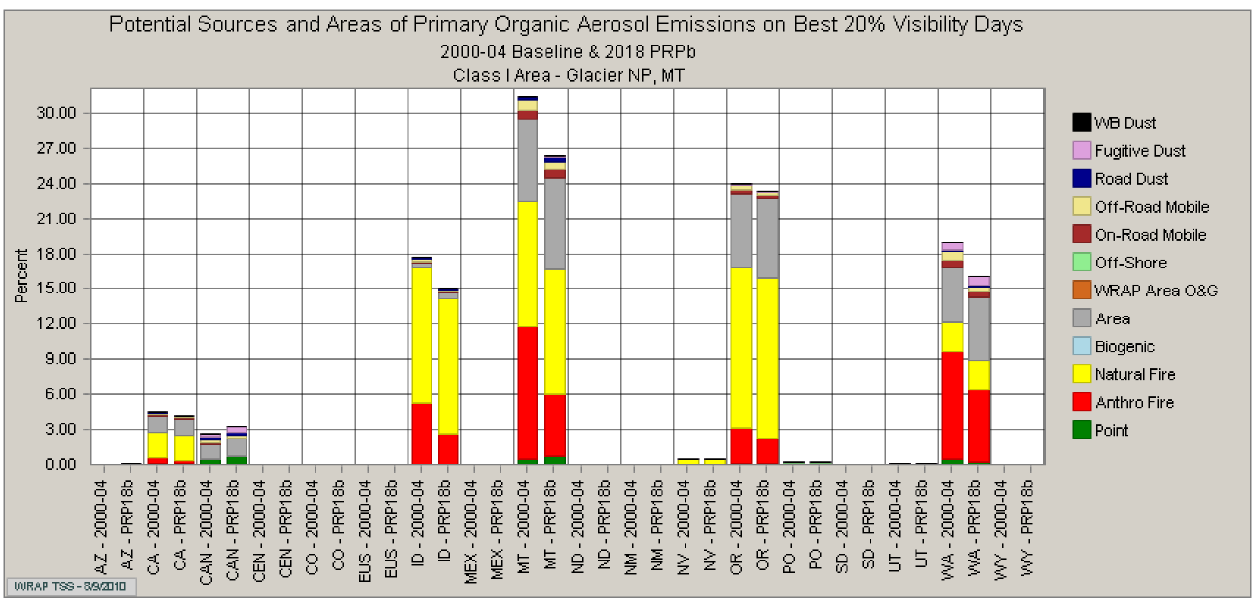


Figure 9-73 WEP Primary Organic Aerosol Glacier National Park 20% Best Days

Elemental Carbon at Glacier National Park Based on WEP

Figure 9-74 shows natural fire from Idaho is expected to be the largest contributor of Idaho visibility impairment on the 20% worst days in the Glacier National Park. It is anticipated there will be overall future visibility improvements from anthropogenic fire and off-road mobile.

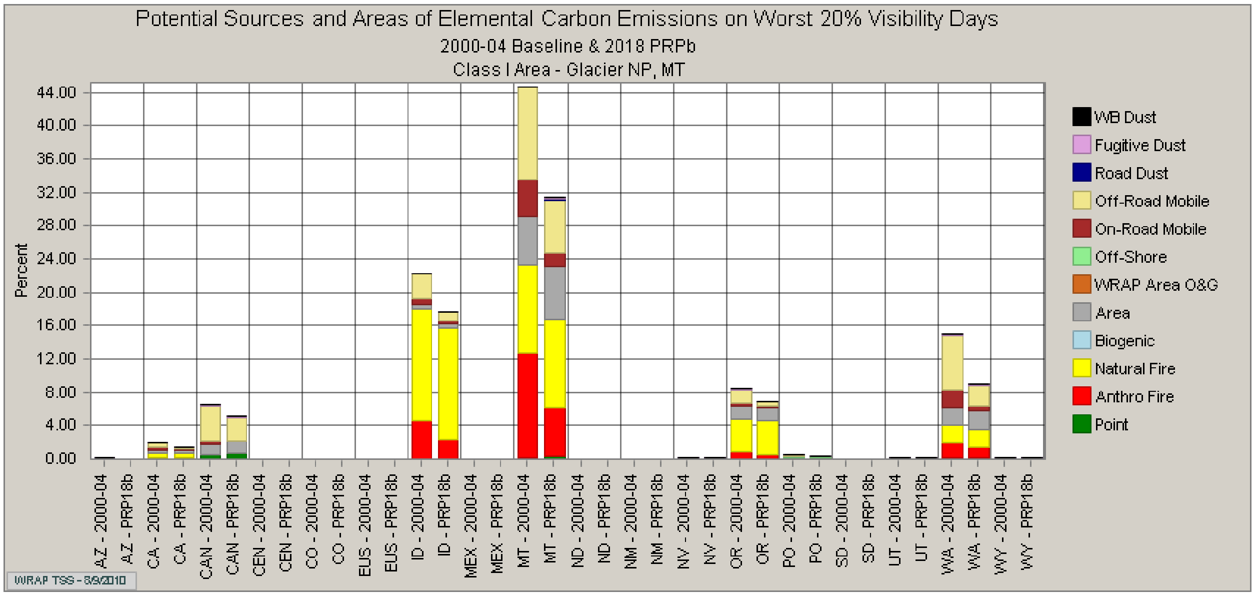


Figure 9-74 WEP Elemental Carbon at Glacier National Park 20% Worst Days

Figure 9-75 shows natural fire as the largest Idaho contributor of elemental carbon on the 20% best days in Glacier National Park. It is expected that elemental carbon will decrease in the future on the 20% best days due to improvements in smoke management programs reducing impacts from anthropogenic fire.

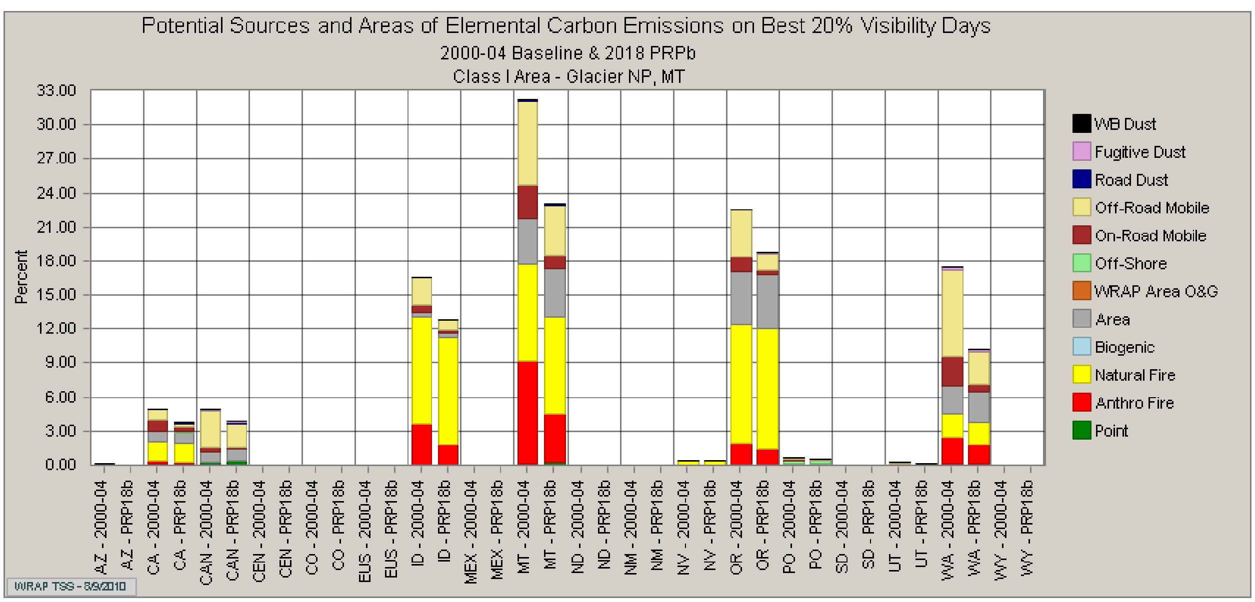


Figure 9-75 WEP Elemental Carbon at Glacier National Park 20% Best Days

Fine Particulate Matter at Glacier National Park Based on WEP

Figure 9-76 shows Montana's contribution of the fine particulate matter to Glacier National Park at over 36% during the 20% worst visibility days in 2002. Idaho shows contributions of about 8% of the fine particulate matter. Idaho's area source and fugitive dust are expected to increase during the first planning period and outpace reductions from anthropogenic fire.

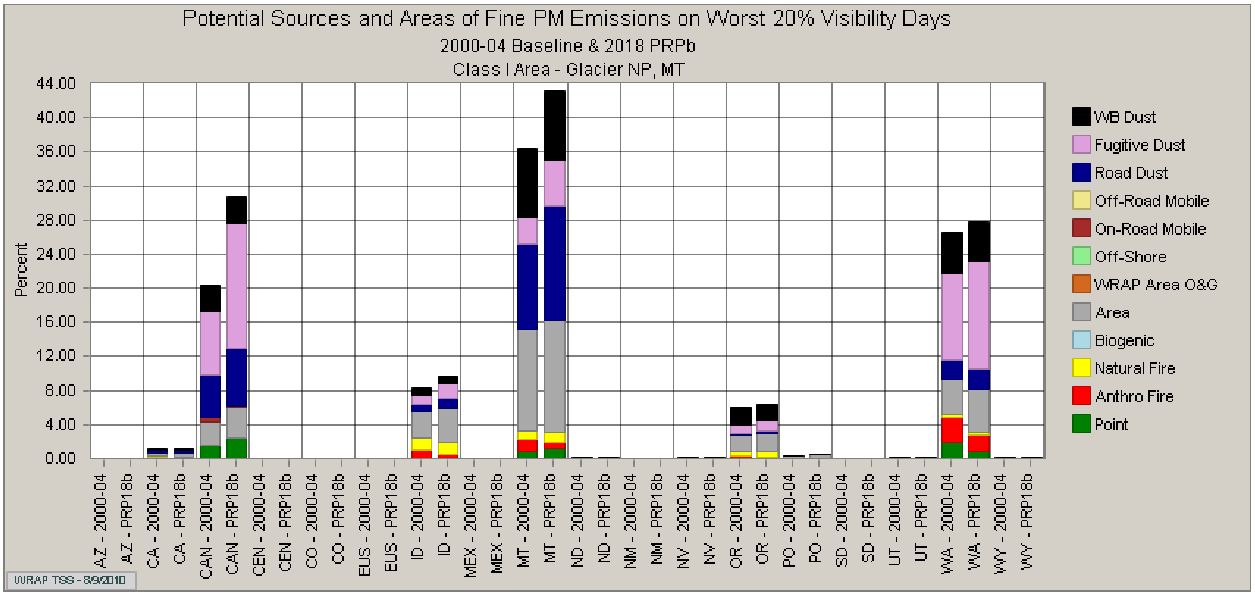


Figure 9-76 WEP Fine Particulate Matter at Glacier National Park Worst 20% Days

Figure 9-77 shows the same trends in fine particulate on the 20% best visibility days as on the 20% worst days in Glacier National Park. Overall, there is only a slight increase in visibility impact from area source and fugitive dust coming from Idaho.

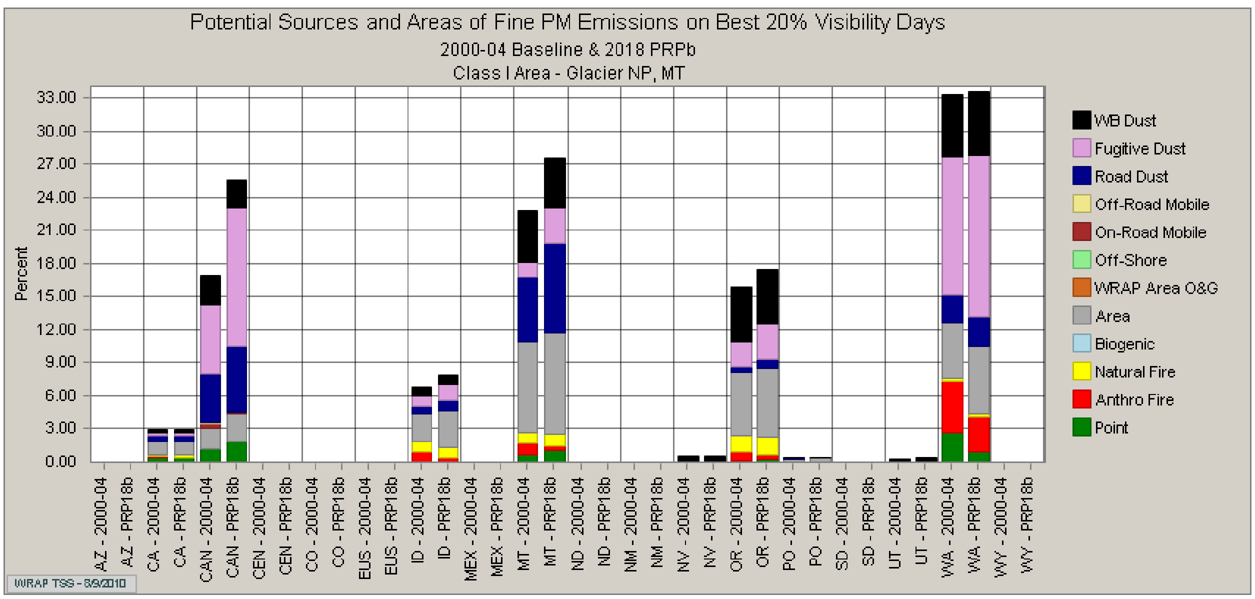


Figure 9-77 WEP Fine Particulate Matter at Glacier National Park Best 20% Days

Coarse Particulate Matter at Glacier National Park Based on WEP

Figure 9-78 shows coarse particulate from Idaho is trending similar to fine particulate in Glacier National Park on the 20% worst visibility days. Idaho, Montana, Washington and Oregon are all projecting increases in fugitive dust. Overall, coarse particulate is expected to increase in the Glacier National Park.

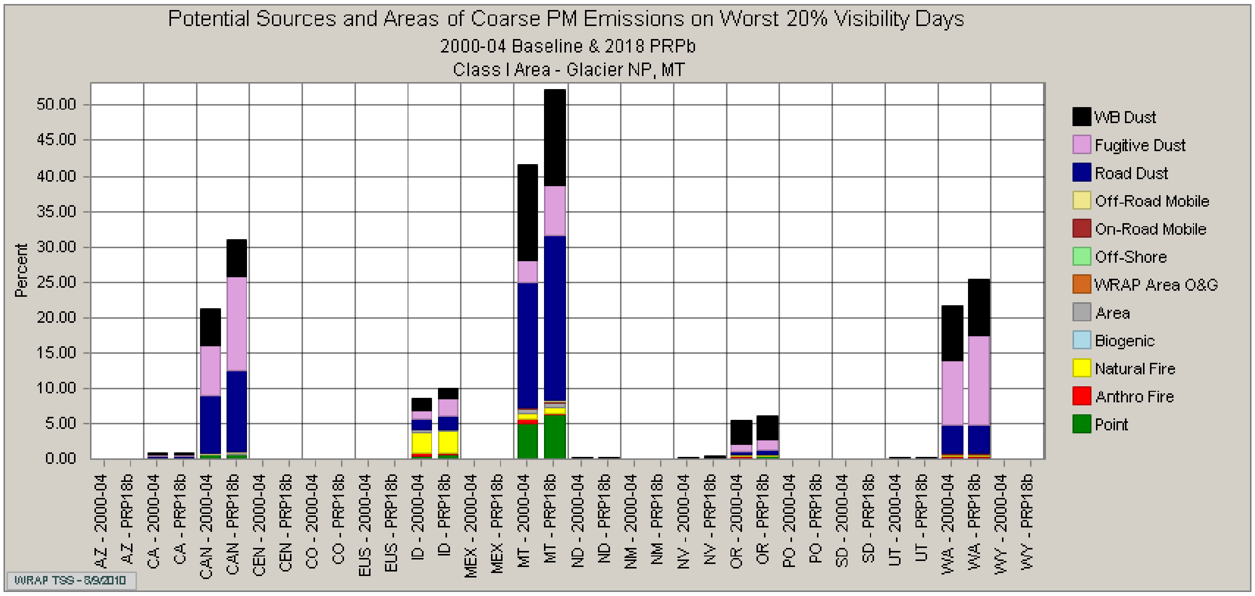


Figure 9-78 WEP Coarse Particulate Matter at Glacier National Park 20% Worst Days

Figure 9-79 shows an expected increase in coarse particulate on the 20% best days in Glacier National Park due to increases in fugitive dust and road dust.

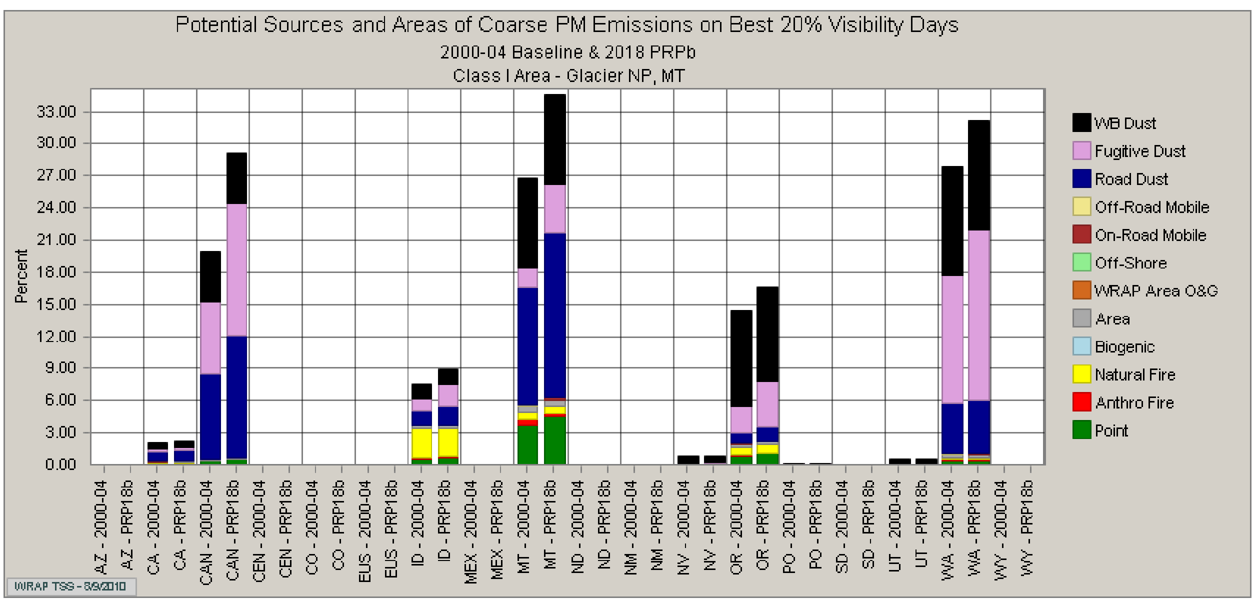


Figure 9-79 WEP Coarse Particulate Matter at Glacier National Park 20% Best Days

9.3.2 Cabinet Mountain Wilderness Source Apportionment

Sulfate at Cabinet Mountain Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-80 show the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-80 shows Washington and then Idaho and Oregon as the largest contributors of sulfate at Cabinet Mountain Wilderness. Overall, the concentration levels attributed to all the WRAP states is fairly low and decreasing over time due to expected reductions primarily from mobile sources. Idaho's contribution is expected to have an overall reduction of roughly 8% over the first planning period. Natural fire from Idaho is projected to account for 6% of the sulfate and only roughly 2% of the total contribution will be coming from Idaho anthropogenic sources. The large contribution from natural fire will make it difficult to show much progress in visibility improvement from Idaho area, point, and mobile sources.

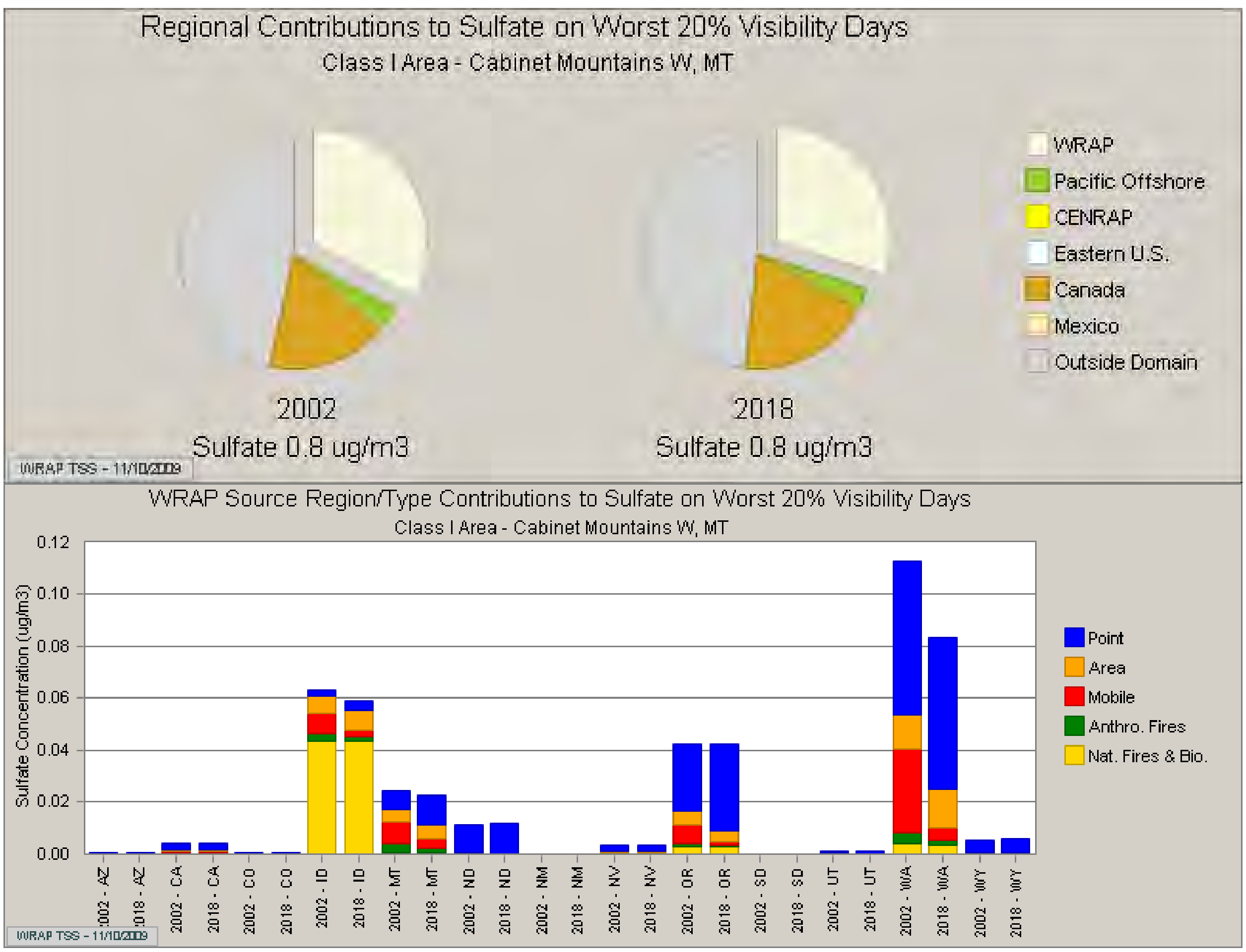


Figure 9-80 PSAT Sulfate Concentrations at Cabinet Mountain Wilderness 20% Worst Days

Figure 9-81 shows that overall improvement in future sulfate contributions on the 20% best days from Idaho are due to expected improvements from mobile sources. Washington and Nevada are expected to show slight increases due to point sources but this doesn't take into account all the BART controls that will be required to be added during this period.

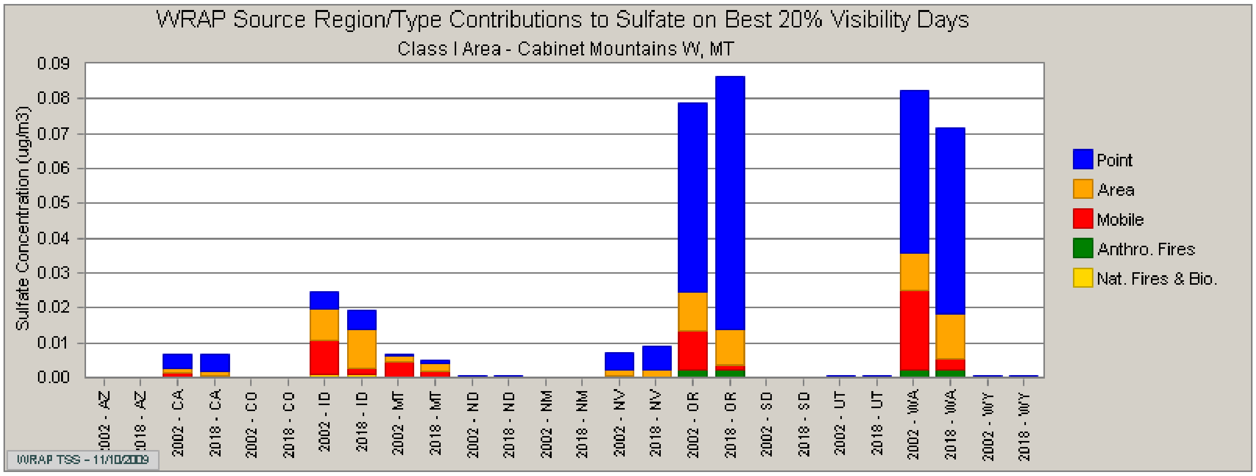


Figure 9-81 PSAT Sulfate Concentrations at Cabinet Wilderness 20% Best Days

Nitrate at Cabinet Mountain Wilderness Based on PSAT Modeling

The regional source contribution pie charts in figure 9-82 show the WRAP states are only contributing roughly two-thirds to three-quarters of the visibility impairment on the 20% worst days in the Cabinet Mountain Wilderness. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution and the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-82 shows Washington then Oregon and Idaho as the largest contributors of nitrate in 2002. Overall, the concentration levels attributed to all the WRAP states is expected to decrease over time due to reductions primarily from mobile sources. Idaho's contribution is expected to show an overall reduction of roughly 26% over the first planning period with a future contribution of 14% of the total nitrate concentrations. This does not include emission reductions expected from all the subject-to-BART sources.

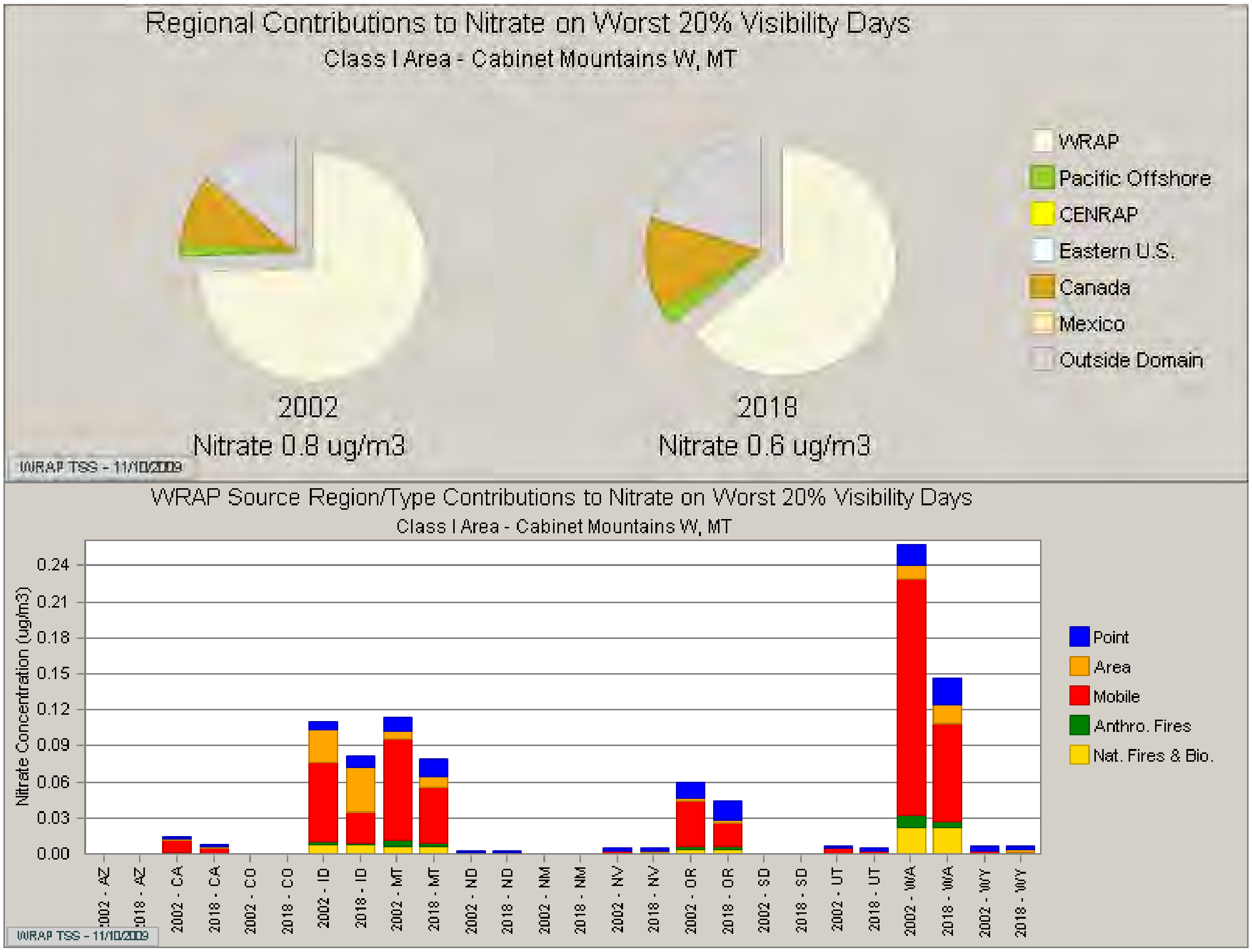


Figure 9-82 PSAT Nitrate Concentrations at Cabinet Mountain Wilderness 20% Worst Days

Figure 9-83 shows an overall improvement in future nitrate contributions coming from all WRAP states on the 20% best days at Cabinet Mountain Wilderness. The expected improvements are primarily from the mobile source category.

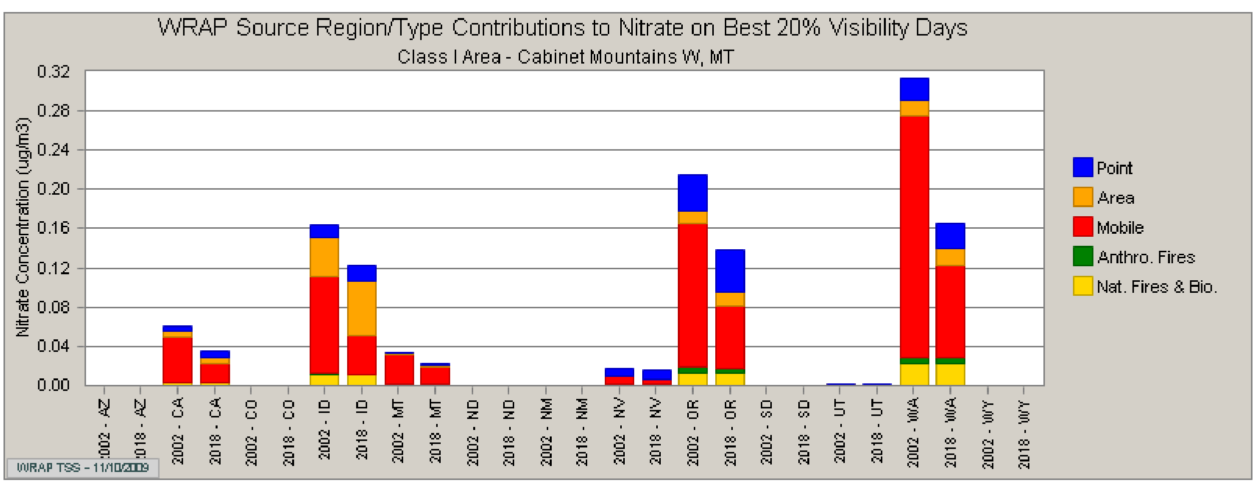


Figure 9-83 PSAT Nitrate Concentrations at Cabinet Mountain Wilderness 20% Best Days

Primary Organic Aerosol at Cabinet Mountain Wilderness Based on WEP

Figure 9-84 shows that the preponderance of organic aerosol on the 20% worst days in the Cabinet Mountain Wilderness is expected to come from Idaho natural fire. There are decreases anticipated from anthropogenic sources from most states. Overall, primary organic aerosol is expected to decrease because of reductions from anthropogenic fire.

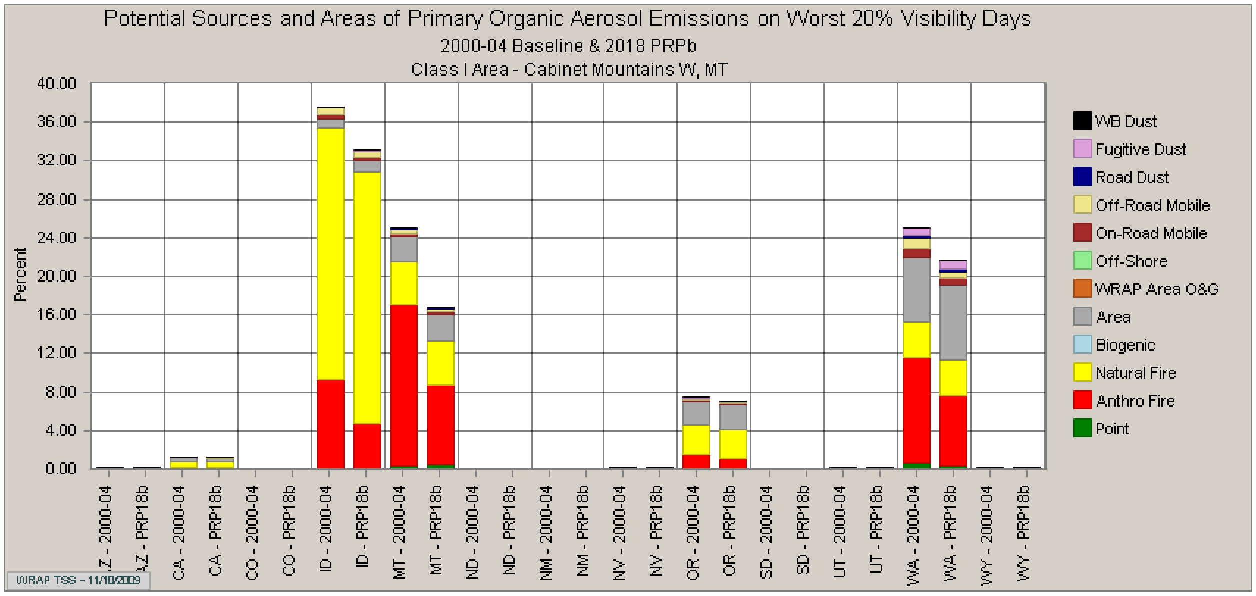


Figure 9-84 WEP Primary Organic Aerosol at Cabinet Mountain Wilderness 20% Worst Days

Figure 9-85 shows similar results for the 20% best days in the Cabinet Mountain Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. Overall, most states are anticipating reductions coming from anthropogenic fire.

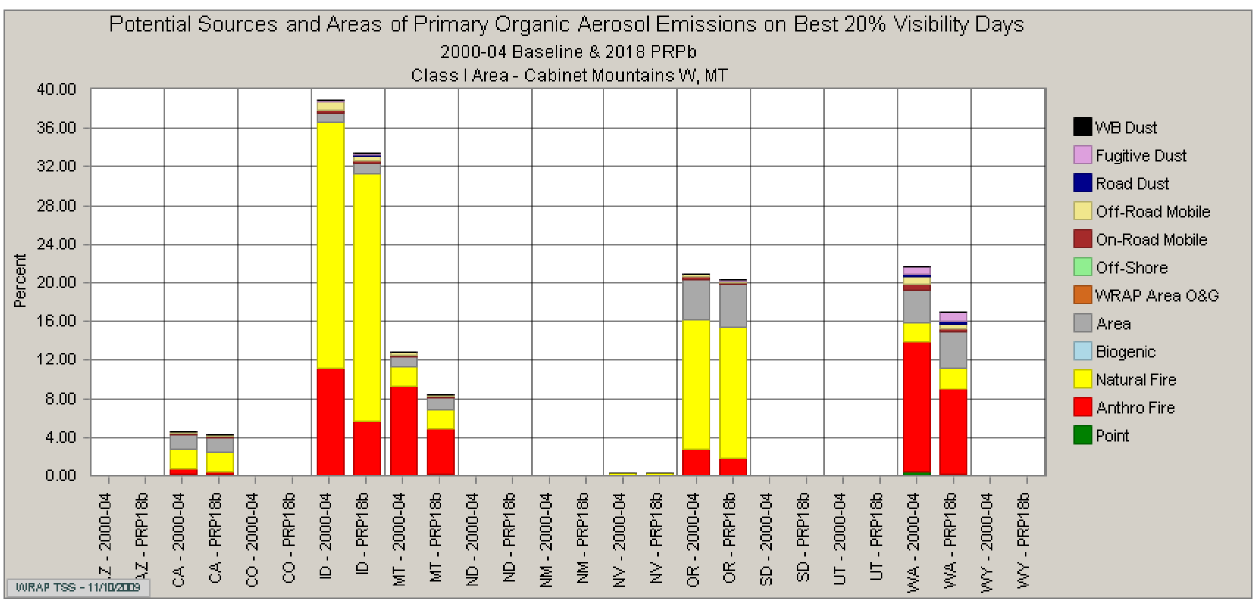


Figure 9-85 WEP Primary Organic Aerosol Cabinet Mountain Wilderness 20% Best Days

Elemental Carbon at Cabinet Mountain Wilderness Based on WEP

Figure 9-86 shows natural fire from Idaho is expected to be the largest contributor of elemental fire visibility impairment on the 20% worst days in the Cabinet Mountain Wilderness. It is anticipated there will be overall future visibility improvements from anthropogenic fire and off-road mobile.

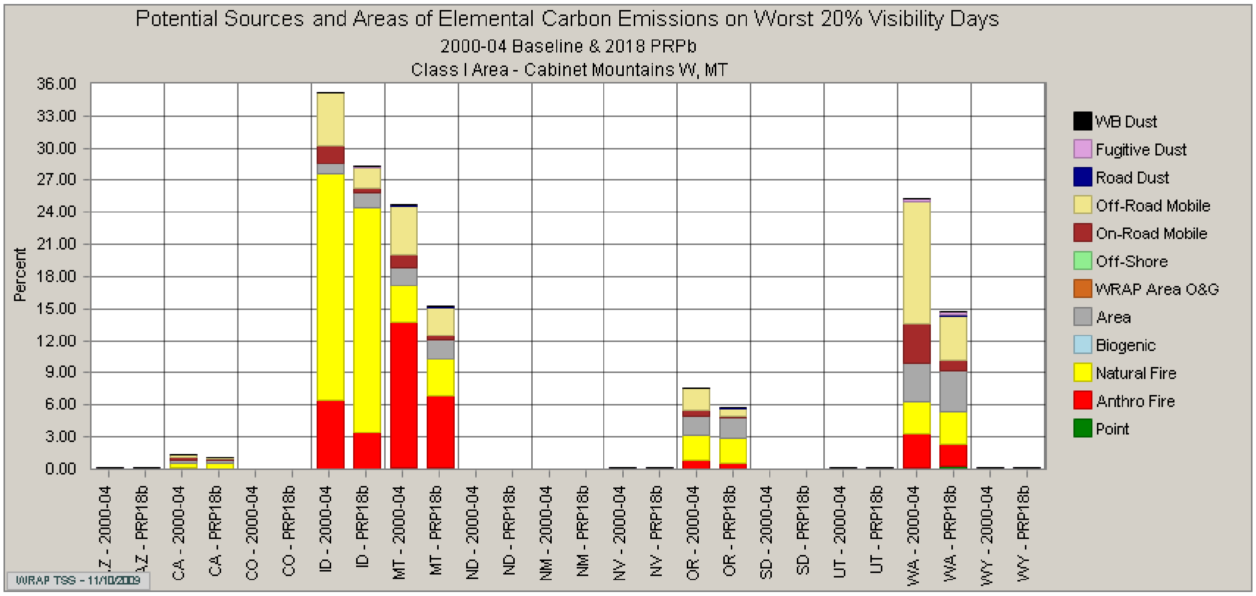


Figure 9-86 WEP Elemental Carbon at Cabinet Mountain Wilderness 20% Worst Days

Figure 9-87 shows similar expected results for elemental carbon for the 20% best days in the Cabinet Mountain Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. It is expected elemental carbon will decrease in the future on the 20% best days due to improvements in smoke management programs reducing impacts from anthropogenic fire.

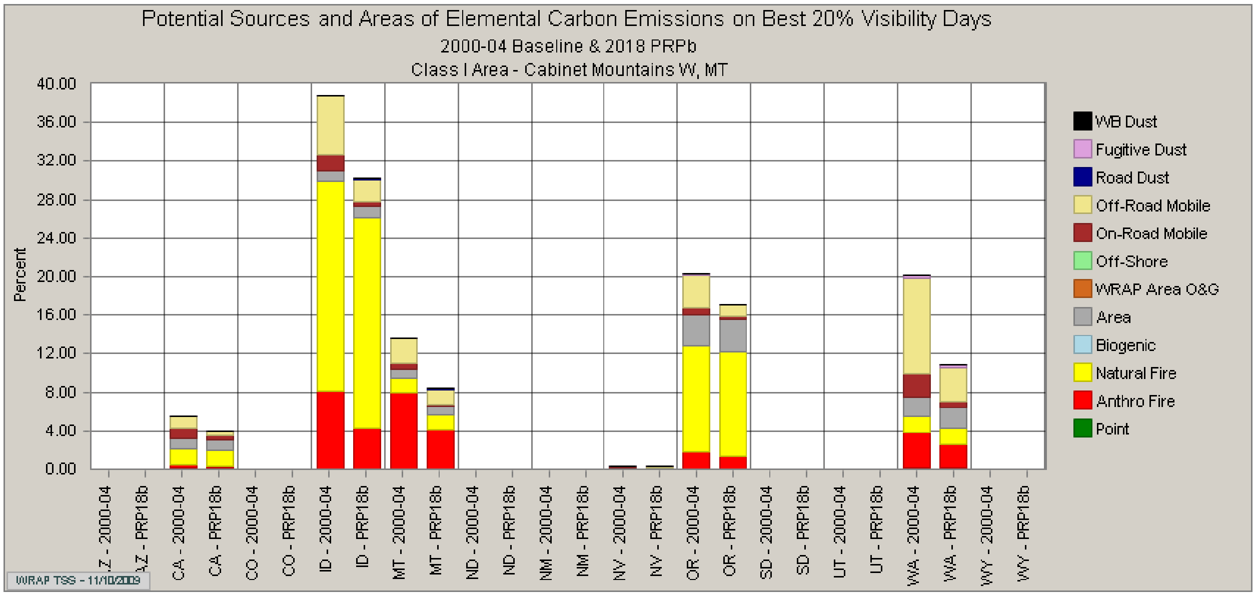


Figure 9-87 WEP Elemental Carbon at Cabinet Mountain Wilderness 20% Best Days

Fine Particulate Matter at Cabinet Mountain Wilderness Based on WEP

Figure 9-88 shows Washington is expected to contribute a little over 50% of the fine particulate matter to Cabinet Mountain Wilderness during the 20% worst visibility days 2002. Montana and Idaho are expected to show almost equal contributions with around 15% of the fine particulate matter contributed by each. Idaho's area source and road dust are expected to increase during the first planning period and outpace reductions from anthropogenic fire.

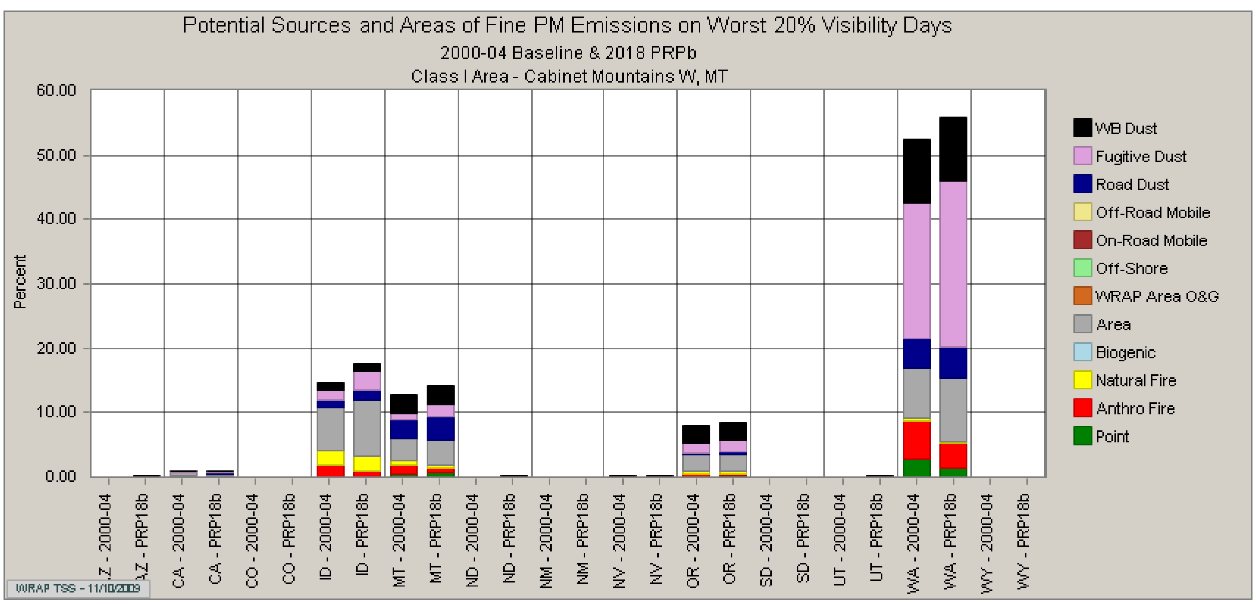


Figure 9-88 WEP Fine Particulate Matter at Cabinet Mountain Wilderness Worst 20% Days

Figure 9-89 shows the same trends in fine particulate on the best 20% visibility days as on the worst 20% days in the Cabinet Mountain Wilderness. Overall, there is only a slight increase in visibility impact from area source and fugitive dust coming from Idaho.

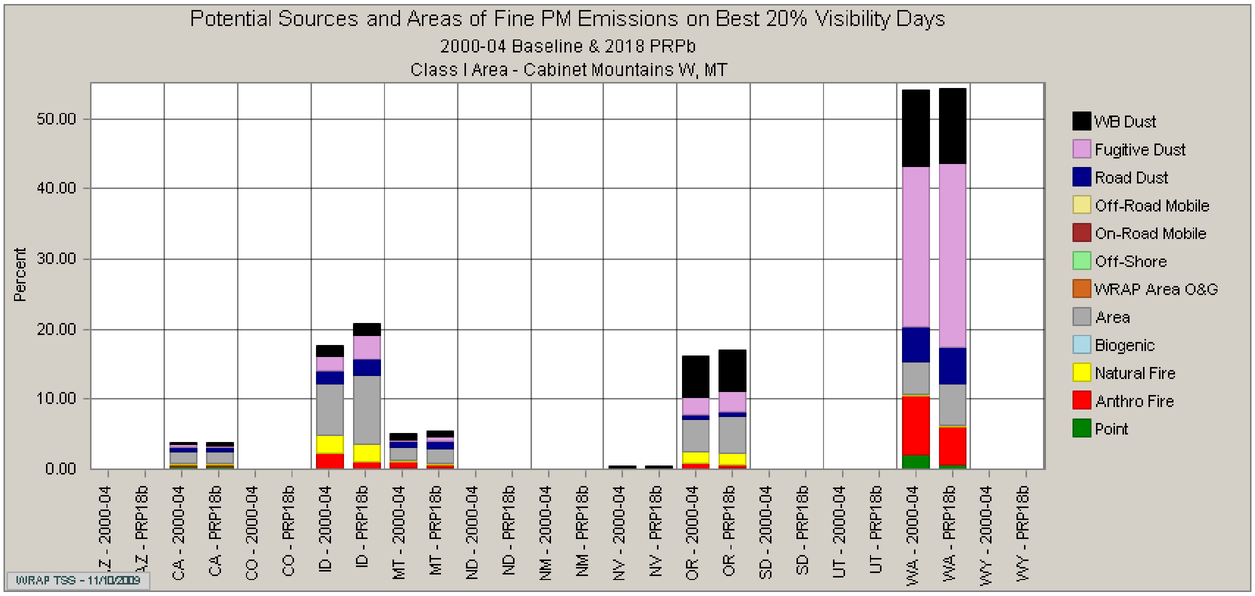


Figure 9-89 WEP Fine Particulate Matter at Cabinet Mountain Wilderness Best 20% Days

Coarse Particulate Matter at Cabinet Mountain Wilderness Based on WEP

Figure 9-90 shows coarse particulate is trending similar to fine particulate in the Cabinet Mountain Wilderness on the 20% worst visibility days with Washington being the largest contributor. Idaho, Montana, Washington, and Oregon are all projecting increases in fugitive dust and road dust with a slight decrease in anthropogenic fire. Overall, coarse particulate is expected to increase in the Cabinet Mountain Wilderness.

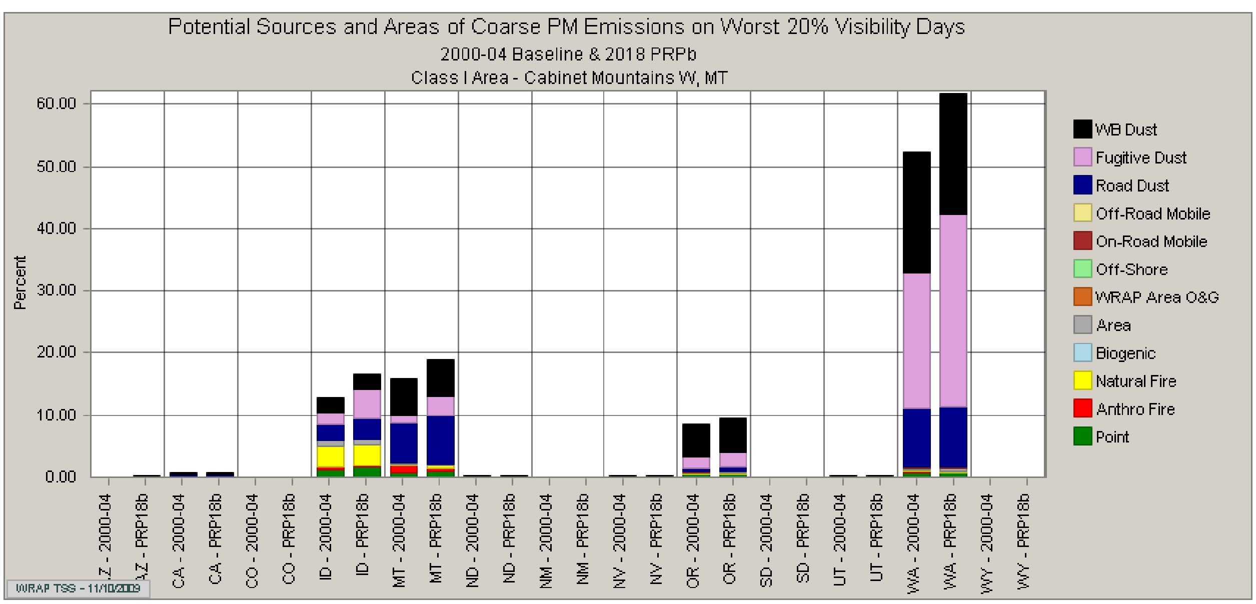


Figure 9-90 WEP Coarse Particulate Matter at Cabinet Mountain Wilderness 20% Worst Days

Figure 9-91 shows an expected increase in coarse particulate on the 20% best days in the Cabinet Mountain Wilderness due to increases in fugitive dust and road dust.

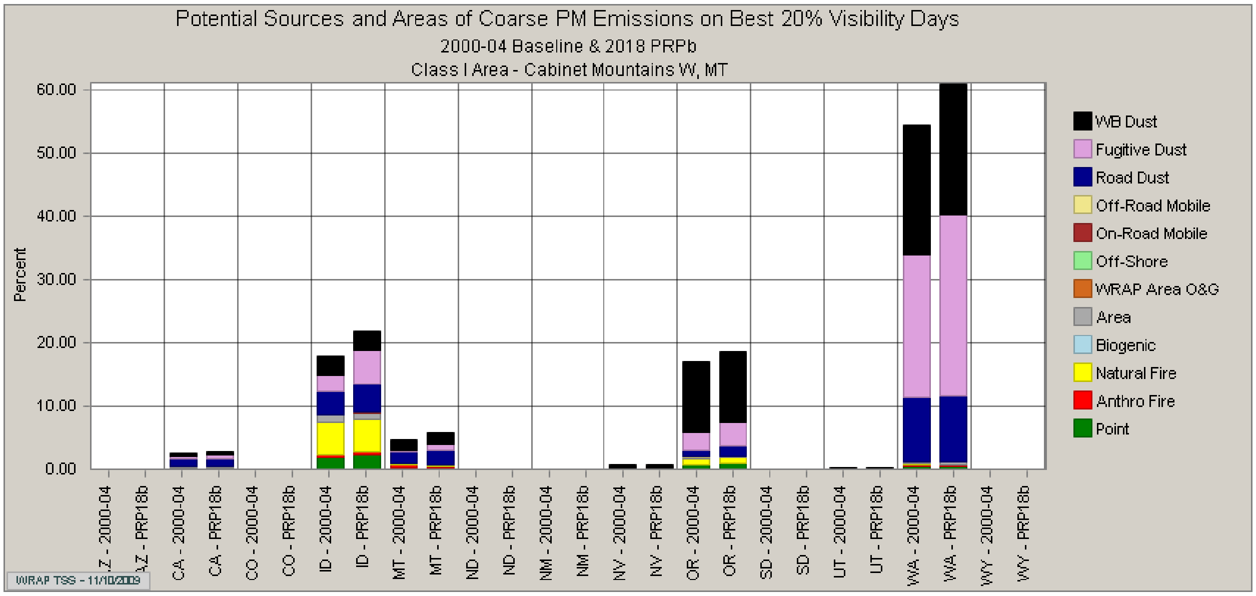


Figure 9-91 WEP Coarse Particulate Matter at Cabinet Mountain Wilderness 20% Best Days

9.3.3 Bob Marshall Wilderness, Mission Mountain Wilderness, and Scapegoat Wilderness Source Apportionment[9]

Sulfate at Bob Marshall Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-92 show the WRAP states are only expected to contribute roughly a little over 25% of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-92 shows Montana and then Washington and Idaho as the largest contributors of sulfate at Bob Marshall Wilderness. Overall, the concentration levels attributed to all the WRAP states are fairly low and decreasing over time due to expected reductions primarily from mobile sources. Idaho is expecting an overall reduction of roughly 3% over the first planning period. Natural fire from Idaho is projected to account for 3% of the sulfate and only roughly 2% of the total contribution will be coming from Idaho anthropogenic sources. The large contribution from natural fire will make it difficult to show much progress in visibility improvement from Idaho area, point, and mobile sources.

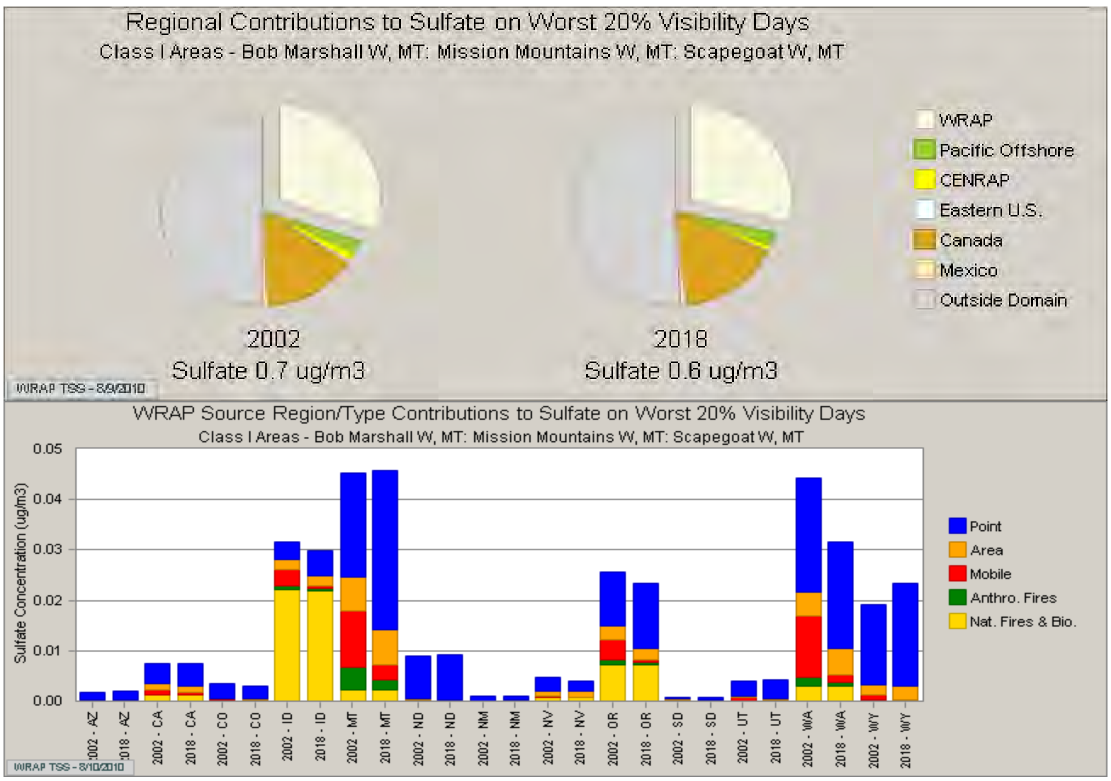


Figure 9-92 PSAT Sulfate Concentrations at Bob Marshall Wilderness 20% Worst Days

9 Throughout the remainder of this section the Bob Marshall Wilderness, Mission Mountain Wilderness and Scapegoat Wilderness will be represented by the "Bob Marshall Wilderness" since they all share the same IMPROVE monitoring site.

Figure 9-93 shows that overall improvement in future sulfate contributions from Idaho on the 20% best days are due to expected improvements from mobile sources.

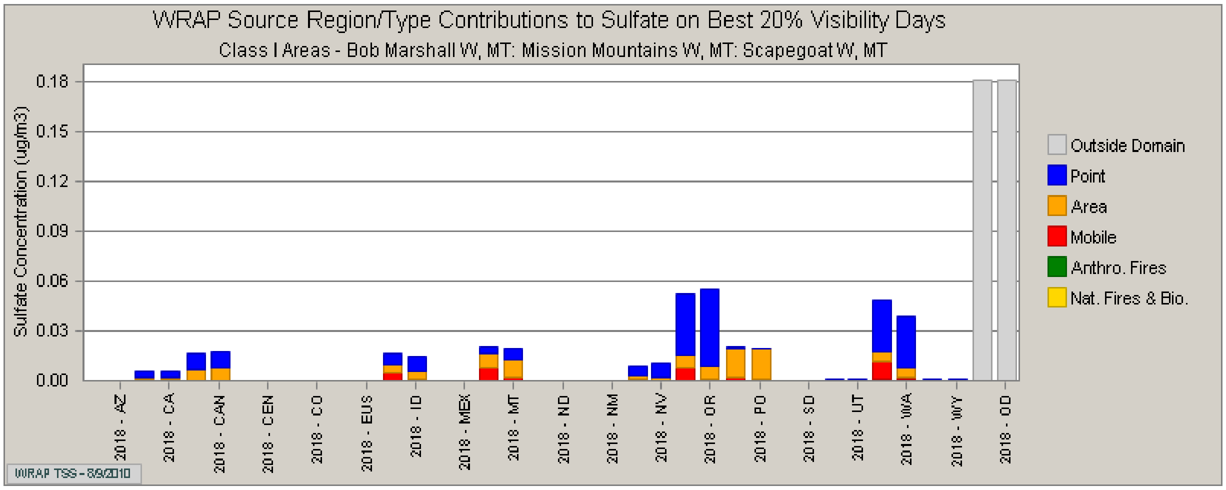


Figure 9-93 PSAT Sulfate Concentrations at Bob Marshall Wilderness 20% Best Days

Nitrate at Bob Marshall Wilderness Based on PSAT Modeling

The regional source contribution pie charts in figure 9-94 show the WRAP states are only contributing roughly half to two-thirds of the visibility impairment on the 20% worst days in the Bob Marshall Wilderness. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution and the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-94 shows Montana then Washington and Idaho as the largest WRAP contributors of nitrate in 2002. Overall, the concentration levels attributed to all the WRAP states are expected to decrease over time due to reductions primarily from mobile sources. Idaho is expecting an overall reduction of roughly 27% over the first planning period with a future contribution of 7% of the total nitrate concentrations. This does not include emission reductions expected from all the subject-to-BART sources.

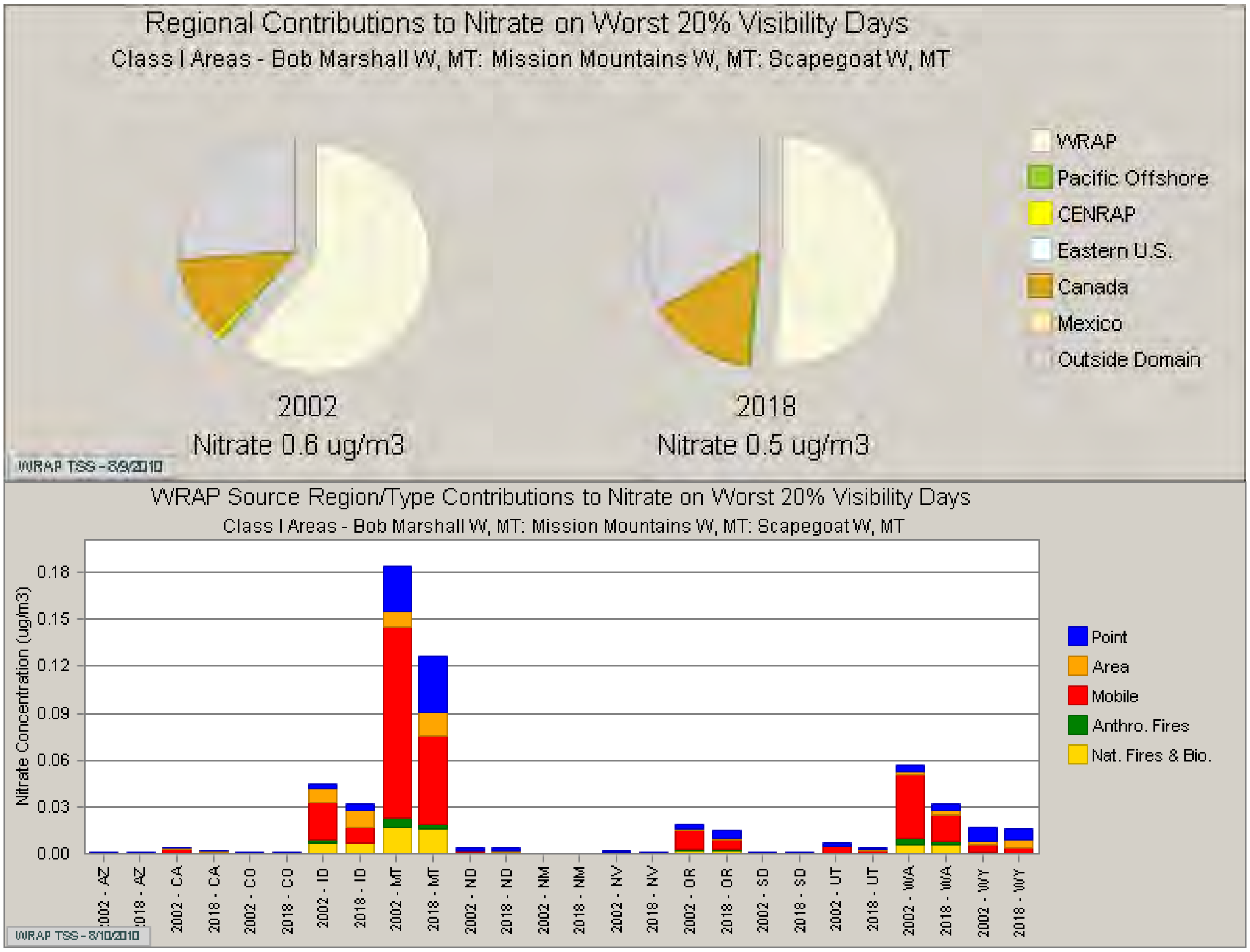


Figure 9-94 PSAT Nitrate Concentrations at Bob Marshall Wilderness 20% Worst Days

Figure 9-95 shows an overall improvement in future nitrate contributions coming from all WRAP states on the 20% best days at Bob Marshall Wilderness. The expected improvements are primarily from the mobile source category.

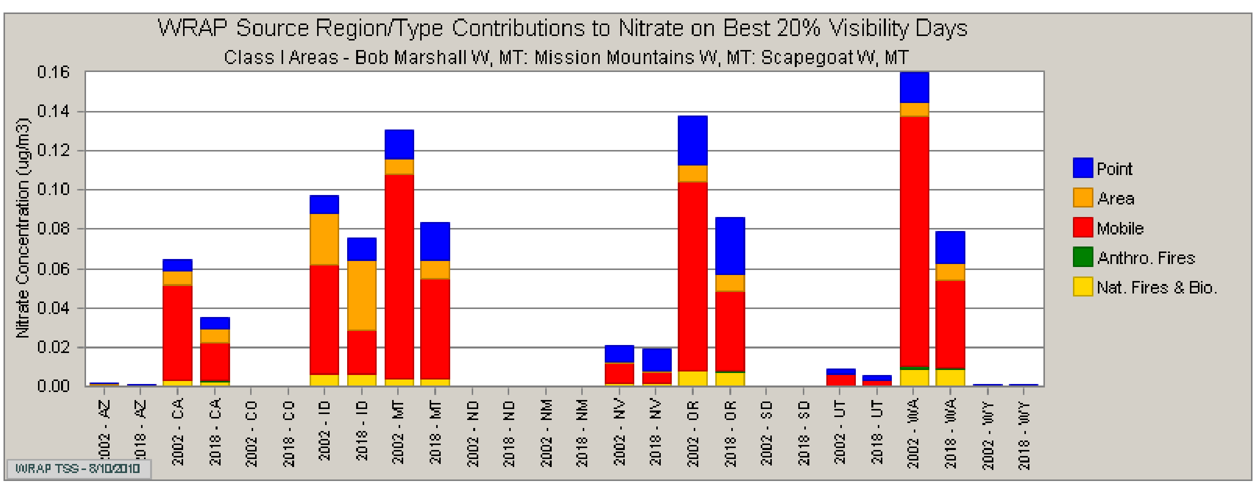


Figure 9-95 PSAT Nitrate Concentrations at Bob Marshall Wilderness 20% Best Days

Primary Organic Aerosol at Bob Marshall Wilderness Based on WEP

Figure 9-96 shows that the preponderance of organic aerosol on the 20% worst days in the Bob Marshall Wilderness is expected to come from Idaho natural fire. There are decreases anticipated from anthropogenic sources from most states. Overall, primary organic aerosol is expected to decrease because of reductions from anthropogenic fire.

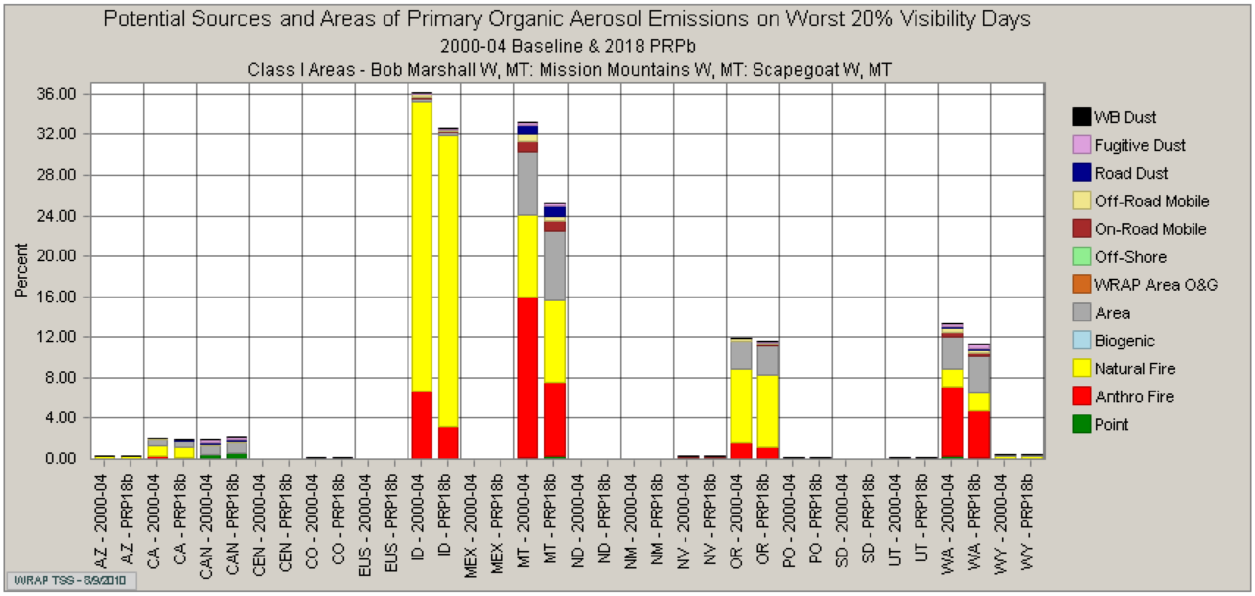


Figure 9-96 WEP Primary Organic Aerosol at Bob Marshall Wilderness 20% Worst Days

Figure 9-74 is showing similar results for the 20% best days in the Bob Marshall Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. Overall, most states are anticipating reductions coming from anthropogenic fire.

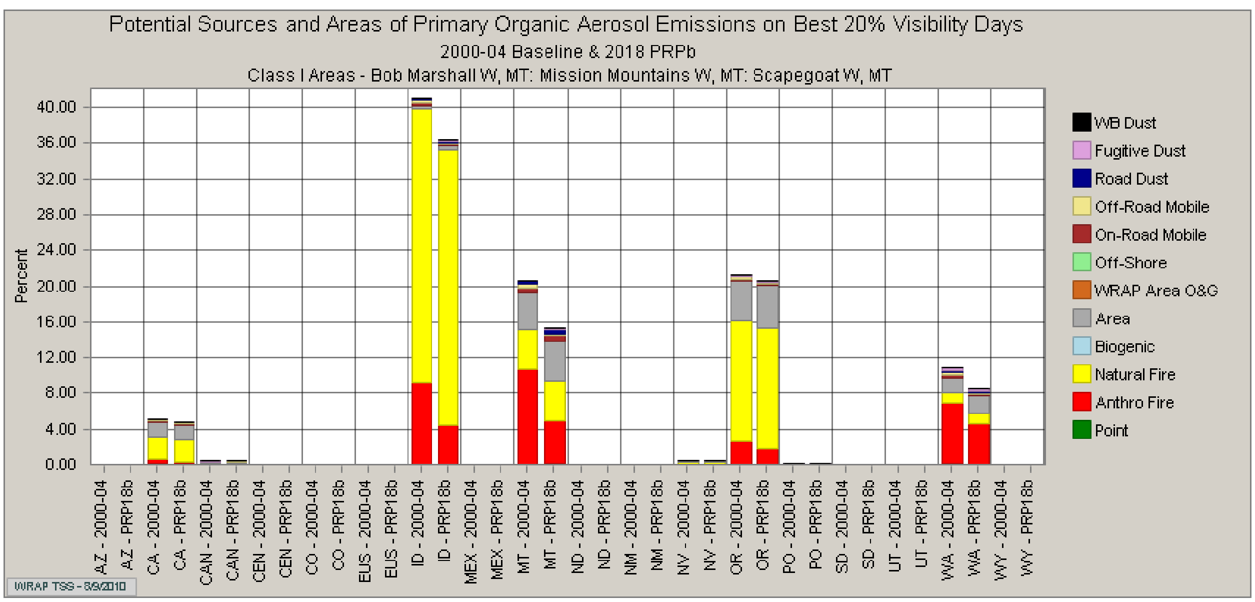


Figure 9-97 WEP Primary Organic Aerosol Bob Marshall Wilderness 20% Best Days

Elemental Carbon at Bob Marshall Wilderness Based on WEP

Figure 9-98 shows natural fire from Idaho is expected to be the largest contributor of elemental carbon visibility impairment on the 20% worst days in the Bob Marshall Wilderness. It is anticipated there will be overall future visibility improvements from anthropogenic fire and off-road mobile.

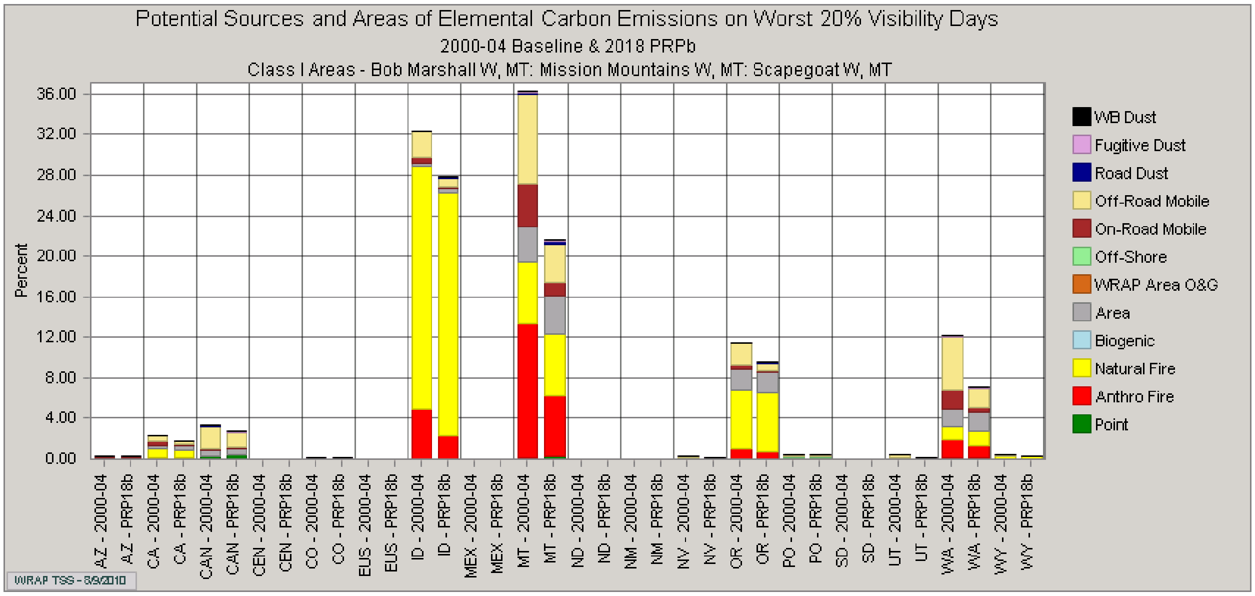


Figure 9-98 WEP Elemental Carbon at Bob Marshall Wilderness 20% Worst Days

Figure 9-99 shows similar expected results for elemental carbon for the 20% best days in the Bob Marshall Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. It is expected elemental carbon will decrease in the future on the 20% best days due to improvements in smoke management programs reducing impacts from anthropogenic fire.

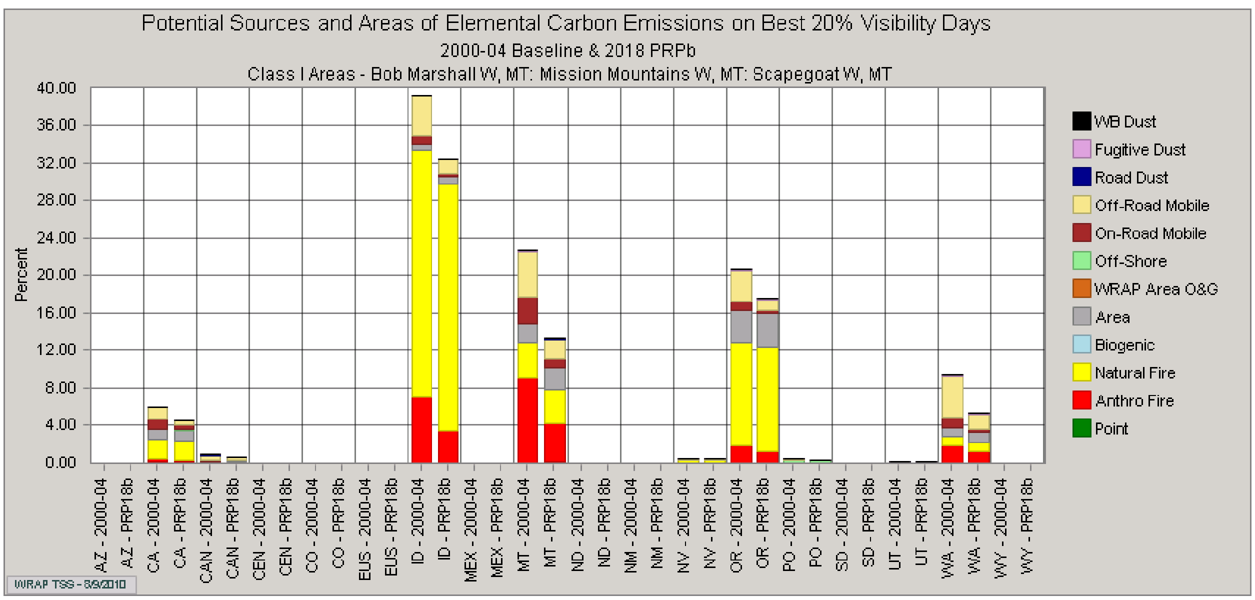


Figure 9-99 WEP Elemental Carbon at Bob Marshall Wilderness 20% Best Days

Fine Particulate Matter at Bob Marshall Wilderness Based on WEP

Figure 9-100 shows Montana is expected to contribute roughly 50% of the fine particulate matter to Bob Marshall Wilderness during the 20% worst visibility days. Oregon and Idaho contributions are expected to be almost equal with less than 10% each of the fine particulate matter contributions. Idaho's area source emissions and road dust are expected to increase during the first planning period and outpace reductions from anthropogenic fire.

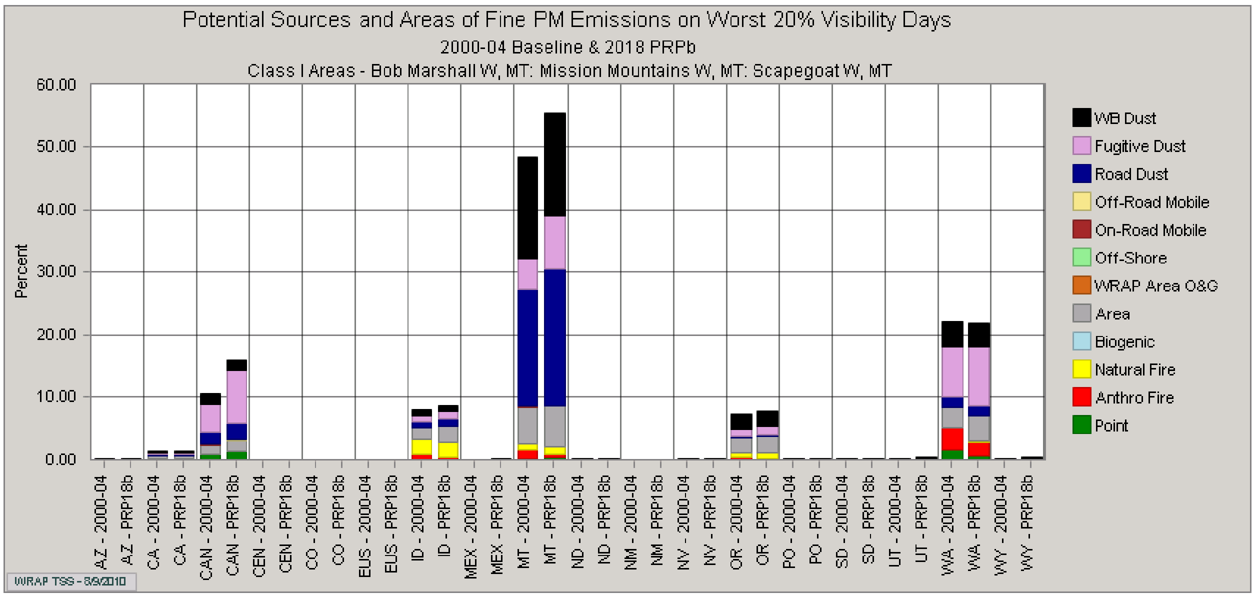


Figure 9-100 WEP Fine Particulate Matter at Bob Marshall Wilderness Worst 20% Days

Figure 9-101 shows the same trends in fine particulate on the 20% best visibility days as on the 20% worst days in the Bob Marshall Wilderness. Overall, there is only a slight increase expected in visibility impact from area source emissions and fugitive dust coming from Idaho.

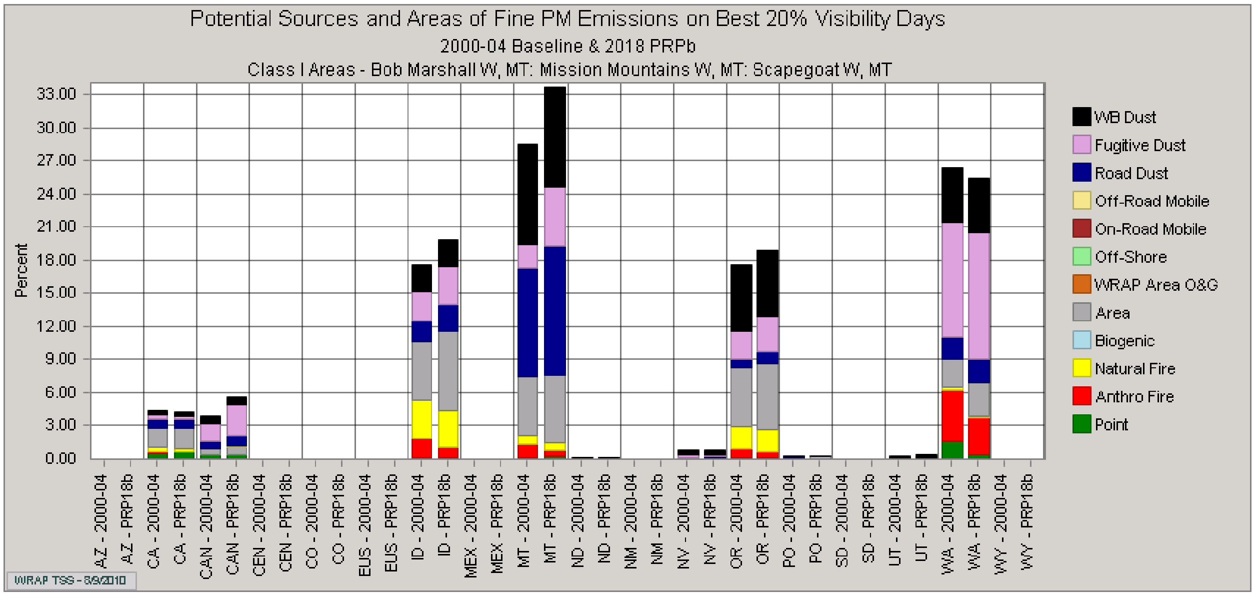


Figure 9-101 WEP Fine Particulate Matter at Bob Marshall Wilderness Best 20% Days

Coarse Particulate Matter at Bob Marshall Wilderness Based on WEP

Figure 9-102 shows coarse particulate in the Bob Marshall Wilderness on the 20% worst visibility days is primarily from Montana. Idaho, Montana, Washington, and Oregon are all projecting increases in fugitive dust and road dust. Overall, coarse particulate is expected to increase in the Cabinet Mountain Wilderness.

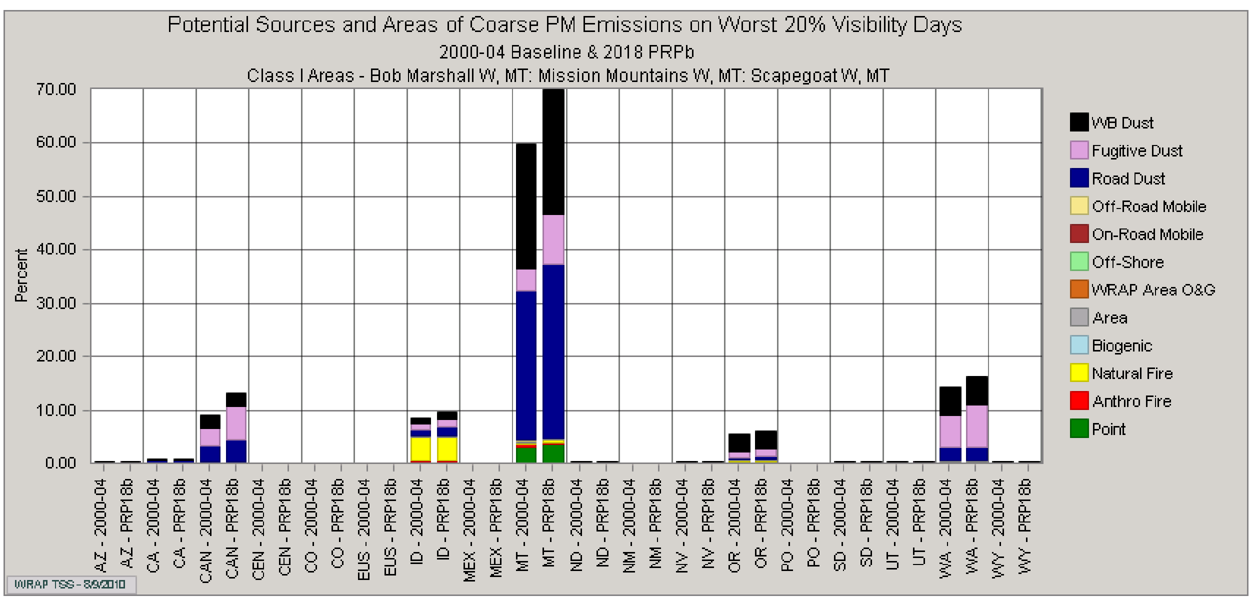


Figure 9-102 WEP Coarse Particulate Matter at Bob Marshall Wilderness 20% Worst Days

Figure 9-103 shows an expected increase in coarse particulate on the 20% best days in the Bob Marshall Wilderness due to increases in fugitive dust and road dust.

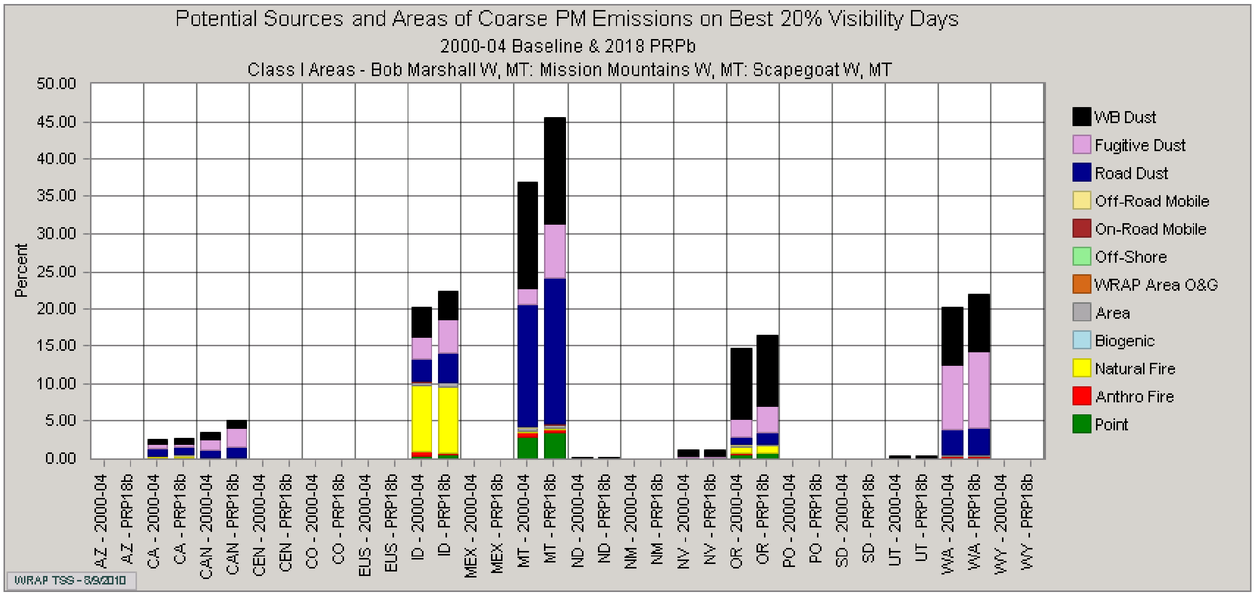


Figure 9-103 WEP Coarse Particulate Matter at Bob Marshall Wilderness 20% Best Days

9.3.4 Gates of the Mountain Wilderness Source Apportionment

Sulfate at Gates of the Mountain Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-104 show the WRAP states are only expected to contribute roughly 25% of the visibility impairment on the 20% worst days in Gates of the Mountain Wilderness. Through the consultation process, the WRAP states can work together on reducing the WRAP region’s contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-104 shows Montana and then Washington and Idaho as the largest contributors of sulfate at Gates of the Mountain Wilderness. Overall, the concentration levels attributed to all the WRAP states are fairly low and decreasing over time due to expected reductions primarily from mobile sources. Idaho shows an expected overall reduction of roughly 6% over the first planning period. Natural fire from Idaho is projected to account for 3% of the sulfate and only roughly 1% of the total contribution will be coming from Idaho anthropogenic sources. The large contribution from natural fire will make it difficult to show much progress in visibility improvement from Idaho area, point, and mobile sources.

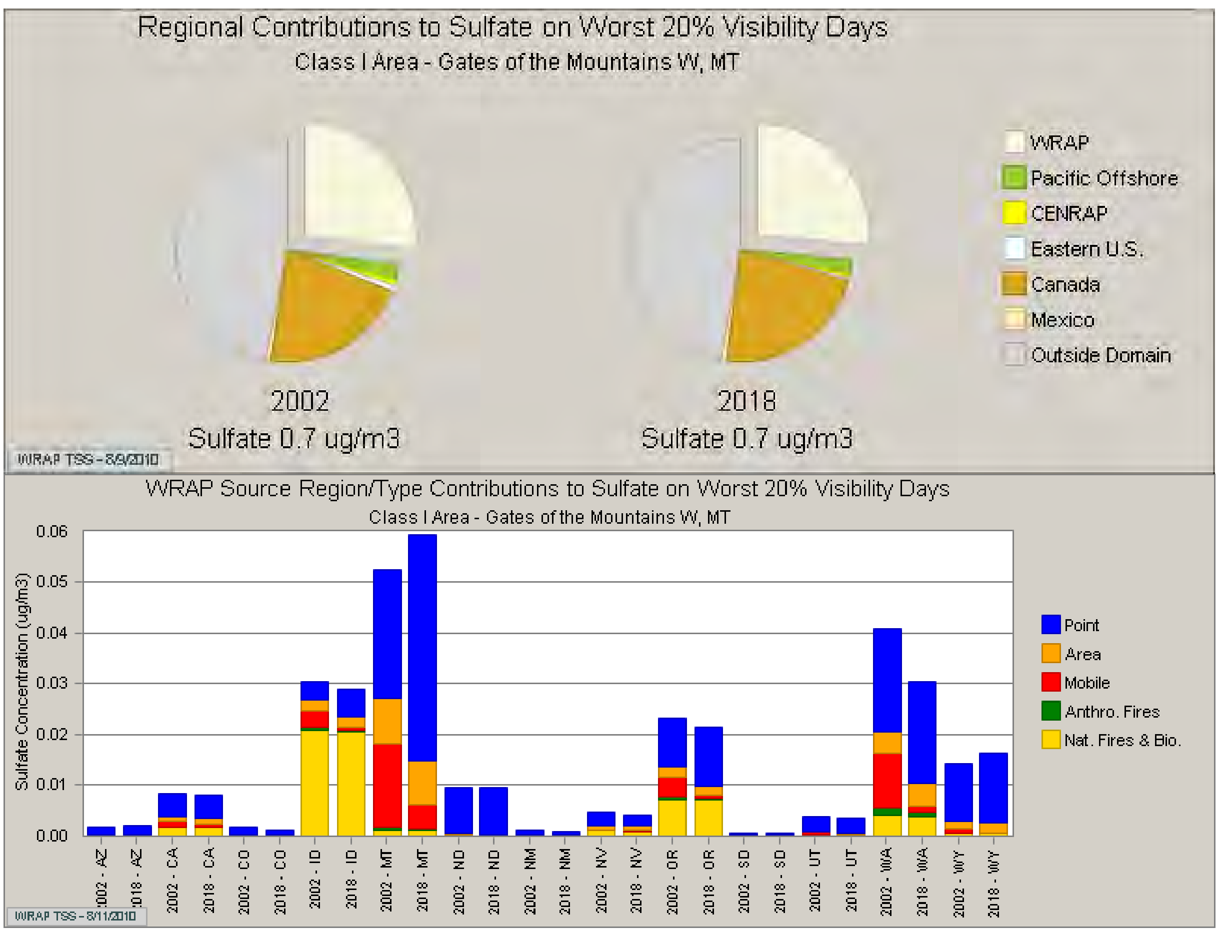


Figure 9-104 PSAT Sulfate Concentrations at Gates of the Mountain Wilderness 20% Worst Days

Figure 9-105 shows that overall improvement in future sulfate contributions from Idaho on the 20% best days are due to expected improvements from mobile sources. Washington and Nevada are showing slight increases due to point sources but this doesn't take into account all the BART controls that will be required to be added.

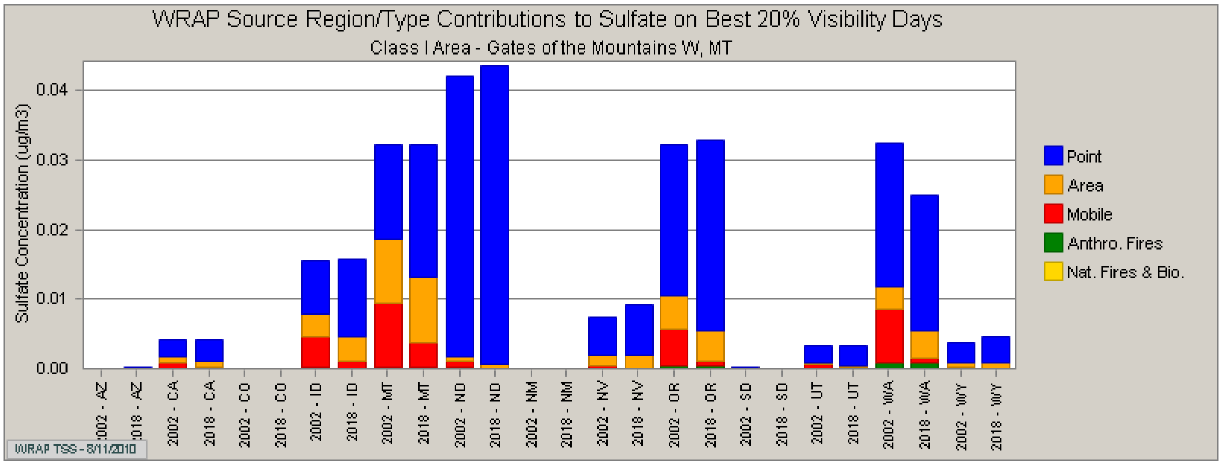


Figure 9-105 PSAT Sulfate Concentrations at Gates of the Mountain Wilderness 20% Best Days

Nitrate at Gates of the Mountain Wilderness Based on PSAT Modeling

The regional source contribution pie charts in figure 9-106 show the WRAP states are only expected to contribute close to 50% of the visibility impairment on the 20% worst days in the Gates of the Mountain Wilderness. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution and the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-106 shows Montana then Washington and Idaho as the largest contributors of nitrate in 2002. Overall, the concentration levels attributed to all the WRAP states are expected to decrease over time due to reductions primarily from mobile sources. Idaho is expected to show an overall reduction of roughly 26% over the first planning period with a future contribution of 6% of the total nitrate concentrations. This does not include emission reductions expected from all the subject-to-BART sources.

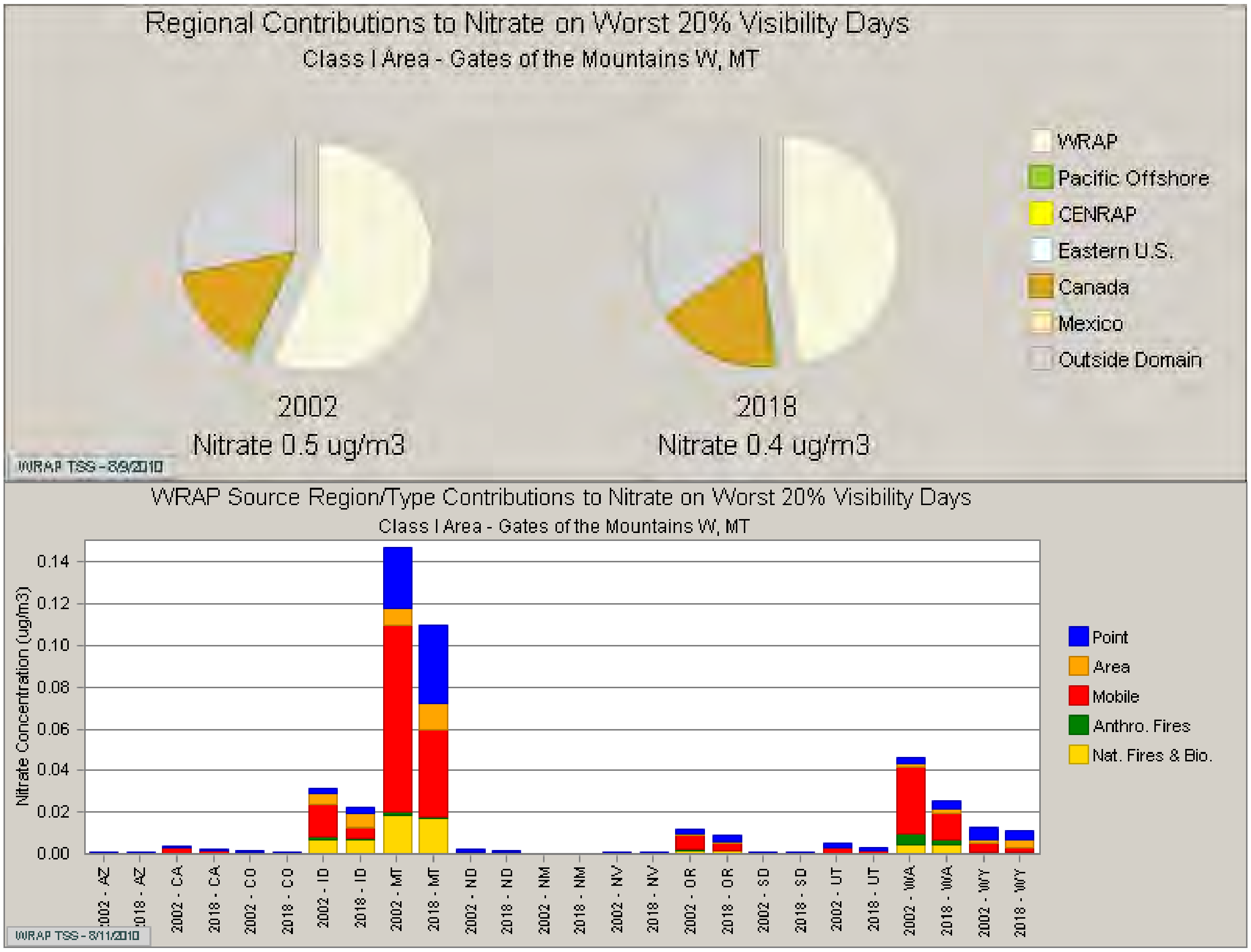


Figure 9-106 PSAT Nitrate Concentrations at Gates of the Mountain Wilderness 20% Worst Days

Figure 9-107 shows an overall improvement in future nitrate contributions expected from all WRAP states on the 20% best days at Cabinet Mountain Wilderness. The expected improvements are primarily coming from the mobile source category.

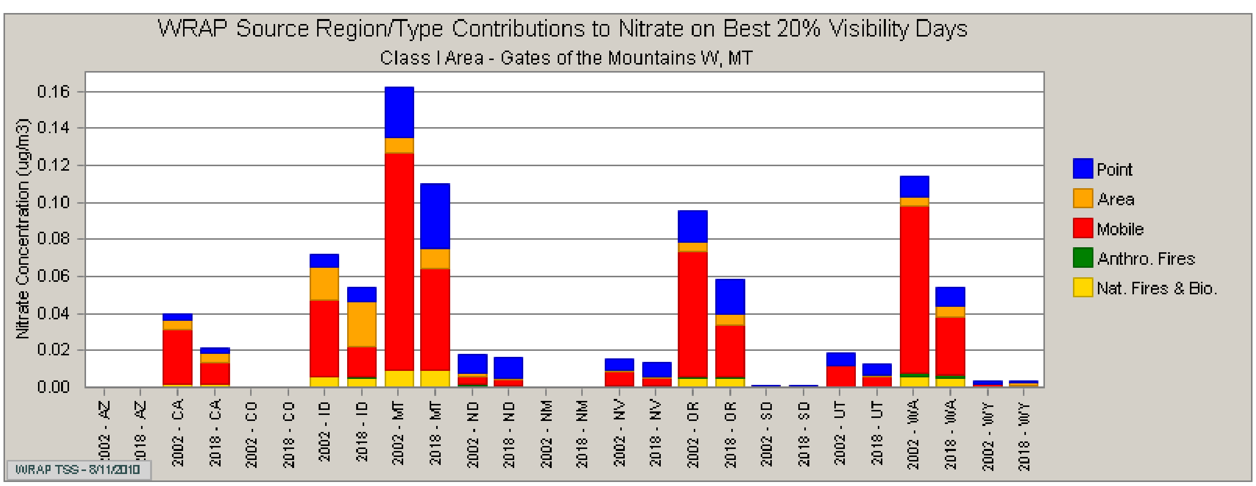


Figure 9-107 PSAT Nitrate Concentrations at Gates of the Mountain Wilderness 20% Best Days

Primary Organic Aerosol at Gates of the Mountain Wilderness Based on WEP

Figure 9-108 shows that the preponderance of organic aerosol on the 20% worst days in the Gates of the Mountain Wilderness is expected to come from Idaho natural fire. There are decreases anticipated from anthropogenic sources from most states. Overall, primary organic aerosol is expected to decrease because of reductions from anthropogenic fire.

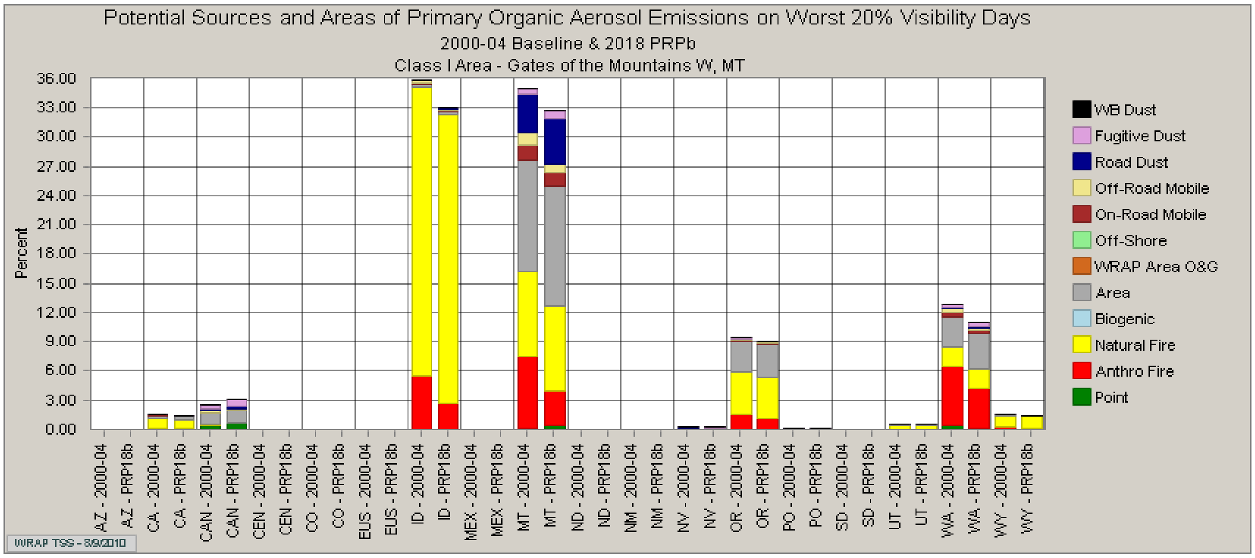


Figure 9-108 WEP Primary Organic Aerosol at Gates of the Mountain Wilderness 20% Worst Days

Figure 9-109 showing similar results expected for the 20% best days in the Gates of the Mountain Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. Overall, most states are anticipating reductions from anthropogenic fire.

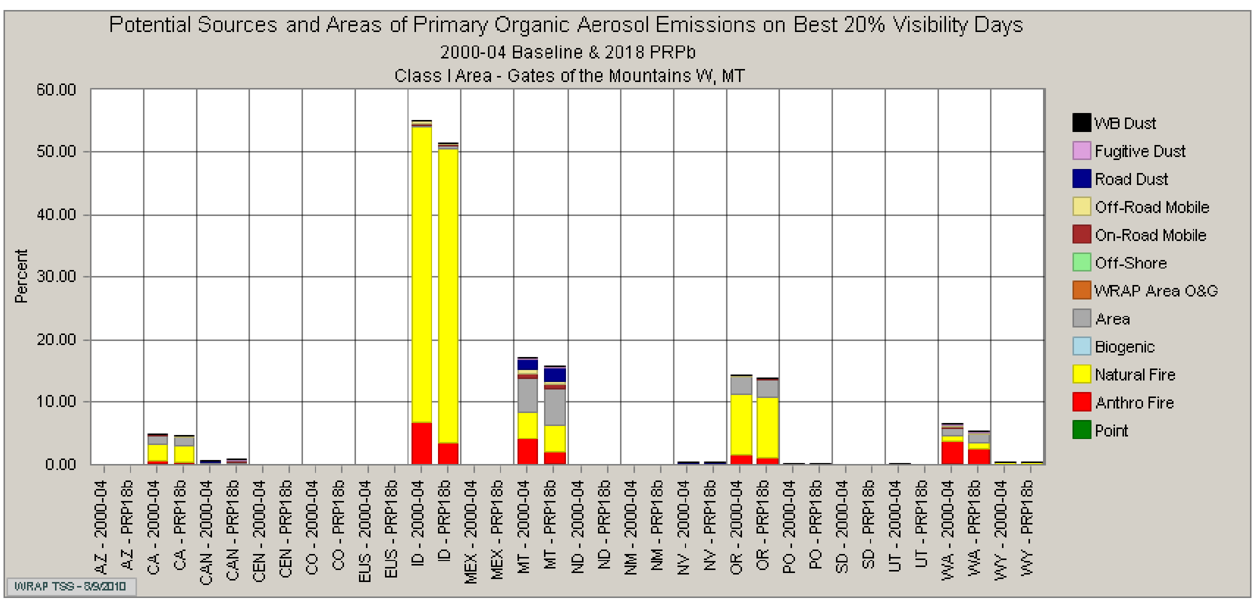


Figure 9-109 WEP Primary Organic Aerosol at Gates of the Mountain Wilderness 20% Best Days

Elemental Carbon at Gates of the Mountain Wilderness Based on WEP

Figure 9-110 shows natural fire from Idaho is expected to be the largest contributor of elemental fire visibility impairment on the 20% worst days in the Cabinet Mountain Wilderness. It is anticipated there will be overall future visibility improvements from anthropogenic fire and off-road mobile.

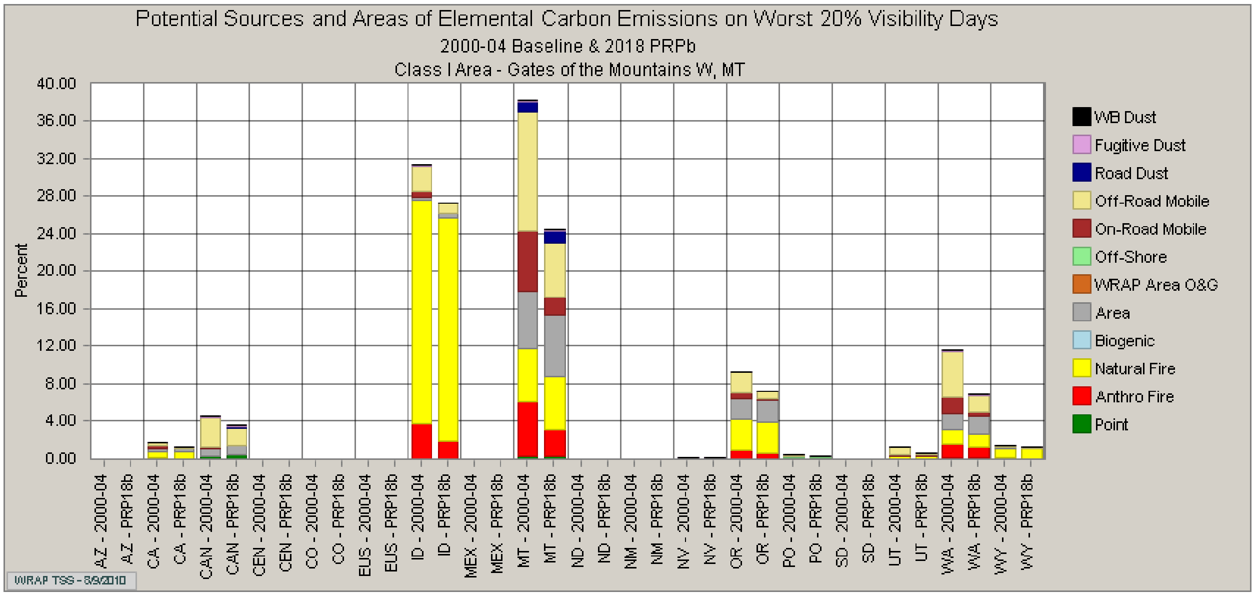


Figure 9-110 WEP Elemental Carbon at Gates of Mountain Wilderness 20% Worst Days

Figure 9-111 shows similar expected results for elemental carbon for the 20% best days in the Gates of the Mountain Wilderness as for the 20% worst days. Natural fire from Idaho is by far the largest source. It is expected elemental carbon will decrease in the future on the 20% best days due to improvements in smoke management programs reducing impacts from anthropogenic fire.

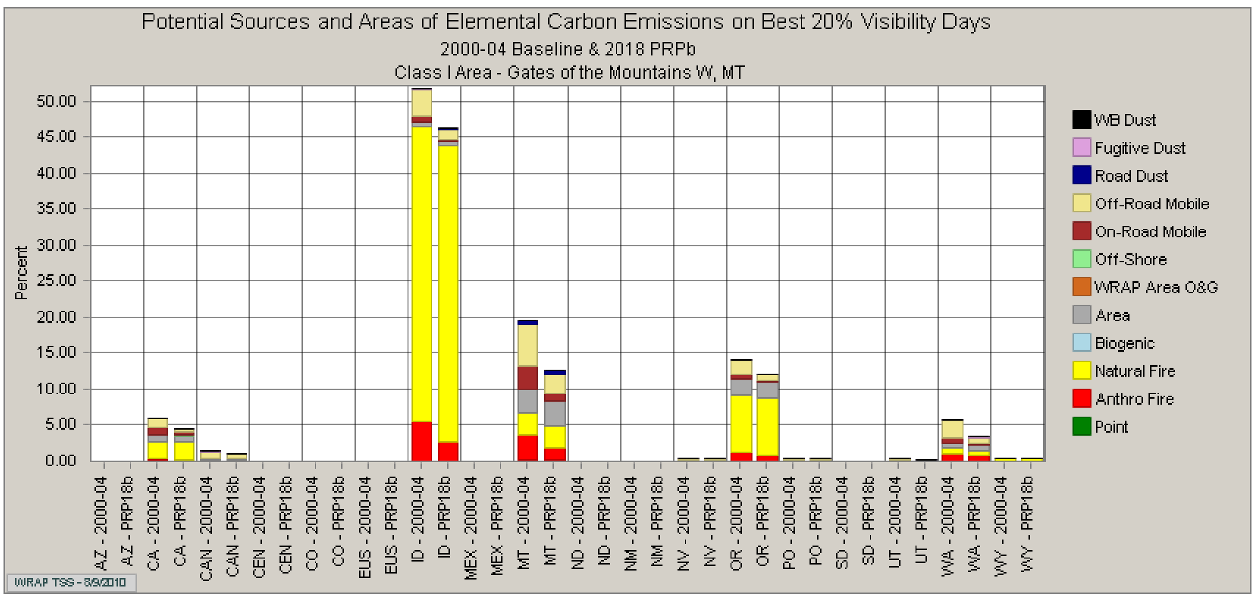


Figure 9-111 WEP Elemental Carbon at Gates of the Mountain Wilderness 20% Best Days

Fine Particulate Matter at Gates of the Mountain Wilderness Based on WEP

Figure 9-112 shows Montana is expected to contribute a little over 70% of the fine particulate matter to Gates of the Mountain Wilderness during the 20% worst visibility days. Oregon and Idaho are showing almost equal contributions at around 5% of the fine particulate matter.

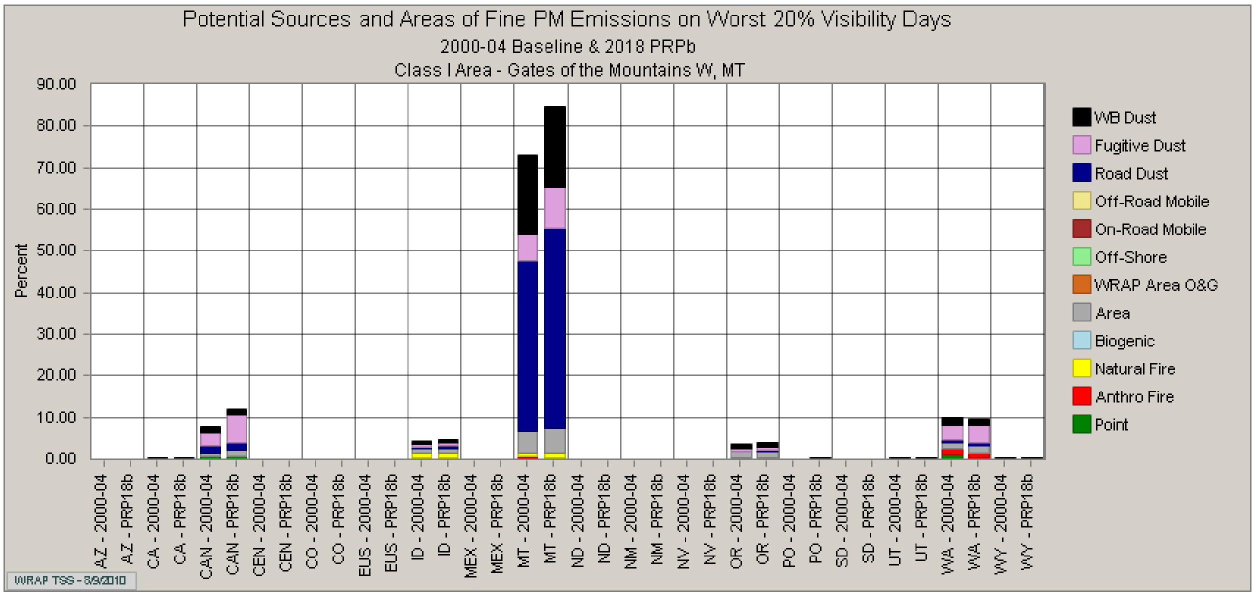


Figure 9-112 WEP Fine Particulate Matter at Gates of the Mountain Wilderness Worst 20% Days

Figure 9-113 shows Washington as the largest contributor of fine particulate on the 20% best visibility days in the Gates of Mountain Wilderness. Overall, there is only a slight increase in visibility impact expected from area source emissions and fugitive dust coming from Idaho.

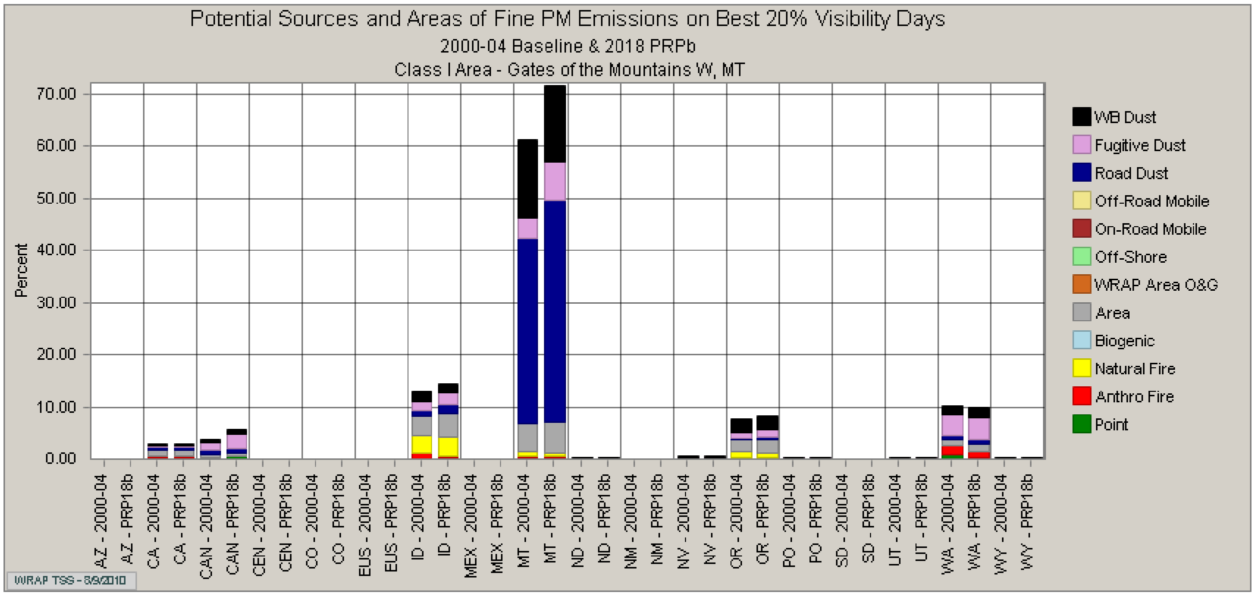


Figure 9-113 WEP Fine Particulate Matter at Gates of the Mountain Wilderness Best 20% Days

Coarse Particulate Matter at Gates of the Mountain Wilderness Based on WEP

Figure 9-114 shows coarse particulate is trending similar to fine particulate in the Gates of the Mountain Wilderness on the 20% worst visibility days with Montana being the largest contributor. Idaho, Washington, and Oregon are all projecting increases in fugitive dust and road dust with a slight decrease in contributions from anthropogenic fire. Overall, coarse particulate is expected to increase in the Gates of the Mountain Wilderness.

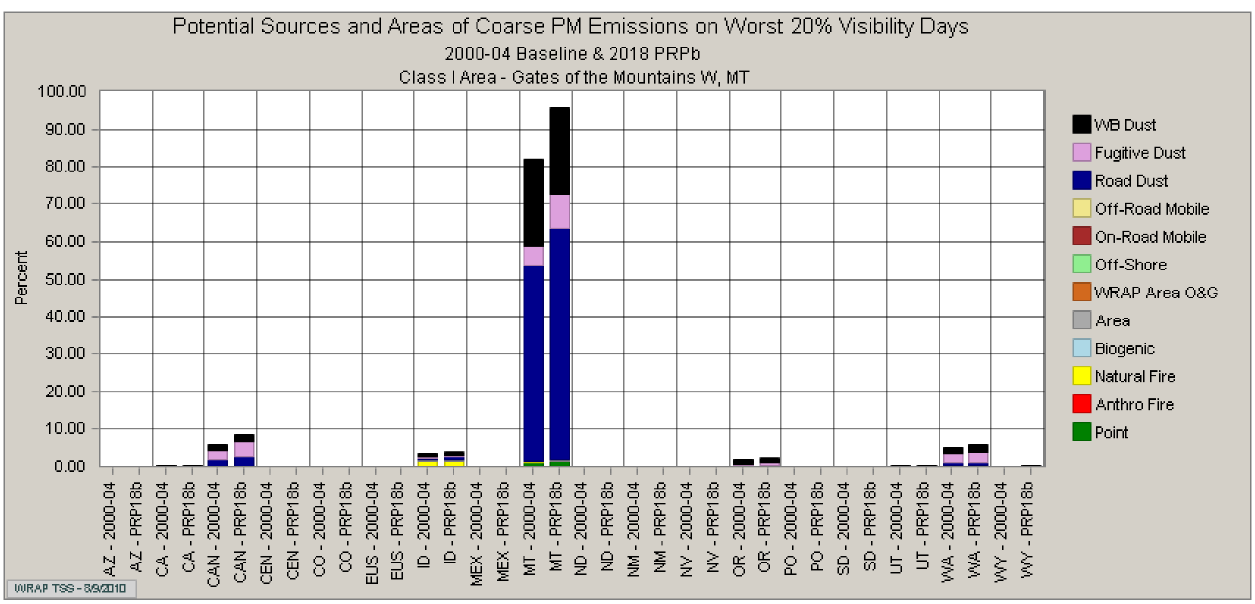


Figure 9-114 WEP Coarse Particulate Matter at Gates of the Mountain Wilderness 20% Worst Days

Figure 9-115 shows an expected increase in coarse particulate on the 20% best days in the Gates of the Mountain Wilderness due to increases in fugitive dust and road dust.

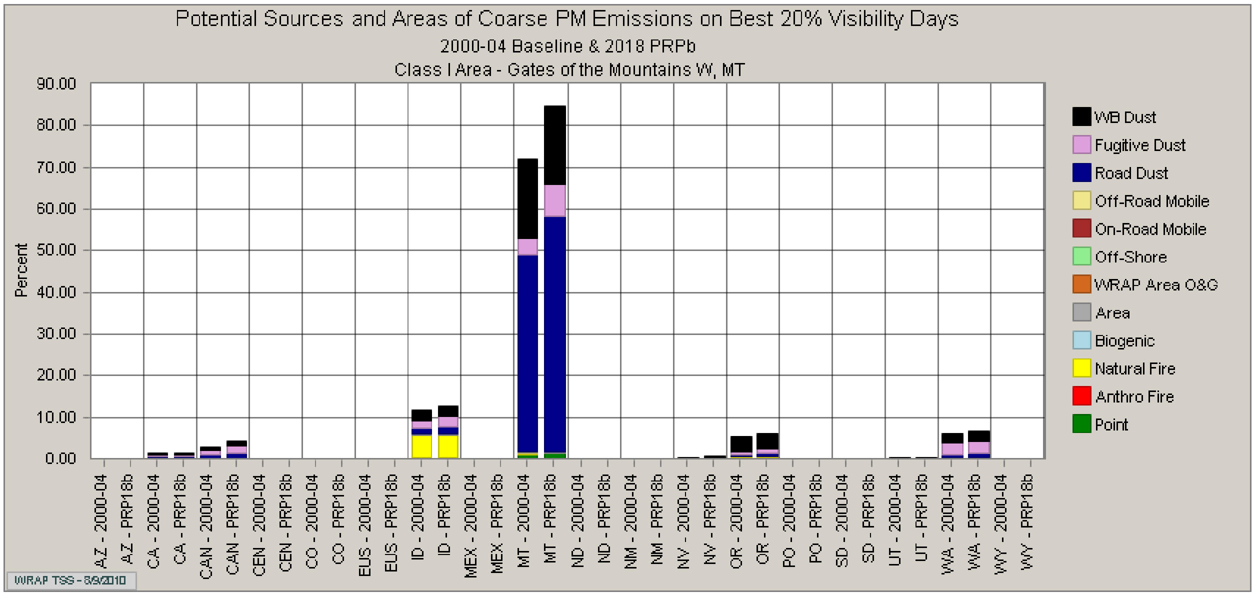


Figure 9-115 WEP Coarse Particulate Matter at Gates of the Mountain Wilderness 20% Best Days

9.3.5 North Absaroka Wilderness and Washakie Wilderness Source Apportionment[10]

Sulfate at North Absoroka Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-116 show the WRAP states are only expected to contribute roughly a third of the sulfate visibility impairment in the North Absaroka Wilderness on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-116 shows Montana and then Idaho as the largest contributors of sulfate in North Absaroka Wilderness. Idaho is expected to contribute roughly 6% of the sulfate with only 3% coming from Idaho anthropogenic sources. The PSAT modeling shows a 3% increase coming from Idaho but this does not include the emissions reductions of roughly 9,000 tons per year expected from P4 Production (formerly Monsanto) in Southeast Idaho. Also, these estimates include the emissions from a once-anticipated EGU, as mentioned before, that had not yet been removed from the emissions inventory used for this modeling. It is expected Idaho's contribution will actually drop when these emission reductions occur.

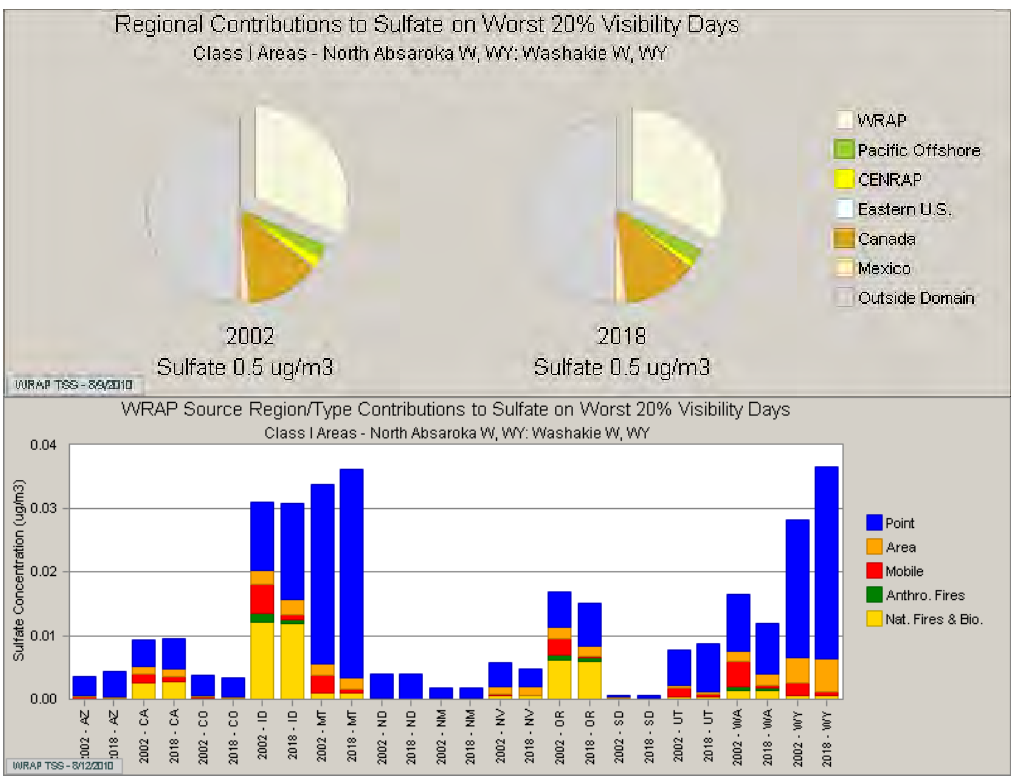


Figure 9-116 PSAT Sulfate Concentrations at North Absaroka Wilderness 20% Worst Days

10 Throughout the remainder of this section North Absaroka Wilderness, and Washakie Wilderness will be represented by the "Bob Marshall Wilderness" since they all share the same IMPROVE monitoring site.

The graph in Figure 9-117 shows an expected decrease in emissions from Idaho point sources in 2018. Using WEP updated emissions inventory and back trajectories, Figure 9-117 shows sulfate emissions from point and mobile sources expected to decrease for Idaho and all other WRAP states.

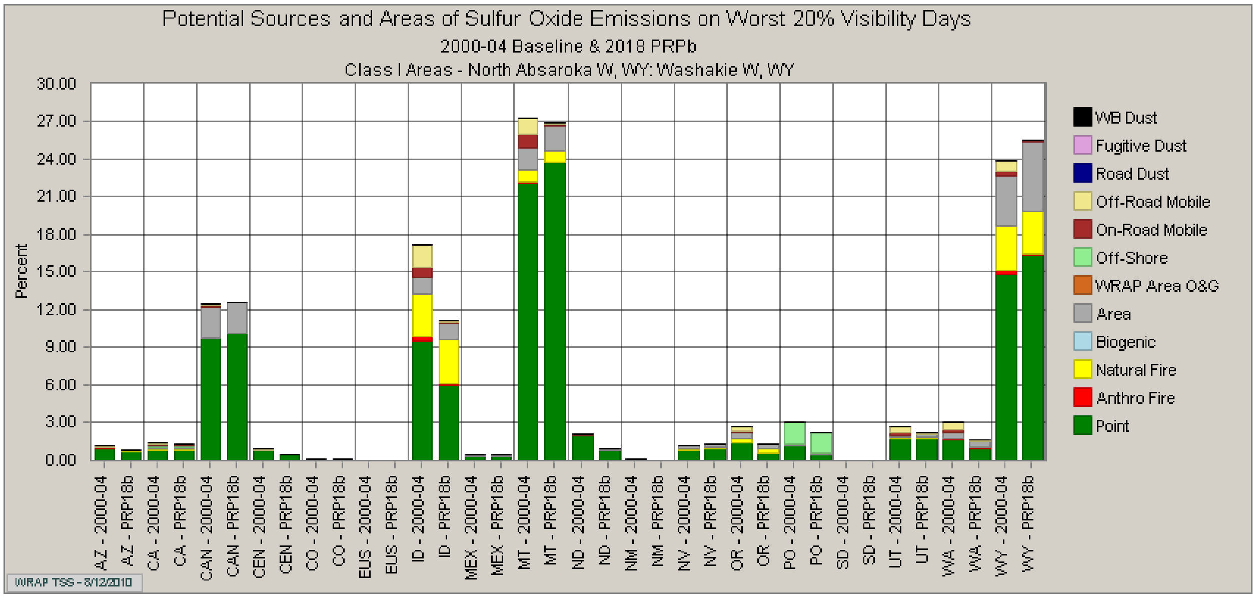


Figure 9-117 WEP Sulfate Concentrations at North Absaroka Wilderness 20% Worst Days

The PSAT results show an expected increase in visibility impairment form sulfate on the 20% best days at Absaroka Wilderness. The updated emissions inventory used by the WEP shows an improvement in future sulfate visibility impacts on the best days. Figures 9-118 and 9-119 show the differences in expected visibility impacts based on using different emissions inventories.

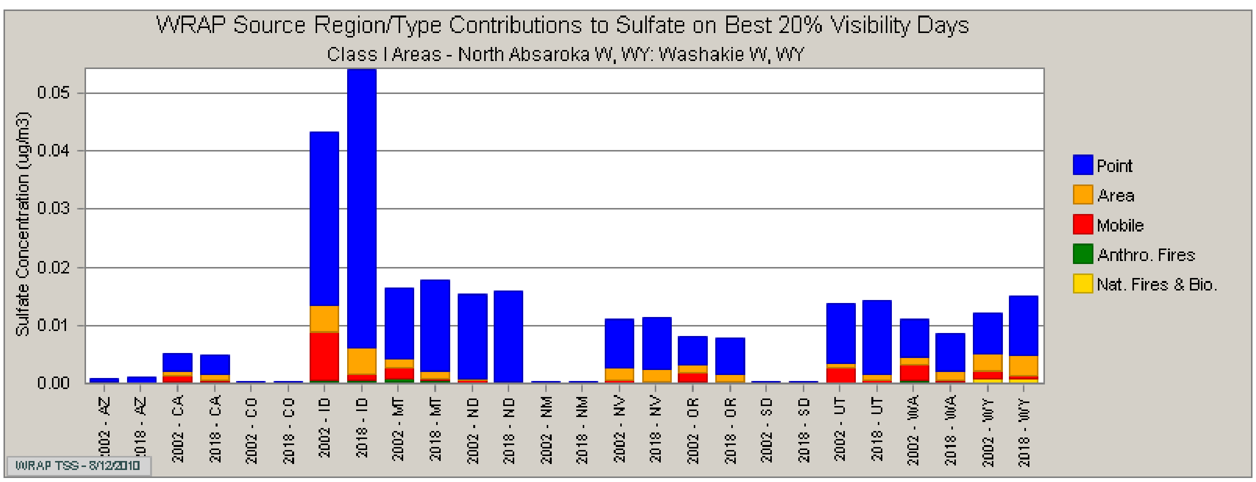


Figure 9-118 PSAT Sulfate Concentrations at North Absaroka Wilderness 20% Best Days

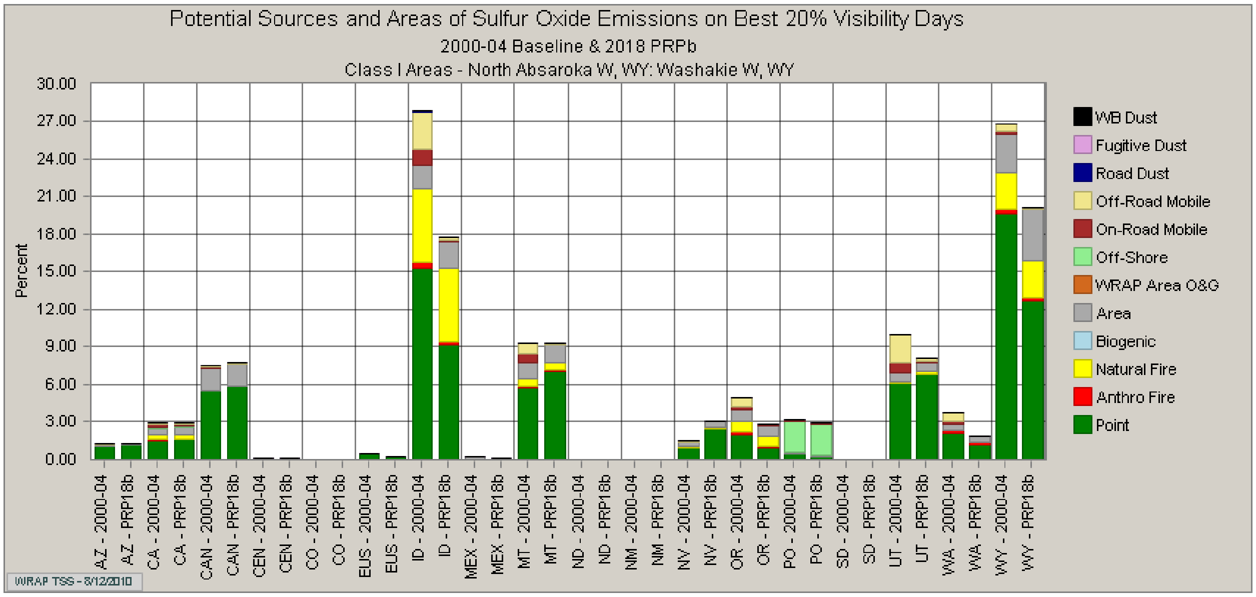


Figure 9-119 WEP Sulfate Concentrations at North Absaroka Wilderness 20% Best Days

Nitrate at North Absaroka Based on PSAT Modeling

Figure 9-120 shows the WRAP States are expected to contribute roughly two thirds to half of the nitrates on the 20% worst days. As WRAP states reduce nitrate contributions over the first planning period ending in 2018, the contributions coming from outside the domain, Pacific offshore (shipping), and Canadian emissions will have a greater impact. This will require regulator actions and negotiations outside the WRAP states' control.

Figure 9-120 also shows Idaho as the largest expected contributor to nitrate concentrations at the North Absaroka Wilderness on the 20% worst days. Overall, Idaho's nitrate emissions are expected to decline by 29% over time primarily due to reductions in mobile emissions.

Because the point source contributions from Idaho are not as large as other categories, the modeled contribution from a once-anticipated EGU in Jerome County as mentioned above did not show such a significant impact. Overall, most WRAP states are expected to improve future visibility impairment due to nitrates on the 20% worst days in North Absaroka Wilderness.

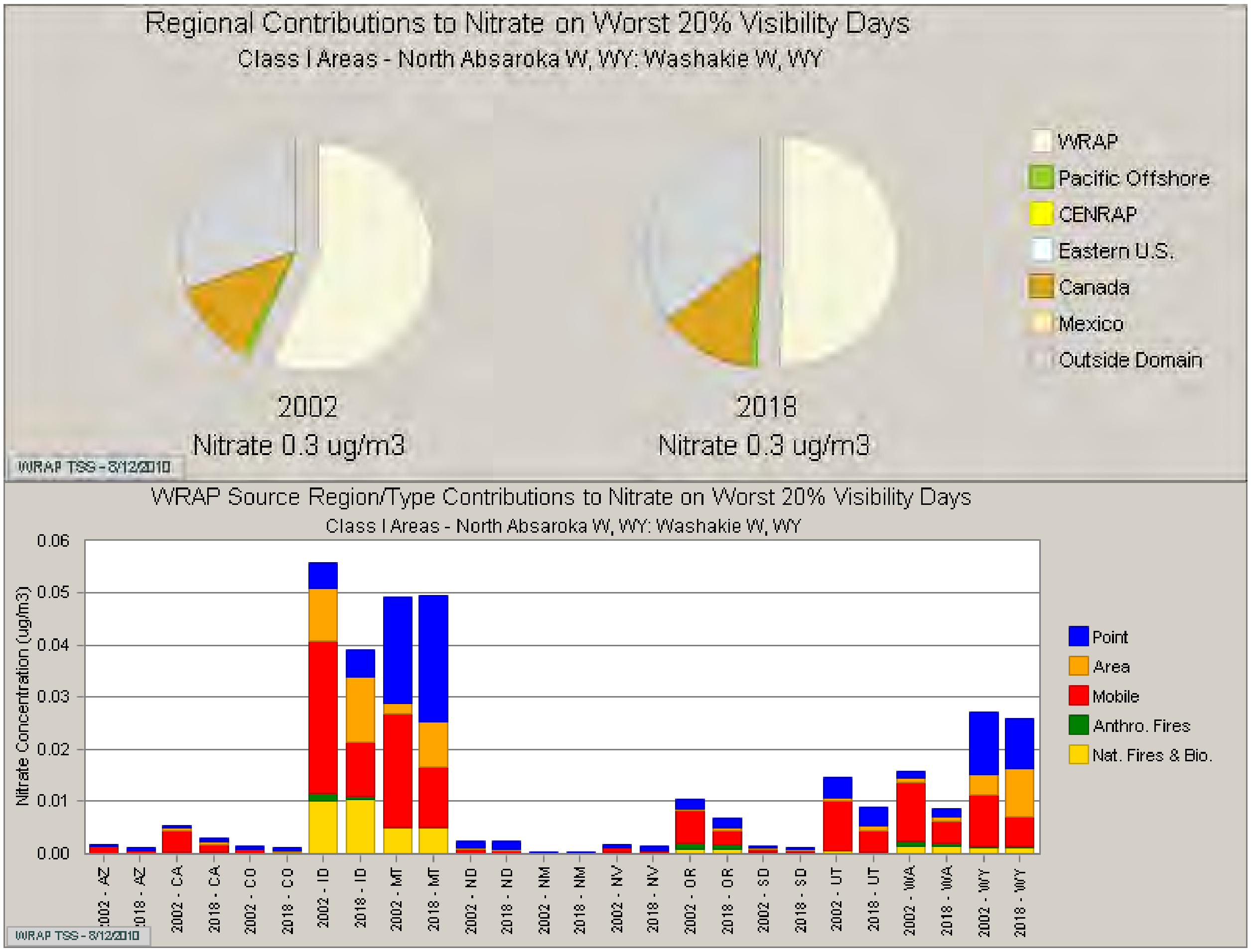


Figure 9-120 PSAT Nitrate Concentrations at North Absaroka Wilderness 20% Worst Days

Figure 9-121 shows all WRAP states are expected to improve the visibility impairment due to nitrates on the 20% best days in North Absaroka Wilderness.

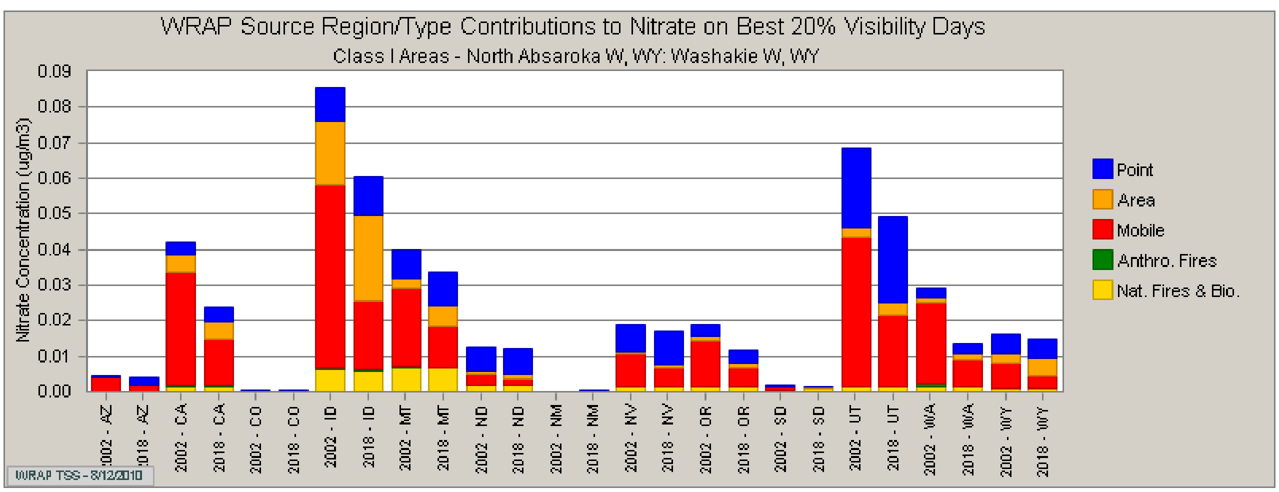


Figure 9-121 PSAT Nitrate Concentrations at North Absaroka Wilderness 20% Best Days

Primary Organic Aerosol at North Absaroka Wilderness Based on WEP

Figure 9-122 shows the preponderance of organic aerosol on the 20% worst days in North Absaroka Wilderness is coming from natural fire primarily from Wyoming. There are decreases anticipated from anthropogenic sources from most states but these are dwarfed by expected emissions from natural fire.

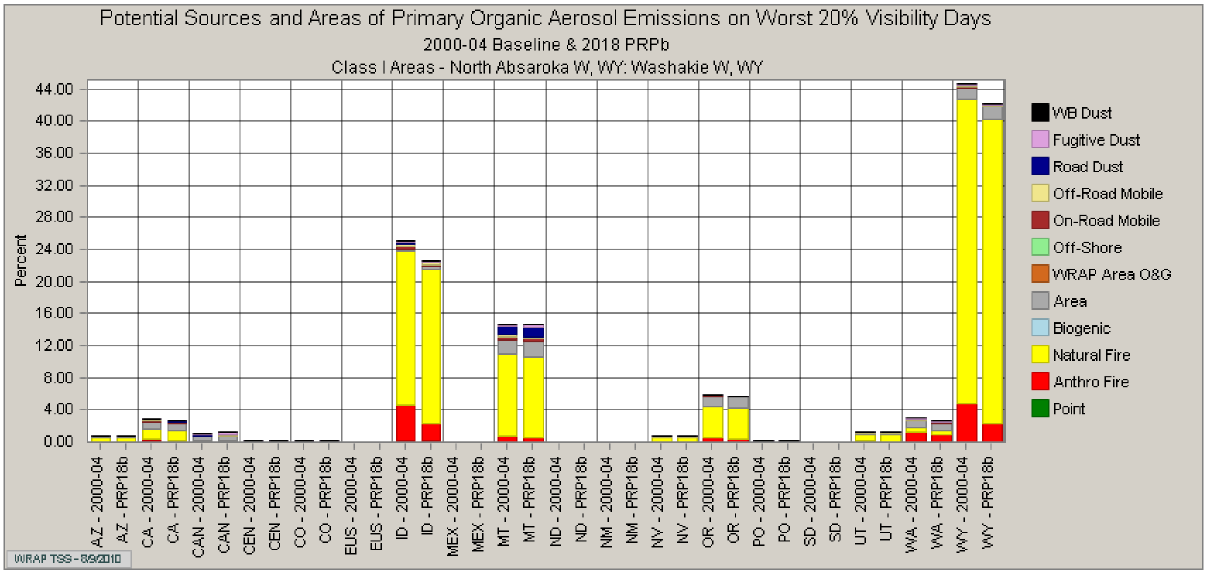


Figure 9-122 WEP Primary Organic Aerosol at North Absaroka Wilderness 20% Worst Days

Primary Organic Aerosol in North Absaroka Wilderness is expected to show an overall improvement on the 20% best visibility days. Figure 9-123 shows an improvement on the best visibility days primarily coming from anthropogenic fire and better smoke management techniques anticipated in the future.

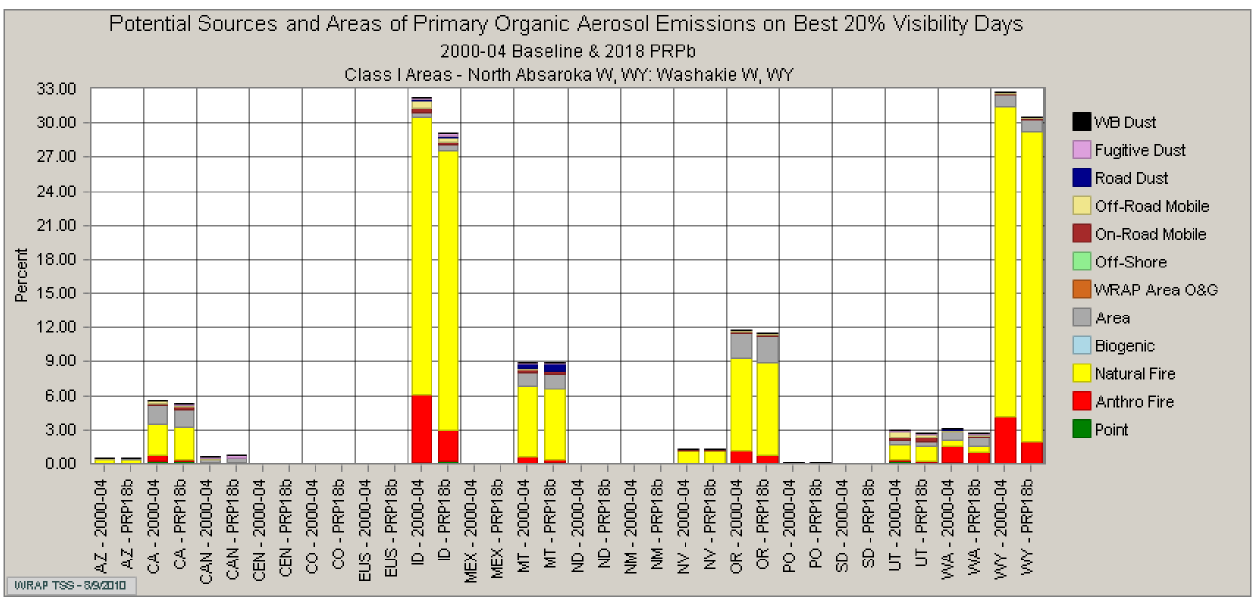


Figure 9-123 WEP Primary Organic Aerosol at North Absaroka Wilderness 20% Best Days

Elemental Carbon at North Absaroka Wilderness Based on WEP

Figure 9-124 is showing natural fire from Wyoming is the largest expected contributor to elemental carbon visibility impairment on the 20% worst visibility days in North Absaroka Wilderness. They analysis shows all WRAP states are expected to make improvements to visibility impairments attributed to elemental carbon.

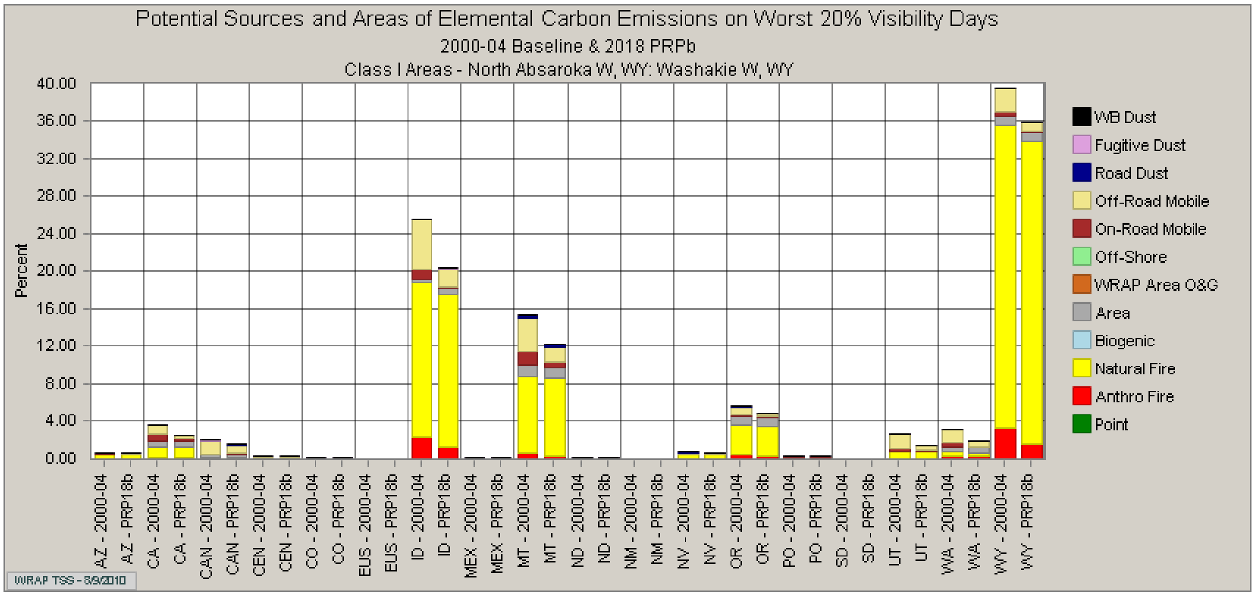


Figure 9-124 WEP Elemental Carbon at North Absaroka Wilderness 20% Worst Days

Figure 9-125 is showing all WRAP states with expected improvement to elemental carbon visibility impairment on the 20% best days. Most of the improvement is expected to come from changes in smoke management and impacts from anthropogenic fire.

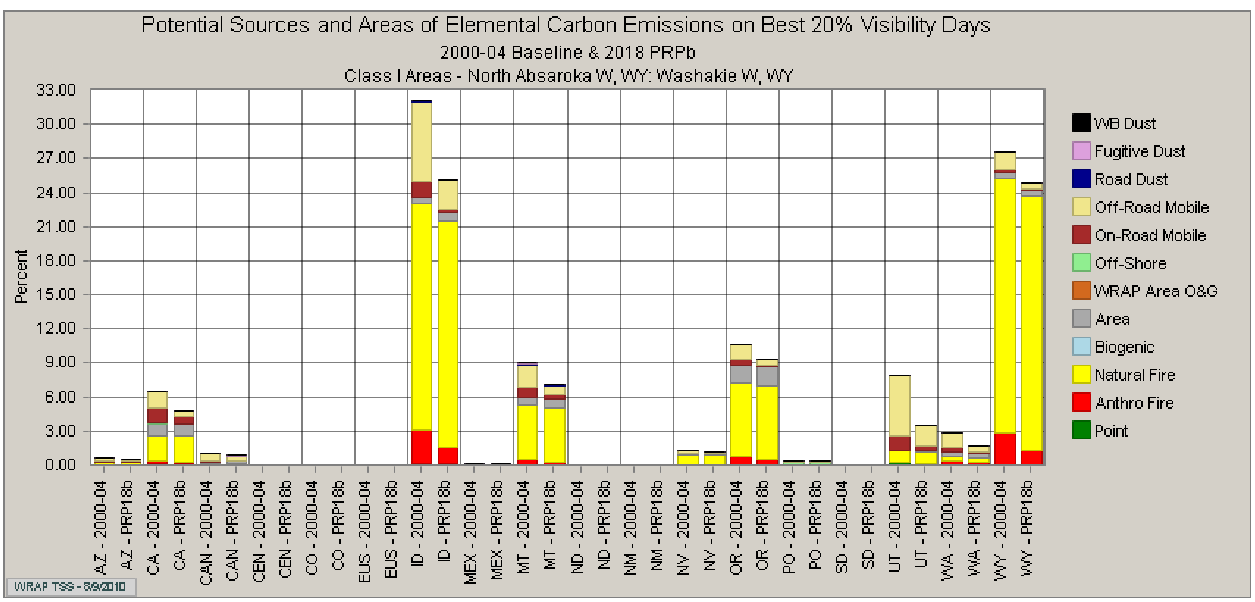


Figure 9-125 WEP Elemental Carbon at North Absaroka Wilderness 20% Best Days

Fine Particulate Matter at North Absaroka Wilderness Based on WEP

Figure 9-63 shows Idaho then Wyoming and Montana as the greatest expected contributors of fine particulate on the 20% worst visibility days in North Absaroka Wilderness. Idaho and Wyoming are showing expected improvements in future contributions from anthropogenic fire but increases in area source emissions, road dust, and fugitive dust are expected to cause overall future increases.

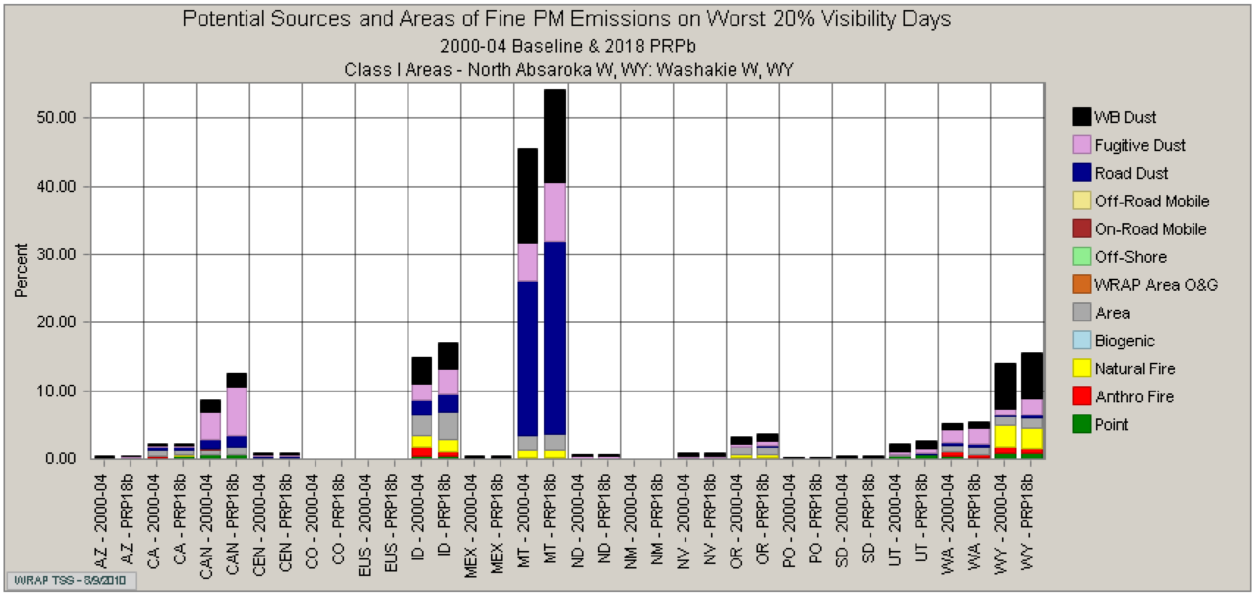


Figure 9-126 WEP Fine Particulate Matter at North Absaroka Wilderness Worst 20% Days

Figure 9-127 shows similar visibility impacts expected from fine particulate on the 20% best days in North Absaroka Wilderness. Future increases in area source emissions, road dust and fugitive dust are expected to outpace improvements from anthropogenic fire.

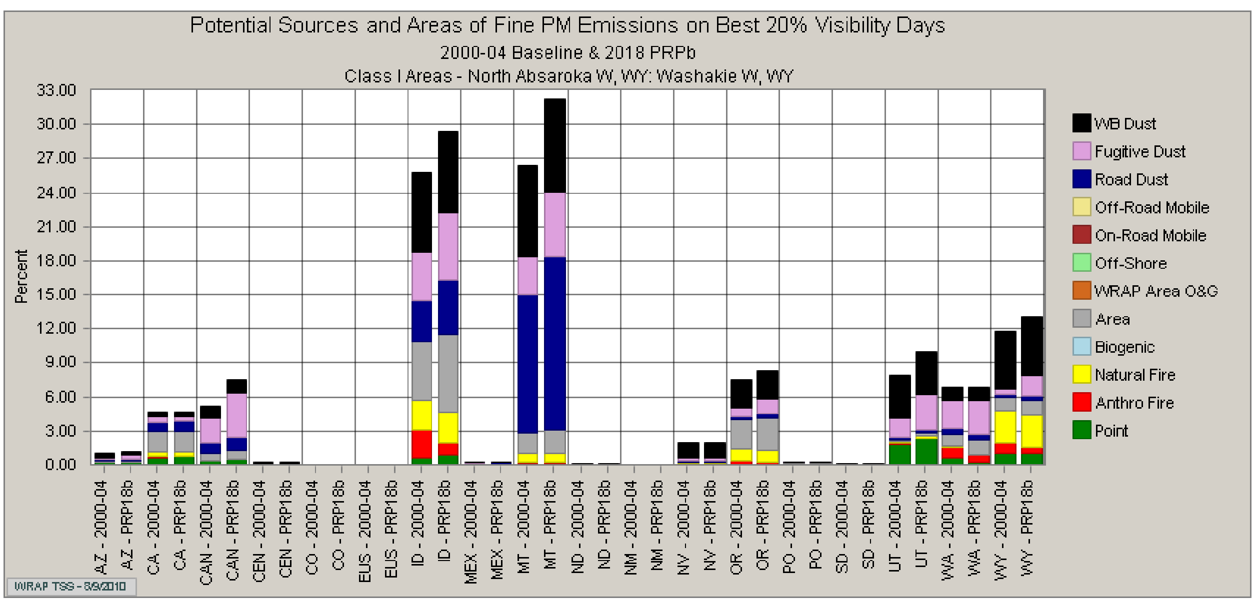


Figure 9-127 WEP Fine Particulate Matter at North Absaroka Best 20% Days

Coarse Particulate Matter at North Absaroka Wilderness Based on WEP

Figure 9-128 shows Idaho and Montana having almost equal expected impacts of coarse particulate, followed by Wyoming, on the 20% worst visibility days at North Absaroka Wilderness. Most states are showing expected increases in fugitive dust and road dust based on WEP modeling.

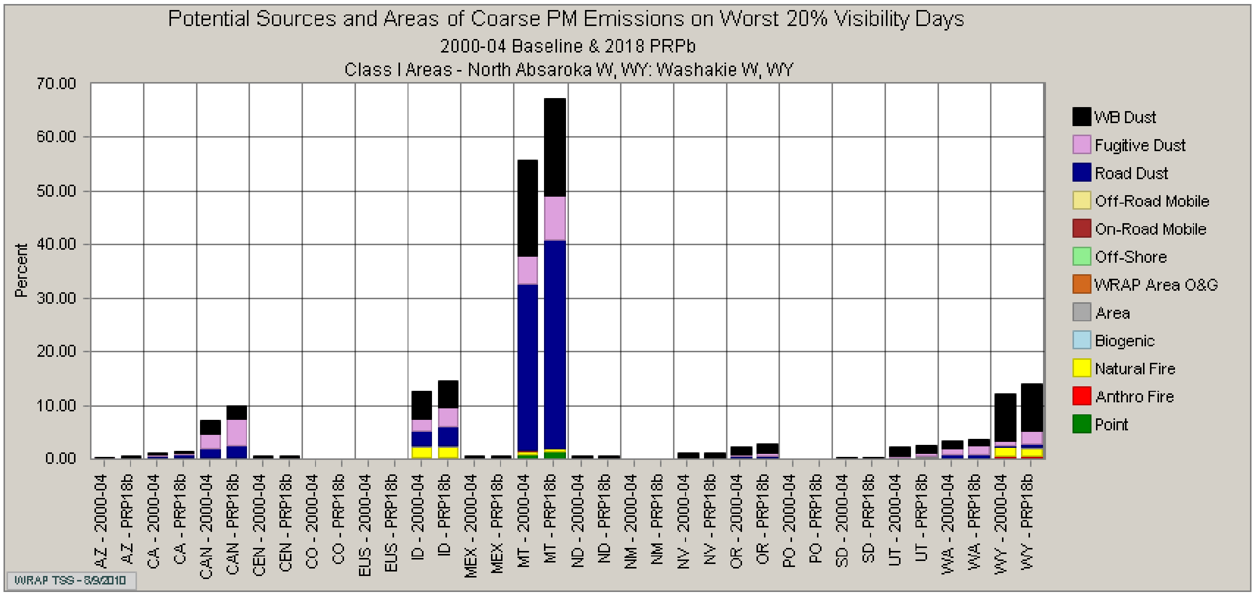


Figure 9-128 WEP Coarse Particulate Matter at North Absaroka Wilderness 20% Worst Days

Figure 9-129 is showing an increase in contributions from coarse particulate coming from WRAP states on the 20% best days are expected to increase in the future.

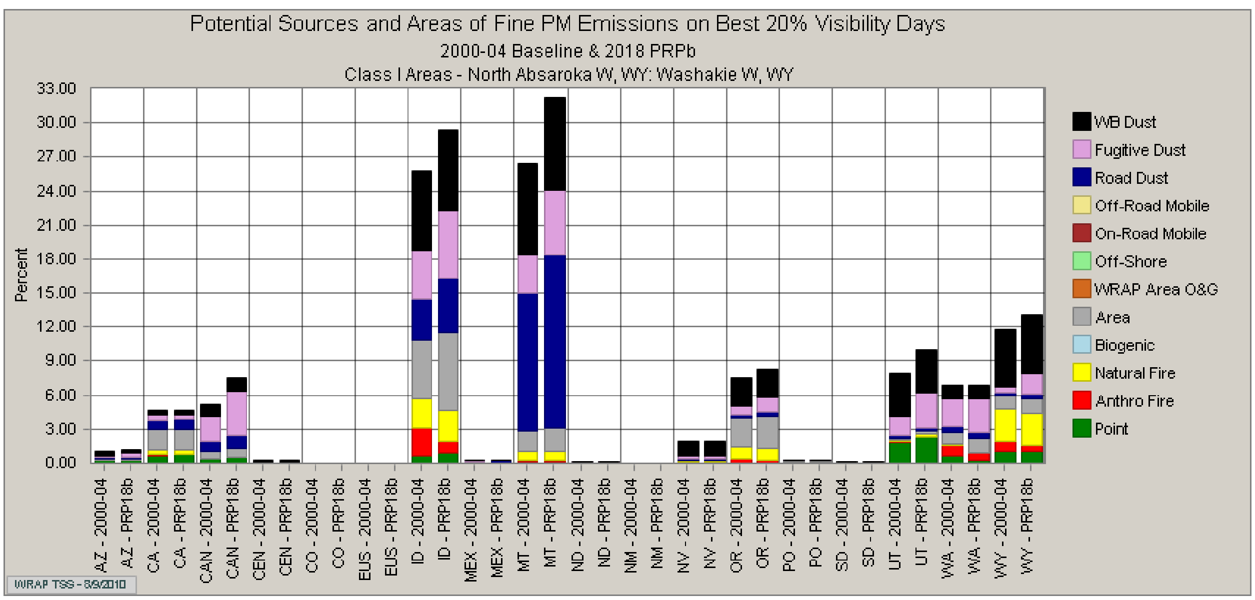


Figure 9-129 Coarse Particulate Matter at North Absaroka 20% Best Days

9.3.6 Bridger Wilderness and Fitzpatrick Wilderness Source Apportionment[11]

Sulfate at Bridger Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-130 show the WRAP states are only expected to contribute roughly half of the sulfate visibility impairment in Bridger Wilderness on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-130 shows Wyoming and then Idaho and Utah as the largest contributors of sulfate in Bridger Wilderness. Idaho is expected to contribute roughly 9% of the sulfate with only 7% coming from Idaho anthropogenic sources. The PSAT modeling shows a 24% increase coming from Idaho but this does not include the emissions reductions of roughly 9,000 tons per year expected from P4 Production (formerly Monsanto) in Southeast Idaho. Also, these estimates include the emissions from a once-anticipated EGU, as mentioned before, that had not yet been removed from the emissions inventory used for this modeling. It is expected Idaho's contribution will actually drop when these emissions reductions occur.

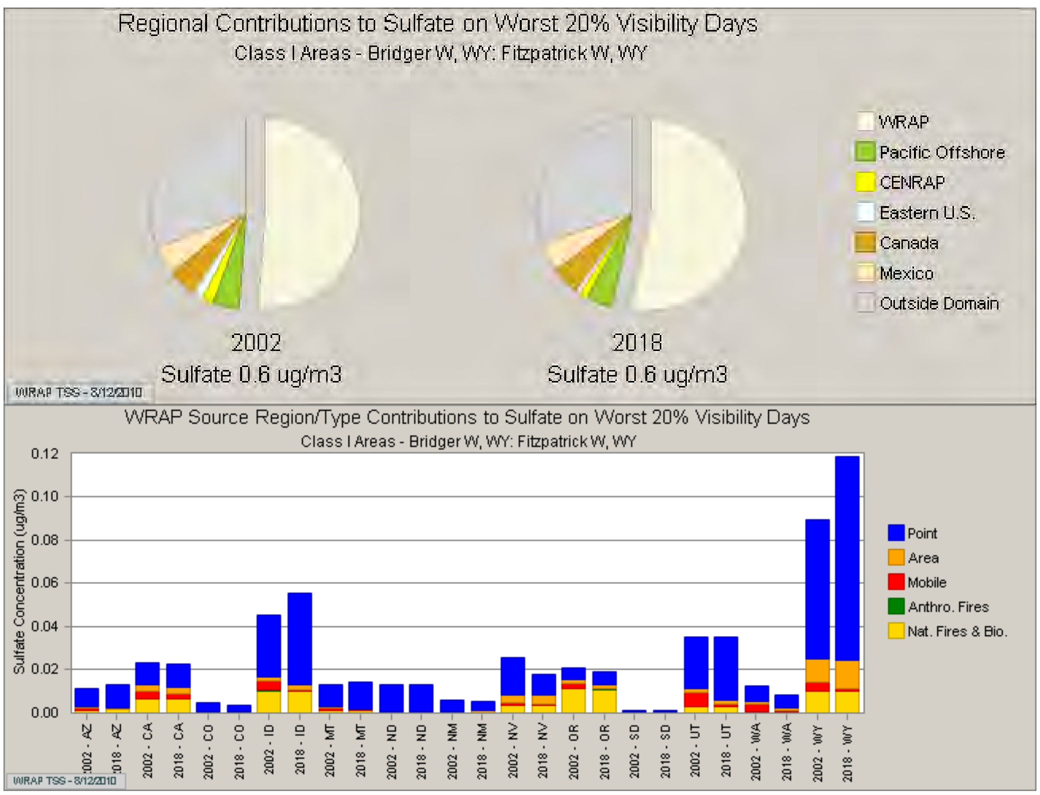


Figure 9-130 PSAT Sulfate Concentrations at Bridger Wilderness 20% Worst Days

11 Throughout the remainder of this section Bridger Wilderness, and Fitzpatrick Wilderness will be represented by the "Bridger Wilderness" since they all share the same IMPROVE monitoring site.

The graph in Figure 9-131 shows an expected decrease in emissions from Idaho point sources in 2018. Using WEP updated emissions inventory and back trajectories, Figure 9-131 shows sulfate emissions from point and mobile sources expected to decrease for Idaho and all other WRAP states.

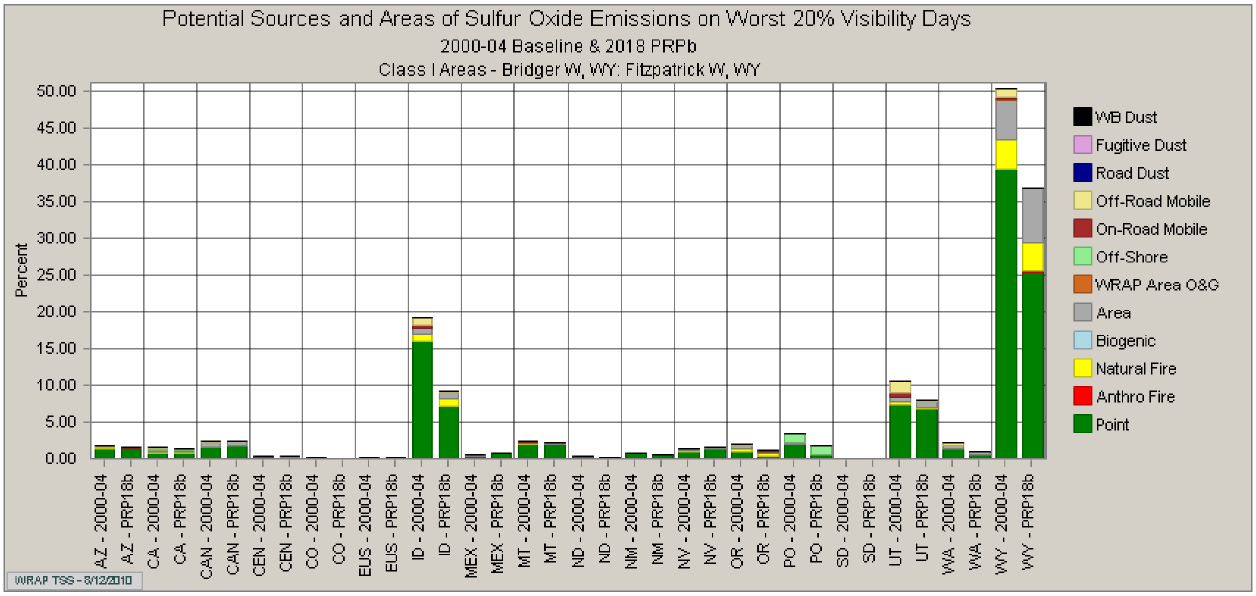


Figure 9-131 WEP Sulfate Concentrations at Bridger Wilderness 20% Worst Days

The PSAT results show an expected increase in visibility impairment form sulfate on the 20% best days at Bridger Wilderness. The updated emissions inventory used by the WEP shows an improvement in future sulfate visibility impacts on the best days. Figures 9-132 and 9-133 show the differences in expected visibility impacts based on using different emissions inventories.

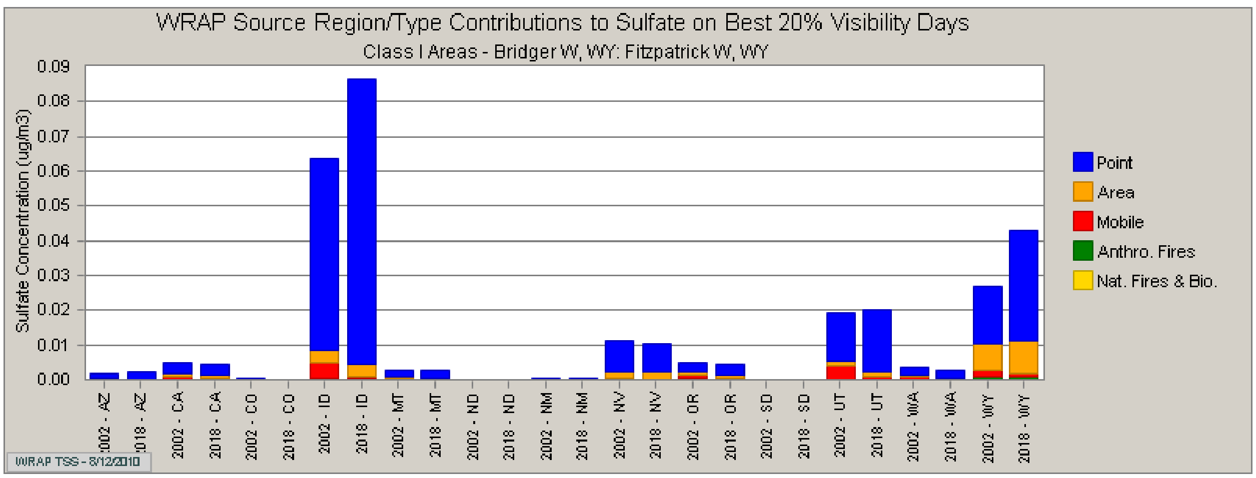


Figure 9-132 PSAT Sulfate Concentrations at Bridger Wilderness 20% Best Days

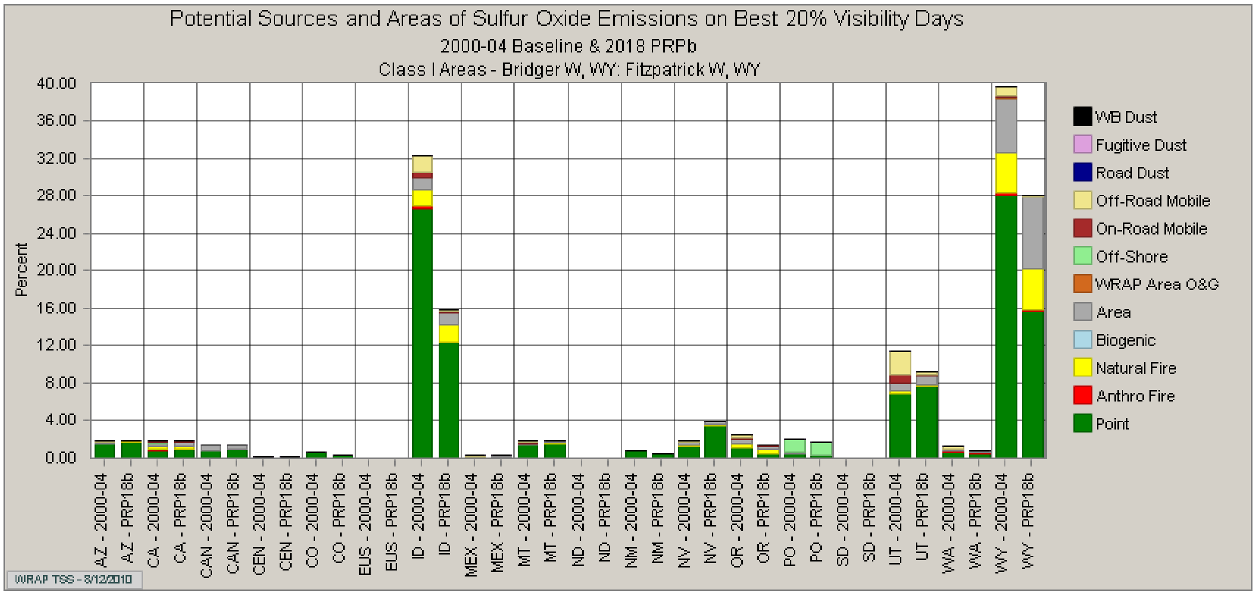


Figure 9-133 WEP Sulfate Concentrations at Bridger Wilderness 20% Best Days

Nitrate at Bridger Wilderness Based on PSAT Modeling

Figure 9-134 shows the WRAP States are expected to contribute roughly two thirds of the nitrates on the 20% worst days. As WRAP states reduce nitrate contributions over the first planning period ending in 2018, the contributions coming from outside the domain, Pacific offshore (shipping) and Canadian emissions, will have a greater impact. This will require regulator actions and negotiations outside the WRAP states' control.

Figure 9-134 also shows, Idaho's nitrate emissions are expected to decline by 35% over time primarily due to reductions in mobile emissions.

Because the point source contributions from Idaho are not as large as other categories, the contribution modeled from a once-anticipated EGU in Jerome County as mentioned above does not show such a significant impact. Overall, most WRAP states are expected to improve future visibility impairment due to nitrates on the 20% worst days in Bridger Wilderness.

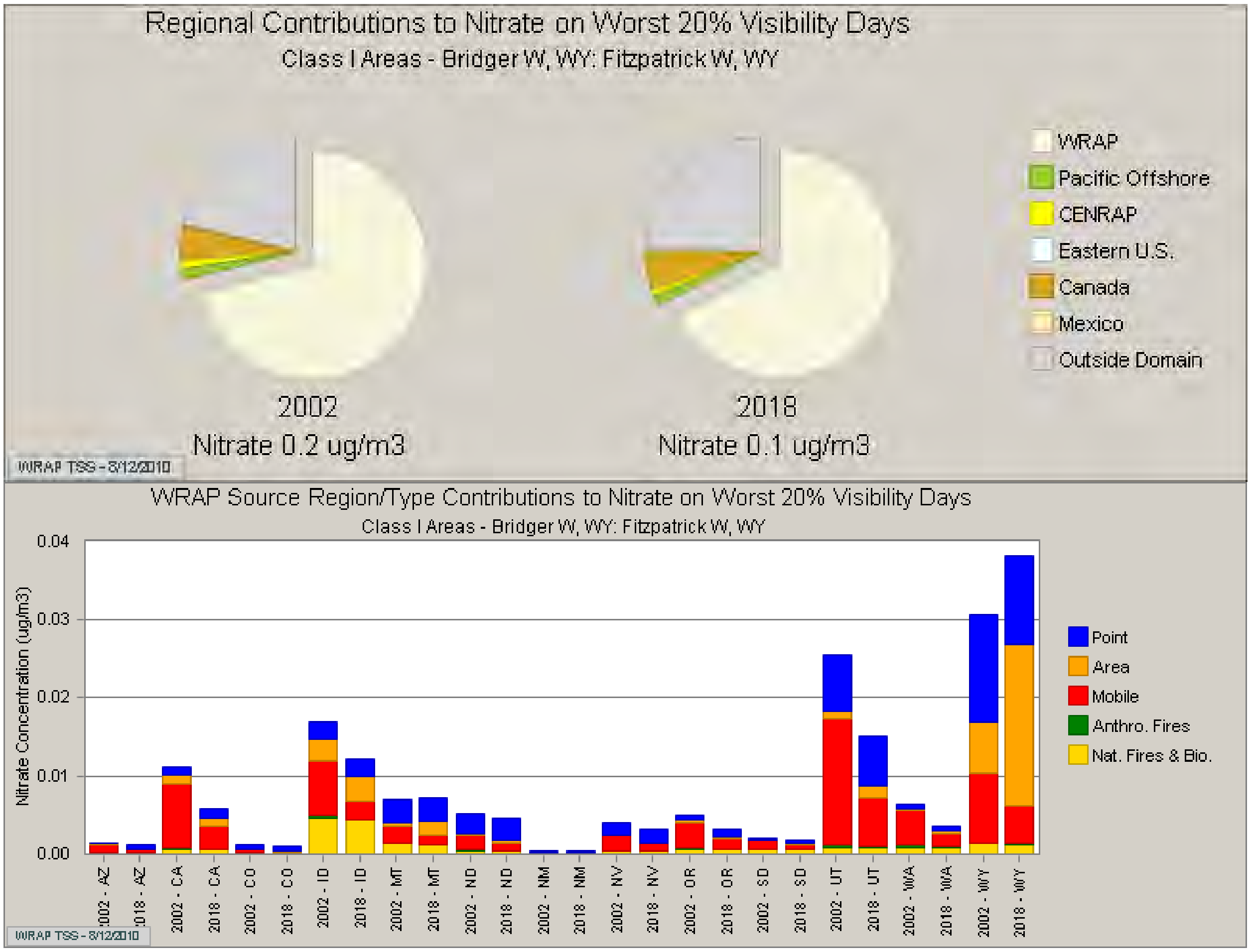


Figure 9-134 PSAT Nitrate Concentrations at Bridger Wilderness 20% Worst Days

Figure 9-135 shows most of the WRAP states are expected to improve the visibility impairment due to nitrates on the 20% best days in Bridger Wilderness.

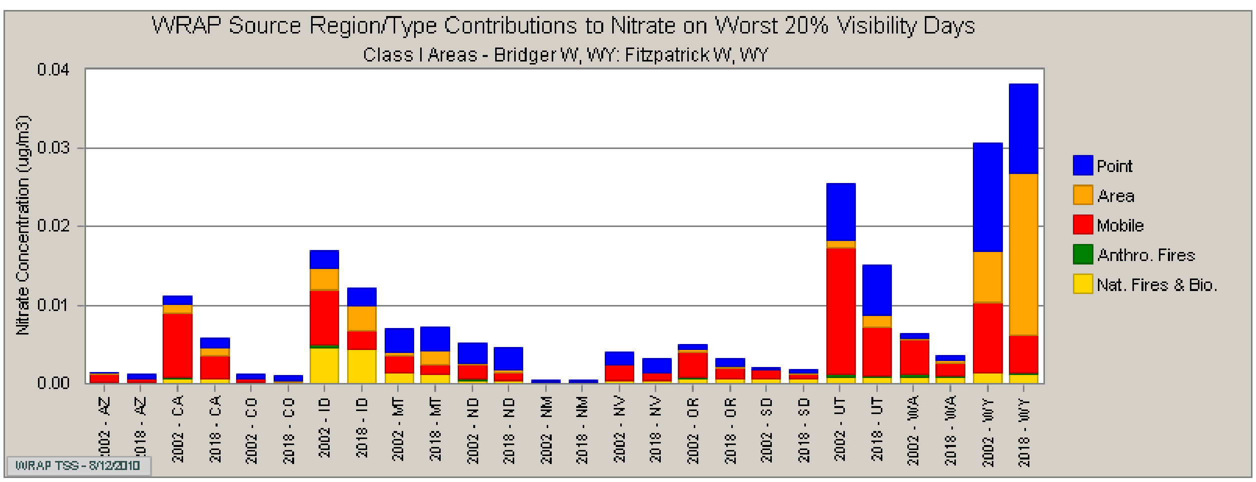


Figure 9-135 PSAT Nitrate Concentrations at Bridger Wilderness 20% Best Days

Primary Organic Aerosol at Bridger Wilderness Based on WEP

Figure 9-136 shows the preponderance of organic aerosol on the 20% worst days in Bridger Wilderness is coming from natural fire primarily from Wyoming. There are decreases anticipated from anthropogenic sources from most states but these are dwarfed by expected emissions from natural fire.

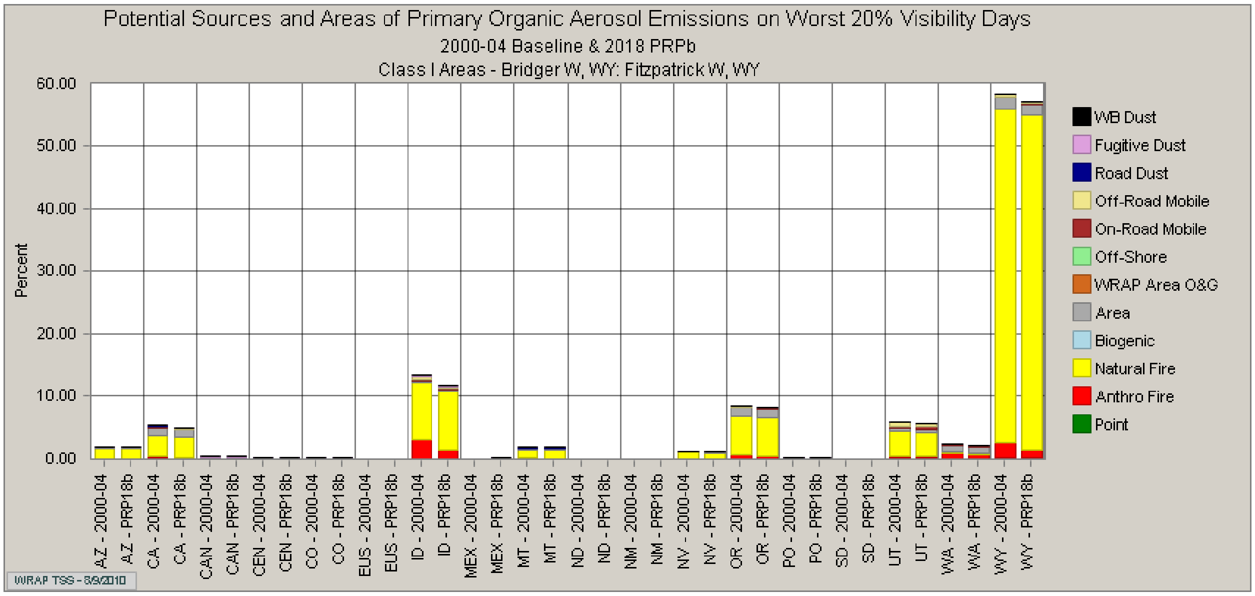


Figure 9-136 WEP Primary Organic Aerosol at Bridger Wilderness 20% Worst Days

Primary Organic Aerosol in Bridger Wilderness shows an overall improvement expected on the 20% best visibility days. Figure 9-137 shows an improvement on the best visibility days primarily coming from anthropogenic fire and better smoke management techniques anticipated in the future.

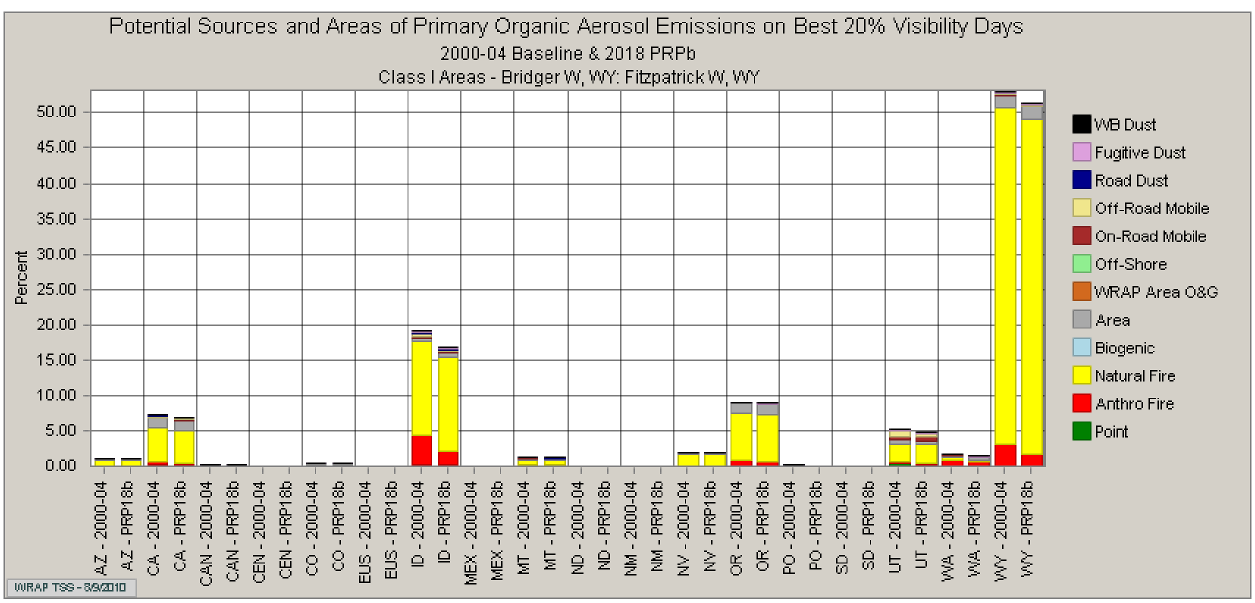


Figure 9-137 WEP Primary Organic Aerosol at Bridger Wilderness 20% Best Days

Elemental Carbon at Bridger Wilderness Based on WEP

Figure 9-138 shows natural fire from Wyoming is the largest expected contributor to elemental carbon visibility impairment on the 20% worst visibility days in Bridger Wilderness. They analysis shows all WRAP states are expected to make improvements to visibility impairments attributed to elemental carbon.

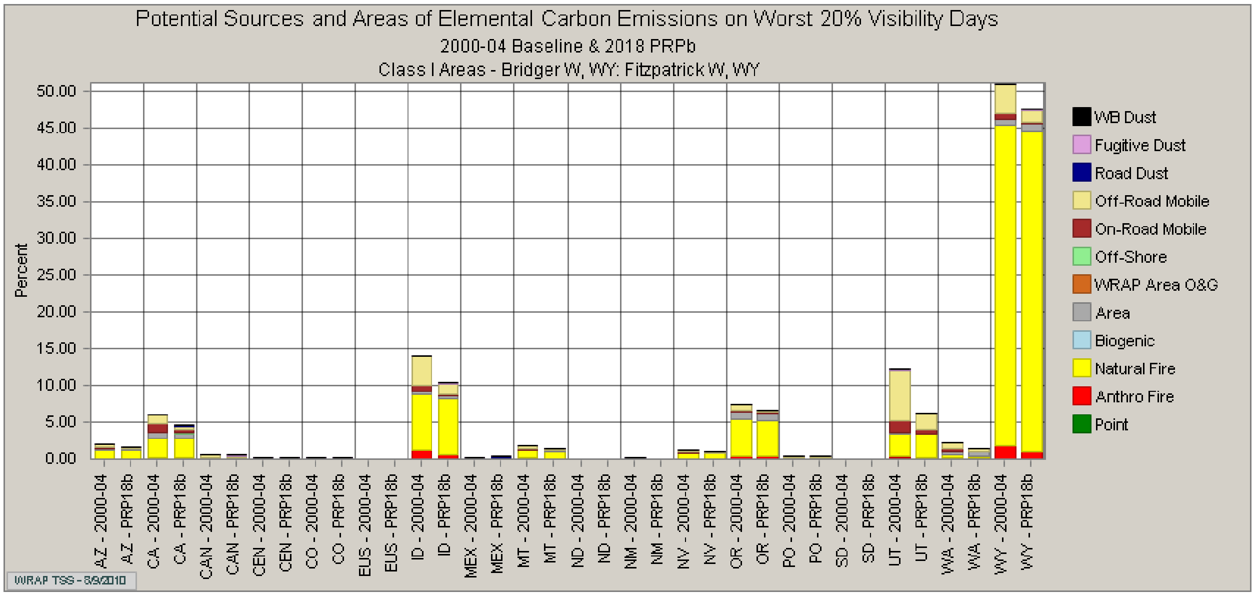


Figure 9-138 WEP Elemental Carbon at Bridger Wilderness 20% Worst Days

Figure 9-139 is showing all WRAP states with expected improvement to elemental carbon visibility impairment on the 20% best days. Most of the improvement is expected to come from changes in smoke management and impacts from anthropogenic fire.

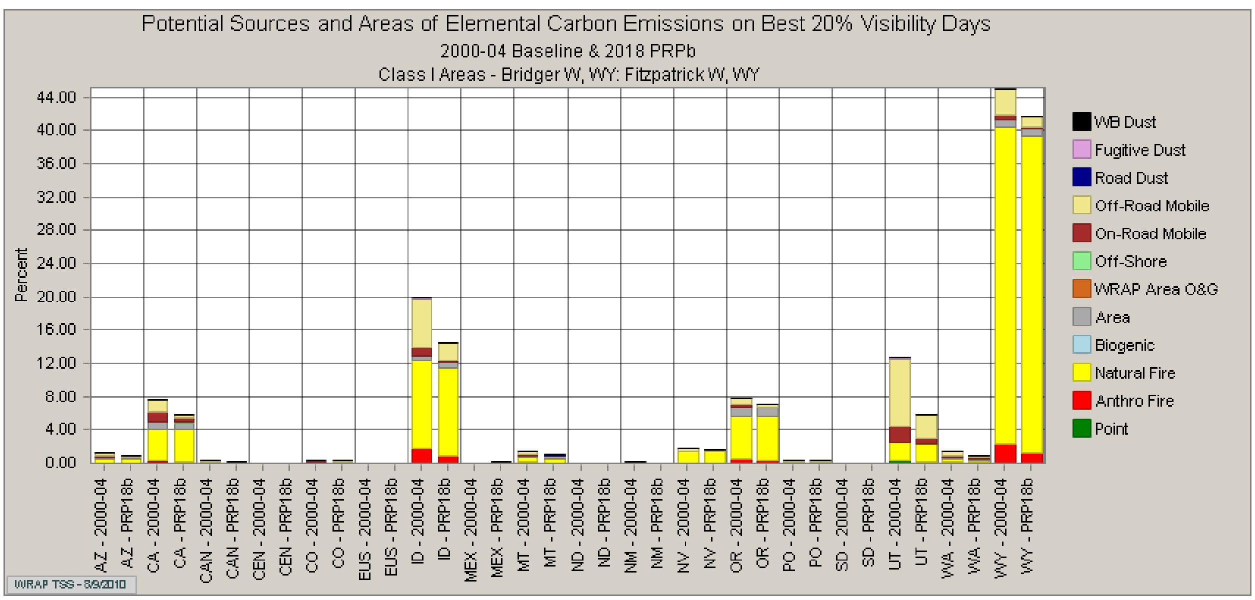


Figure 9-139 WEP Elemental Carbon at Bridger Wilderness 20% Best Days

Fine Particulate Matter at Bridger Based on WEP

Figure 9-140 shows Wyoming and then Idaho as the greatest expected contributors of fine particulate on the 20% worst visibility days in Bridger Wilderness. Idaho and Wyoming are showing expected improvements in future contributions from anthropogenic fire but increases in area source emissions, road dust, and fugitive dust are expected to cause overall future increases.

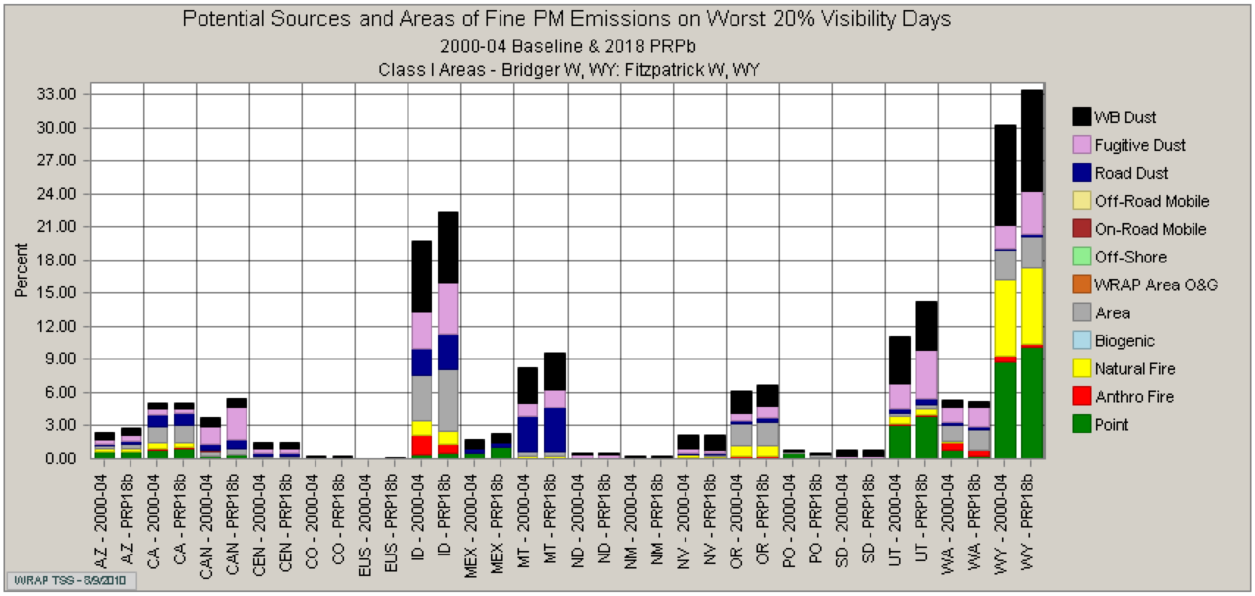


Figure 9-140 WEP Fine Particulate Matter at Bridger Wilderness Worst 20% Days

Figure 9-141 is showing similar visibility impacts expected from fine particulate on the 20% best days in Bridger Wilderness. Future increases in area source emissions, road dust, and fugitive dust are expected to outpace improvements from anthropogenic fire.

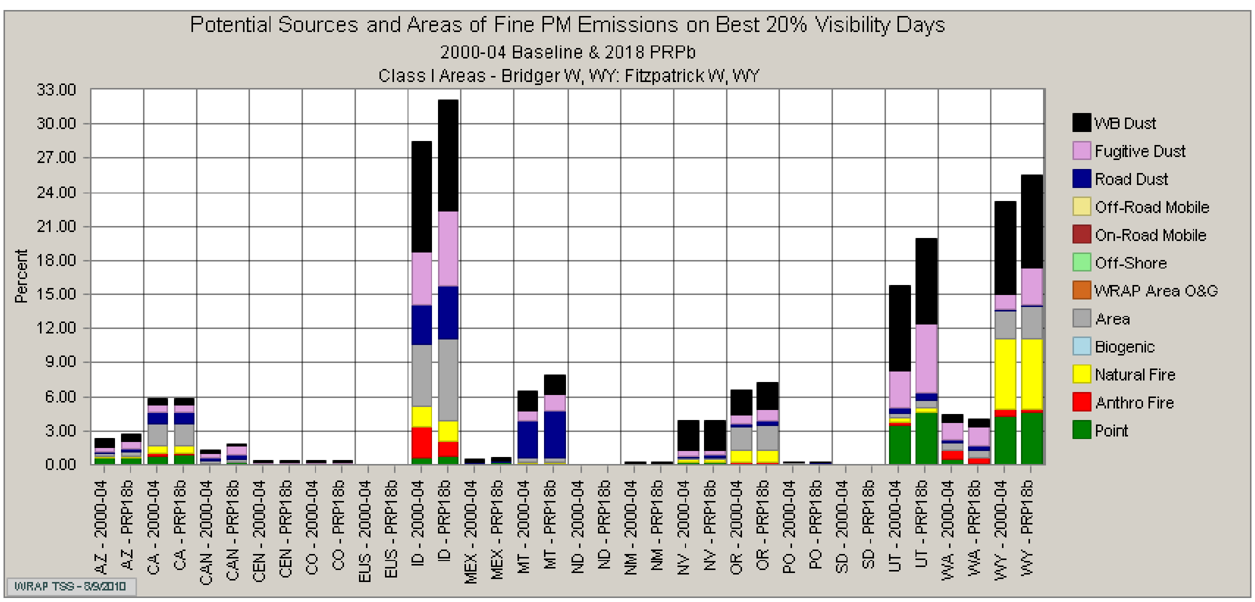


Figure 9-141 WEP Fine Particulate Matter at Bridger Wilderness Best 20% Days

Coarse Particulate Matter at Bridger Wilderness Based on WEP

Figure 9-142 shows Idaho and then Montana as having the greatest impacts of coarse particulate matter on the 20% worst visibility days at Bridger Wilderness. Most states are showing expected increases in fugitive dust and road dust based on WEP modeling.

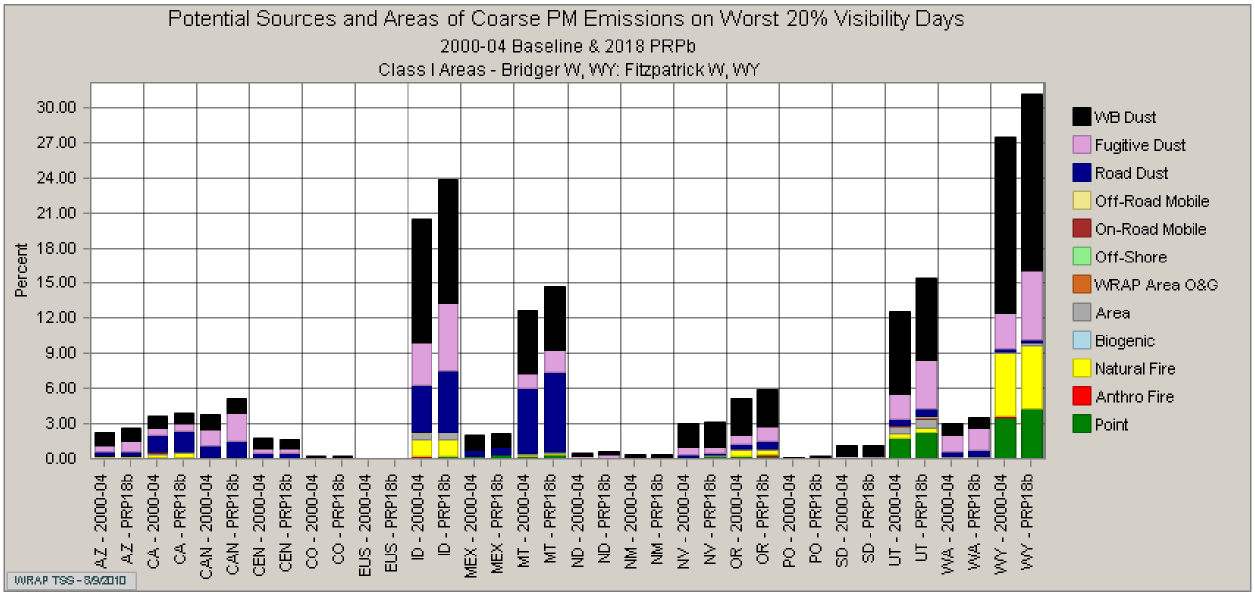


Figure 9-142 WEP Coarse Particulate Matter at Bridger Wilderness 20% Worst Days

Figure 9-143 shows an expected increase in contributions from coarse particulate coming from WRAP states on the 20% best days.

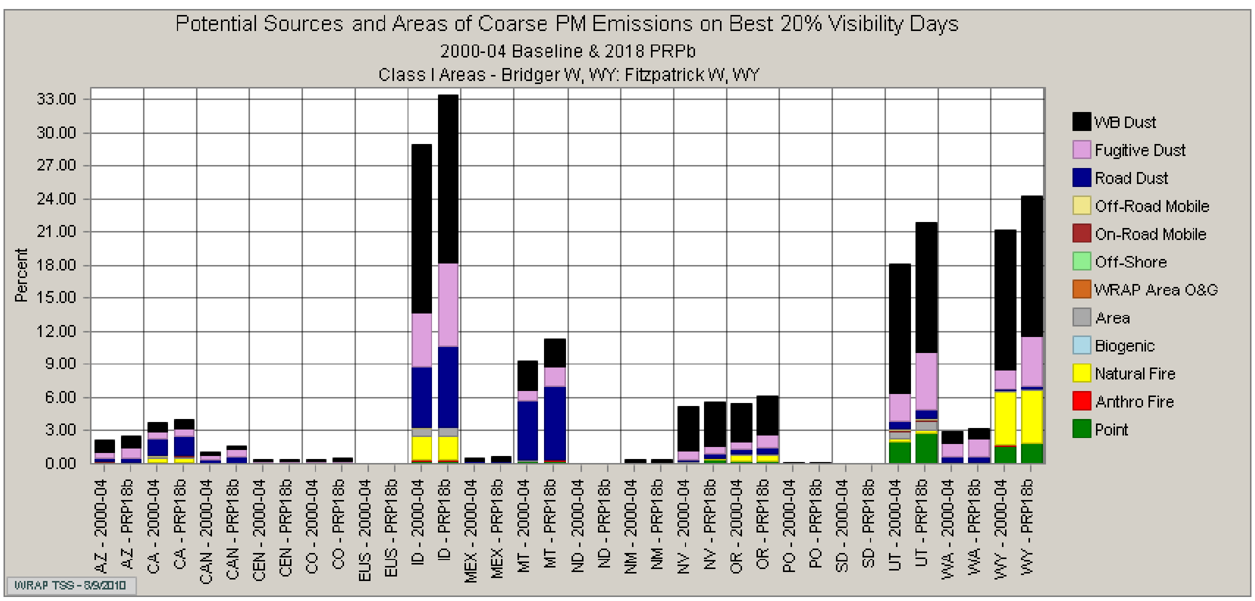


Figure 9-143 Coarse Particulate Matter at Bridger Wilderness 20% Best Days

9.3.7 Eagle Cap Wilderness Source Apportionment[12]

Sulfate at Eagle Cap Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-144 show the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-144 shows Washington as the largest expected contributor of sulfate at Eagle Cap Wilderness with Oregon second and Idaho third. Overall, the concentration levels attributed to all the WRAP States are expected to be fairly low and decreasing over time due to reductions primarily from mobile sources. Idaho is showing an overall reduction of roughly 8% over the first planning period. The projected reductions do not include emissions reductions expected from all the subject-to-BART sources.

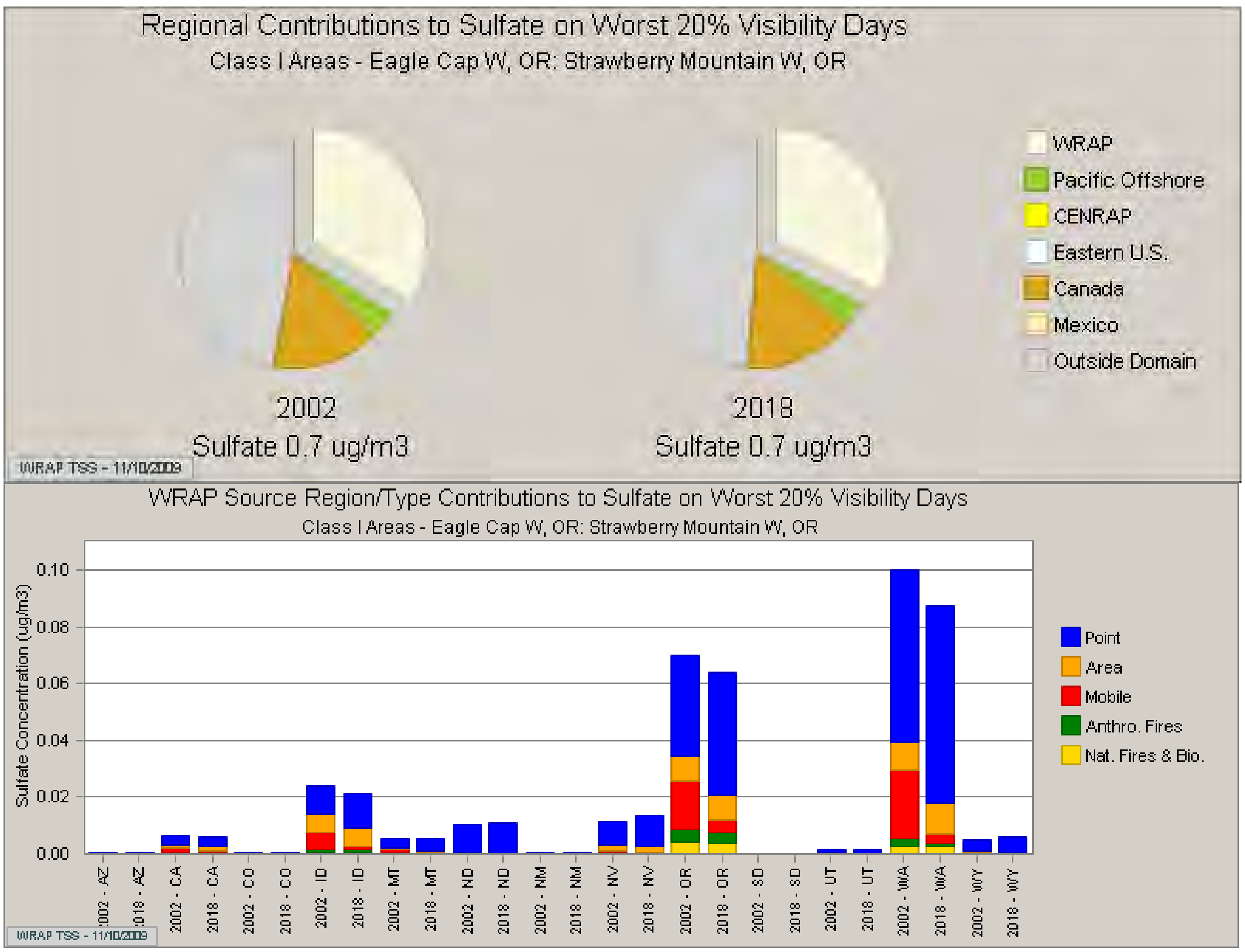


Figure 9-144 PSAT Sulfate Concentrations at Eagle Cap Wilderness 20% Worst Days

---

12 Throughout the remainder of this document the Eagle Cap Wilderness and Strawberry Mountain Wilderness will be represented by the "Eagle Cap Wilderness" since they all share the same monitoring site.

Figure 9-145 shows an overall expected improvement in sulfate concentrations attributed to most WRAP states with the exception of a very slight increase from Nevada. Sulfate concentrations on the 20% best day are expected to drop during the first planning period.

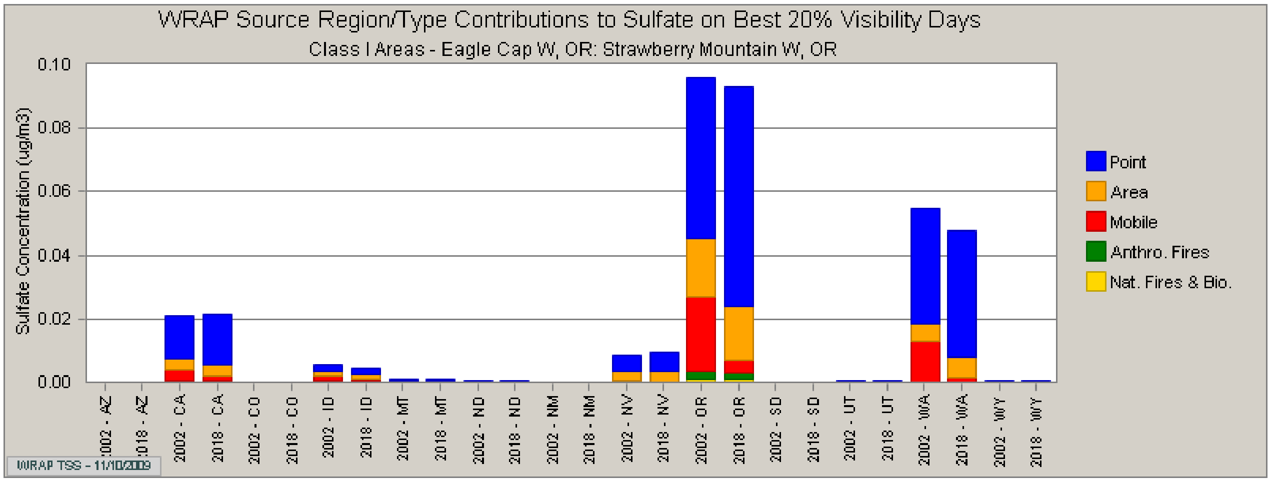


Figure 9-145 PSAT Sulfate Concentrations at Eagle Cap Wilderness 20% Best days

Nitrate at Eagle Cap Wilderness Based on PSAT Modeling

Figure 9-146 shows that overall concentrations of nitrates are expected to be higher than sulfates with a greater concentration coming from WRAP states. This is important to note because higher concentrations and higher contributions from WRAP states carries the opportunity for more control over future visibility improvements.

It also shows the expected highest contribution of nitrates is coming from Oregon followed by Idaho then closely by Washington. It is believed Idaho's higher expected concentrations would occur during high stagnation periods where air mass is slowly moving from the Treasure Valley and Snake River plan toward Hells Canyon and Eagle Cap Wilderness. This is explained in the Best Available Retrofit Technology Evaluation discussion in Chapter 10. During the first planning period, Idaho is expecting to reduce nitrate concentration contributions to Eagle Cap Wilderness by roughly 22%. See Appendix E (Eagle Cap Wilderness) for details.

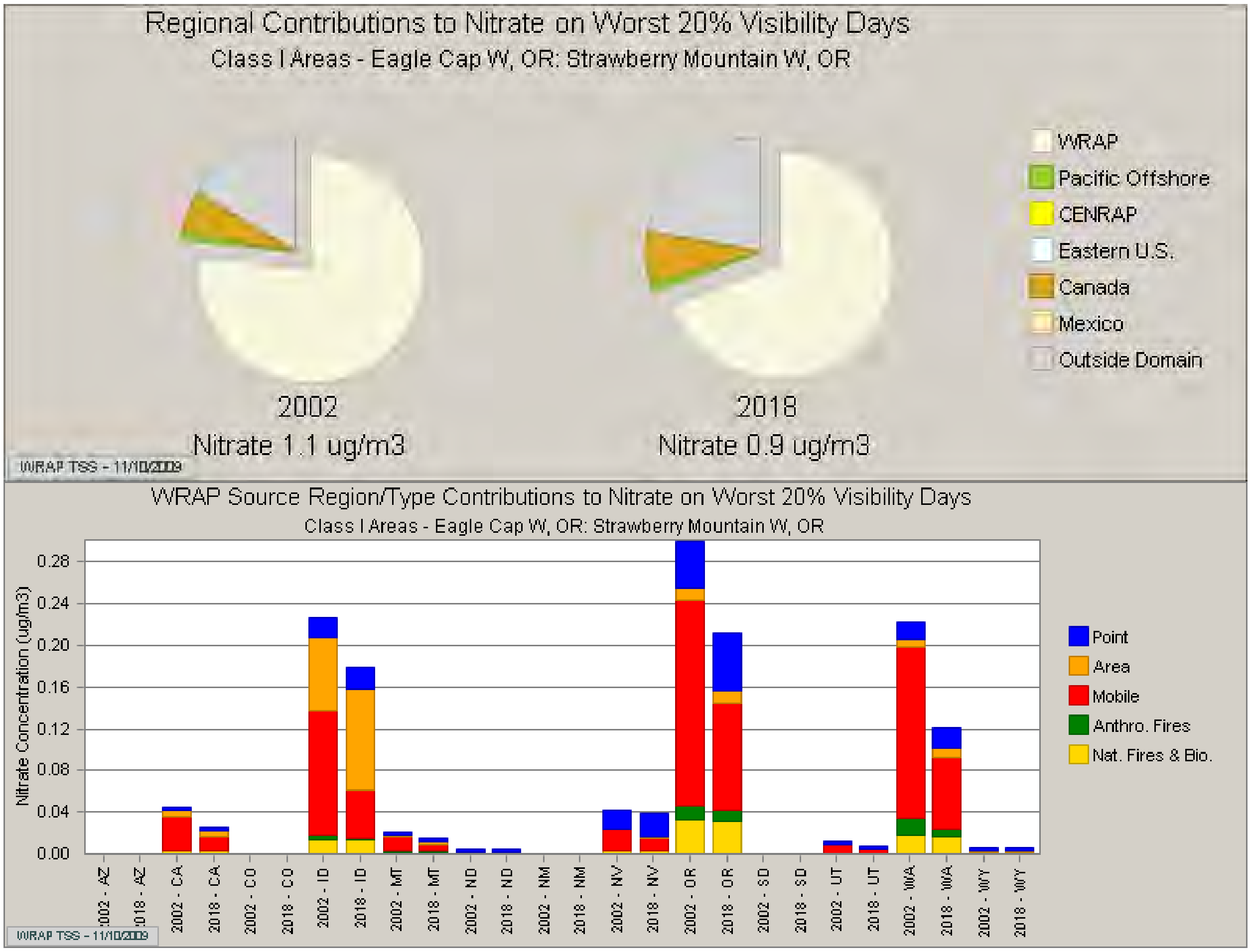


Figure 9-146 PSAT Nitrate Concentrations at Eagle Cap Wilderness 20% Worst Days

Figure 9-147 shows an expected decrease in nitrate concentrations from all WRAP states at Eagle Cap Wilderness on the 20% best visibility days.

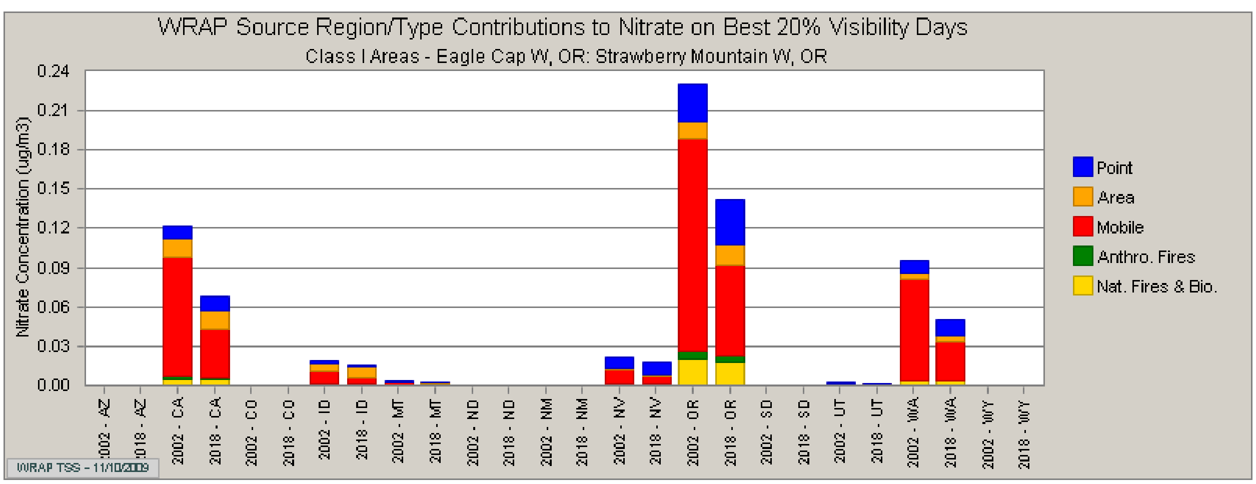


Figure 9-147 PSAT Nitrate Concentrations at Eagle Cap Wilderness 20% Best Days

Primary Organic Aerosol at Eagle Cap Wilderness Based on WEP

For the 20% worst visibility days at Eagle Cap Wilderness, Idaho is showing a minimal expected contribution of primary organic aerosol. Idaho's overall contribution is expected to decline over time due to reductions from anthropogenic fire as shown in figure 9-148. Oregon is showing a larger expected impact with similar reductions over time.

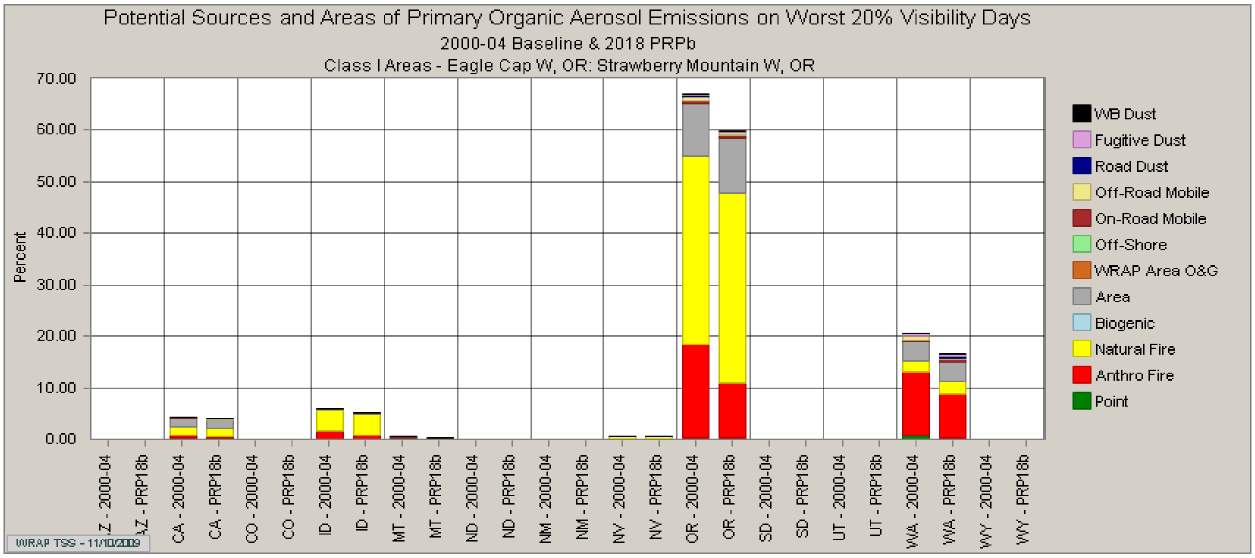


Figure 9-148 WEP Primary Organic Aerosol at Eagle Cap Wilderness 20% Worst Days

Figure 9-149 showing expected improvements in primary organic aerosols from all WRAP states on the 20% best visibility days.

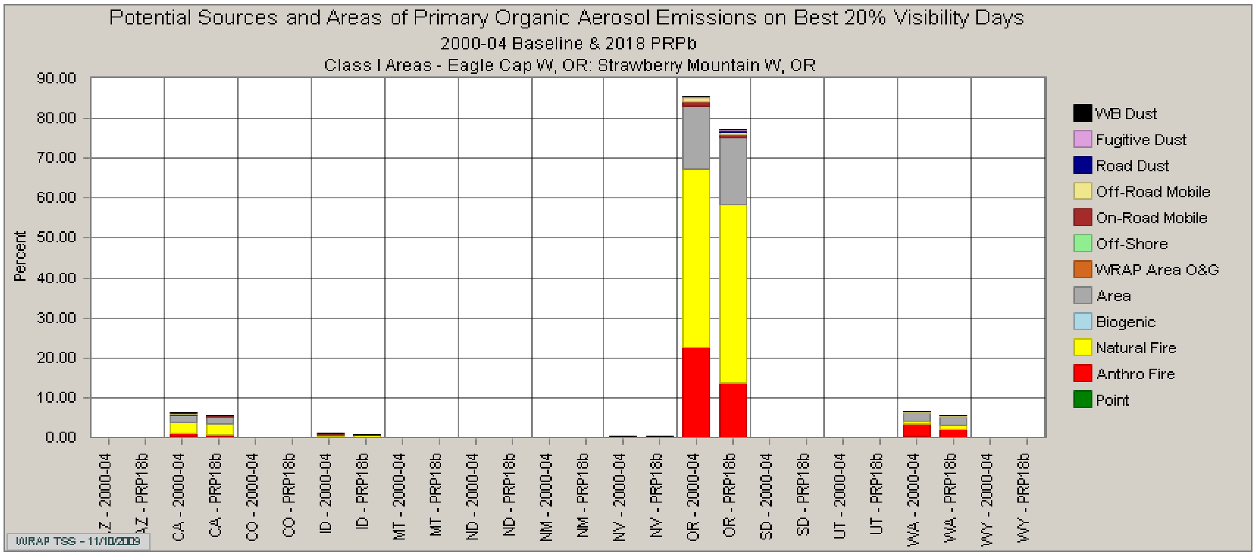


Figure 9-149 WEP Primary Organic Aerosol at Eagle Cap Wilderness20% Best Days

Elemental Carbon at Eagle Cap Wilderness Based on WEP

For the 20% worst visibility days at Eagle Cap, Idaho shows a minimal expected contribution of elemental carbon. Idaho's overall elemental carbon contribution is declining due to reductions from off-road mobile and anthropogenic fire as shown in figure 9-150. Oregon show greater expected impact but similar trends.

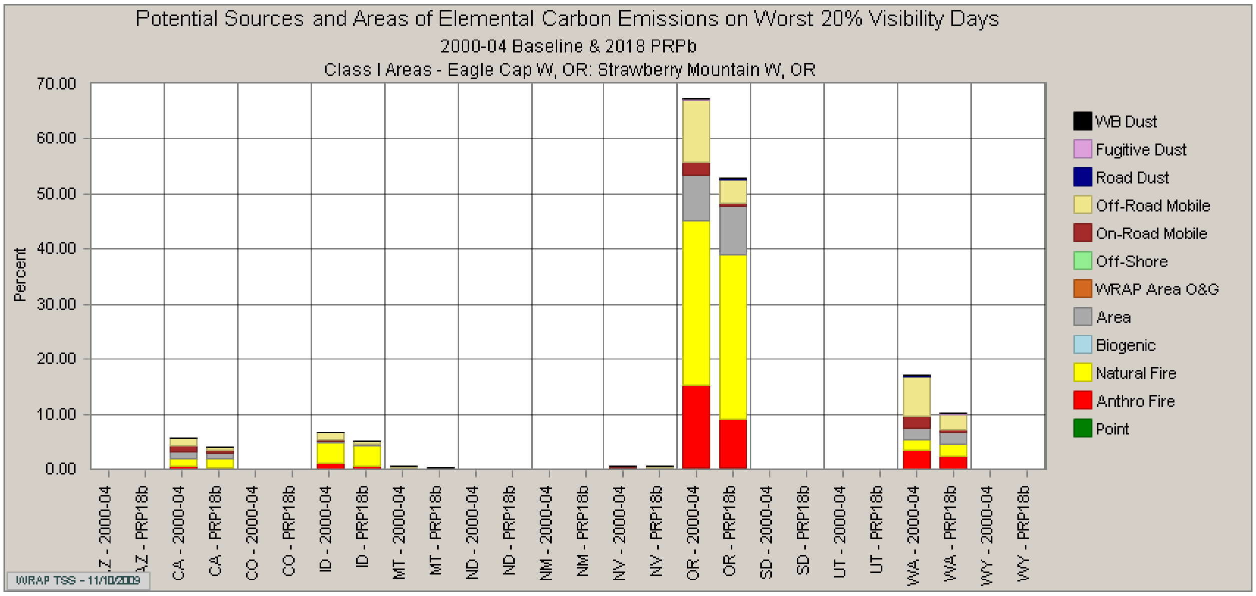


Figure 9-150 WEP Elemental Carbon at Eagle Cap Wilderness 20% Worst Days

Figure 9-151 shows expected improvements in elemental carbon from all WRAP states on the 20% best visibility days at Eagle Cap Wilderness.

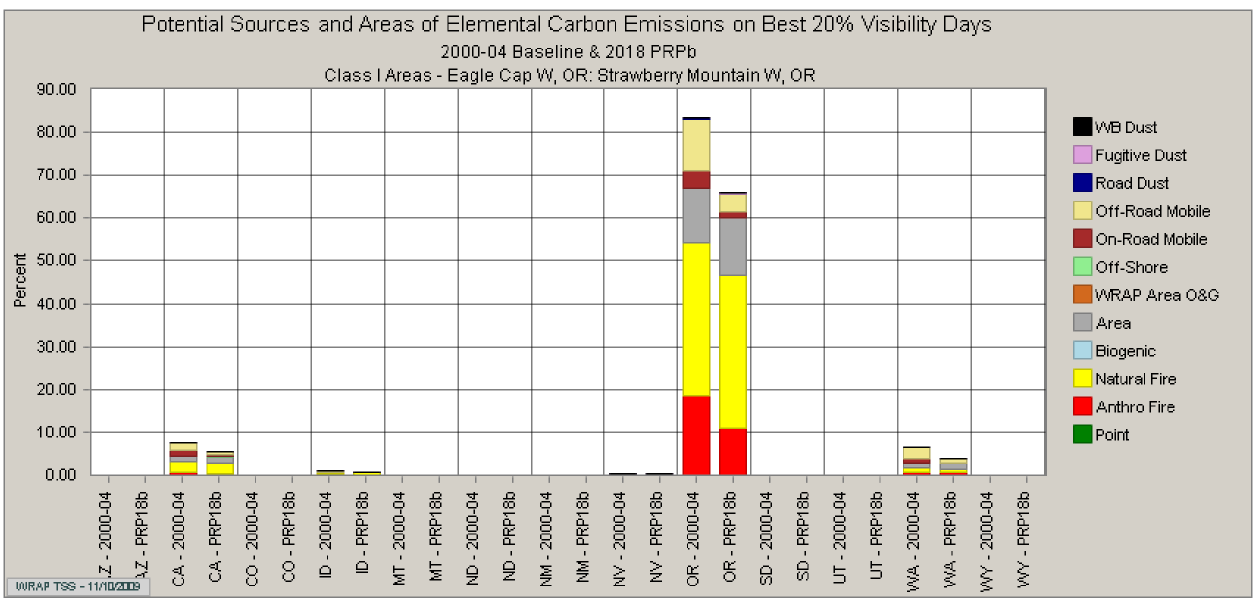


Figure 9-151 WEP Elemental Carbon at Eagle Cap Wilderness 20% Best Days

Fine Particulate Matter at Eagle Cap Wilderness Based on WEP

Figure 9-152 shows Oregon followed by Washington as the largest expected contributors of fine particulate matter to Eagle Cap Wilderness on the 20% worst visibility days. Idaho's expected contribution of fine particulate is very small but expected to grow slightly in the future due to increases in area sources and road dust.

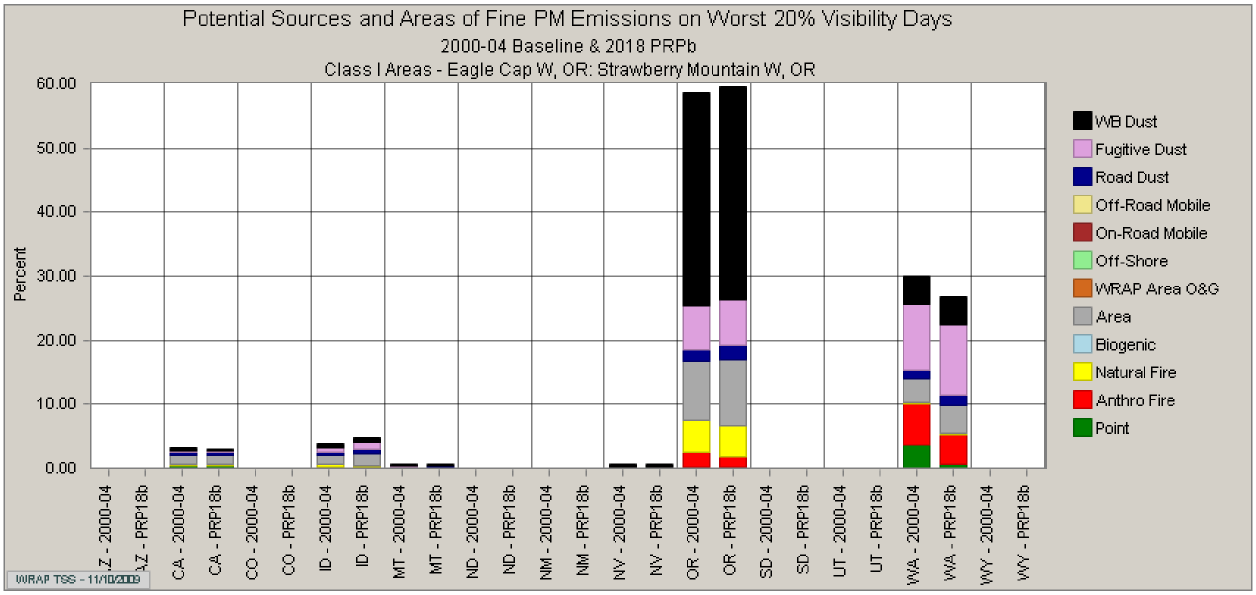


Figure 9-152 WEP Fine Particulate Matter at Eagle Cap Wilderness Worst 20% Days

On the 20% best visibility days at Eagle Cap Wilderness area, Figure 9-153 is showing increases in contributions from Oregon and decreases from Washington. Idaho's expected contribution of fine particulate on the 20% best days is very minimal.

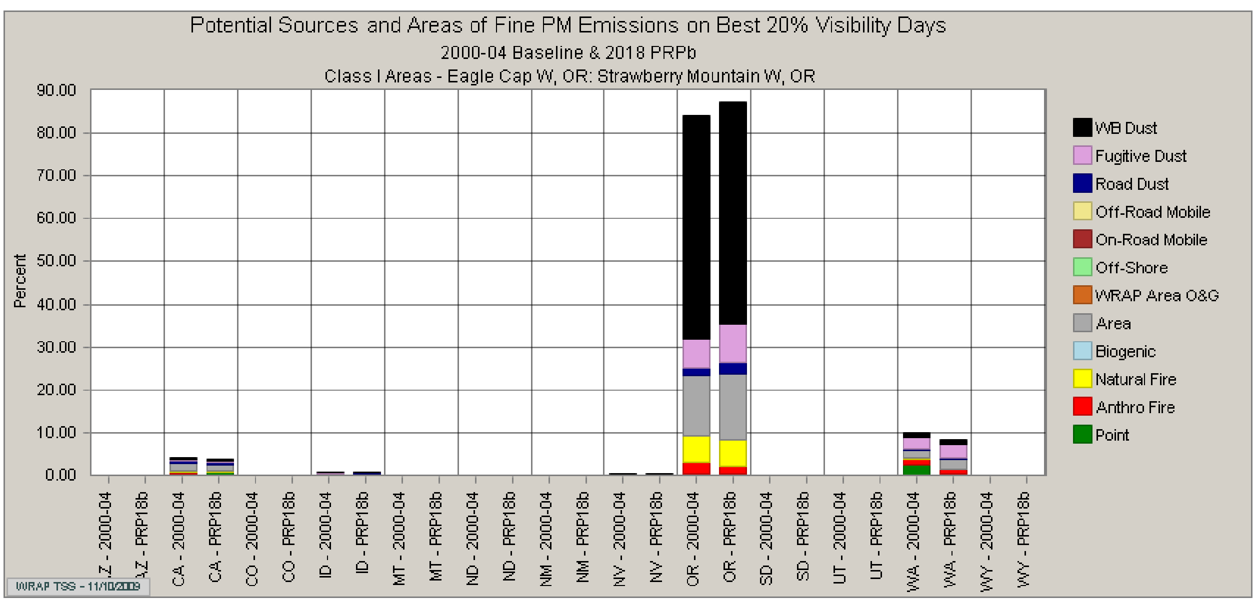


Figure 9-153 WEP Fine Particulate Matter at Eagle Cap Wilderness Best 20% Days

Coarse Particulate Matter at Eagle Cap Wilderness Based on WEP

Figure 9-154 is showing the largest impact from coarse particulate on the 20% worst visibility days is expected to come from Oregon, followed by Washington and then Idaho. Oregon is expecting future increases in fugitive dust and road dust. Washington is showing future increases in fugitive dust visibility impacts.

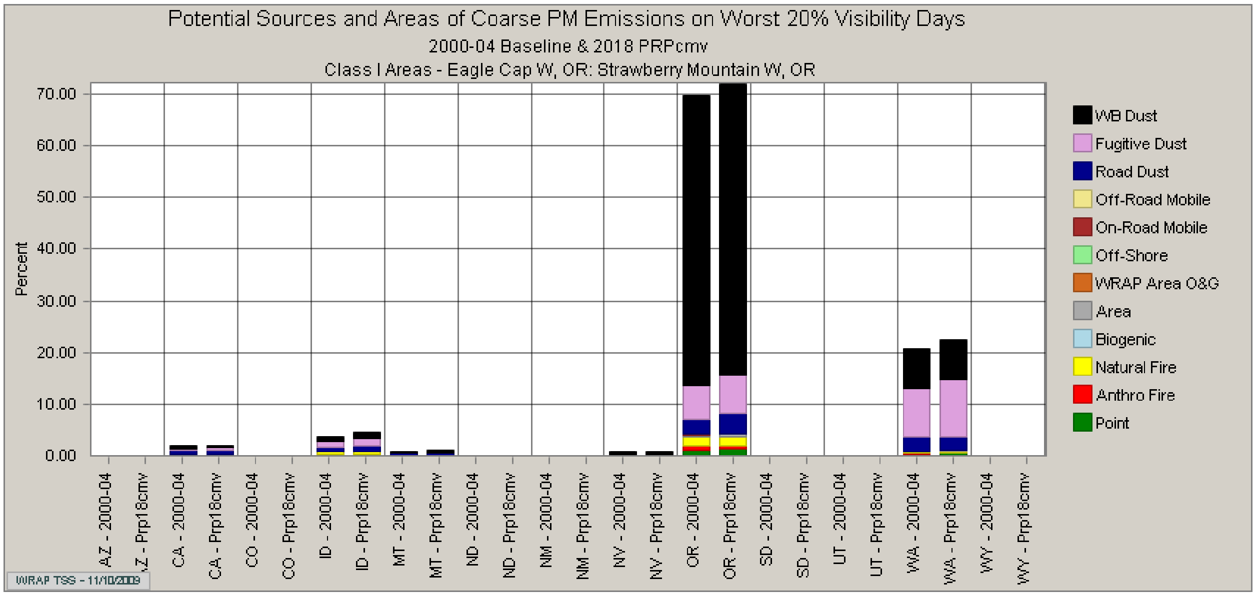


Figure 9-154 WEP Coarse Particulate Matter at Eagle Cap Wilderness 20% Worst Days

During the 20% best visibility days at Eagle Cap Wilderness, the air mass is primarily expected to come from the west as shown by the change in states' contributions with Oregon showing the greatest impact followed by Washington. Figure 9-155 shows Oregon is expecting increases in fugitive dust and road dust impacts. Washington is also expecting to have slight increases in fugitive dust. Idaho's expected impact is very minimal.

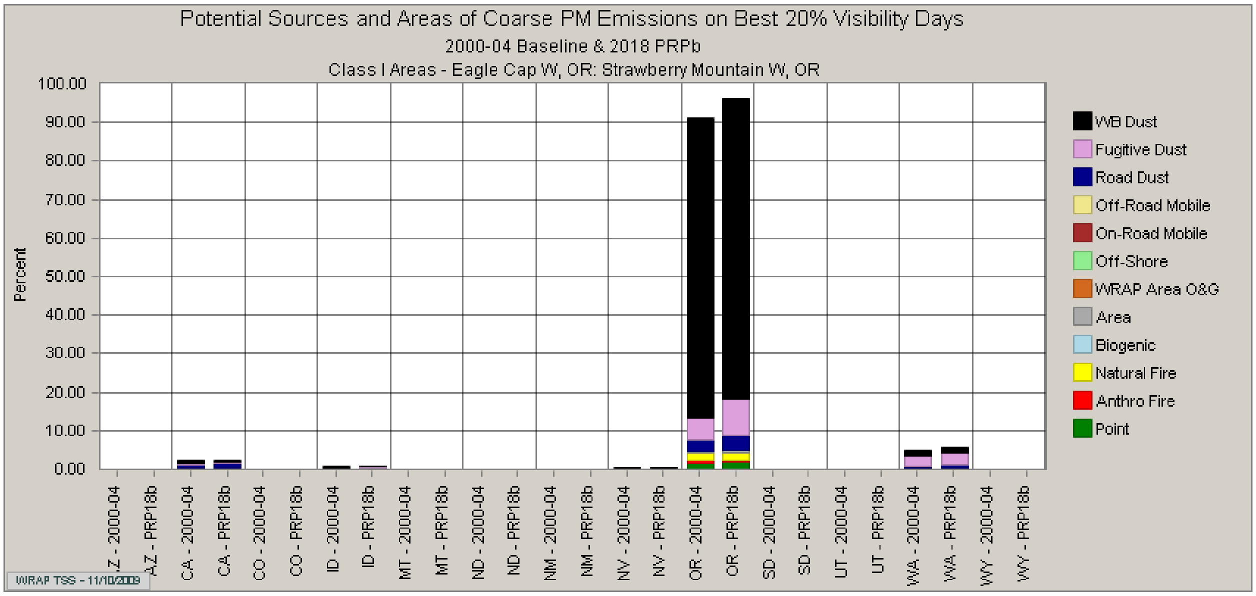


Figure 9-155 WEP Coarse Particulate Matter at Eagle Cap Wilderness20% Best Days

9.3.8 Jarbidge Wilderness Source Apportionment

Sulfate at Jarbidge Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-156 shows the WRAP states are only expected to contribute roughly a third of the visibility impairment on the 20% worst days. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-156 shows Idaho as the largest expected contributor of sulfate at Jarbidge Wilderness. Overall, the concentration levels attributed to individual WRAP states is relatively low. Idaho is showing an overall contribution of roughly 10% in 2018. As previously mentioned, the emissions from a once-anticipated EGU in Jerome County were included but because the plant is unlikely to be built, those emissions were removed from later emissions inventories.

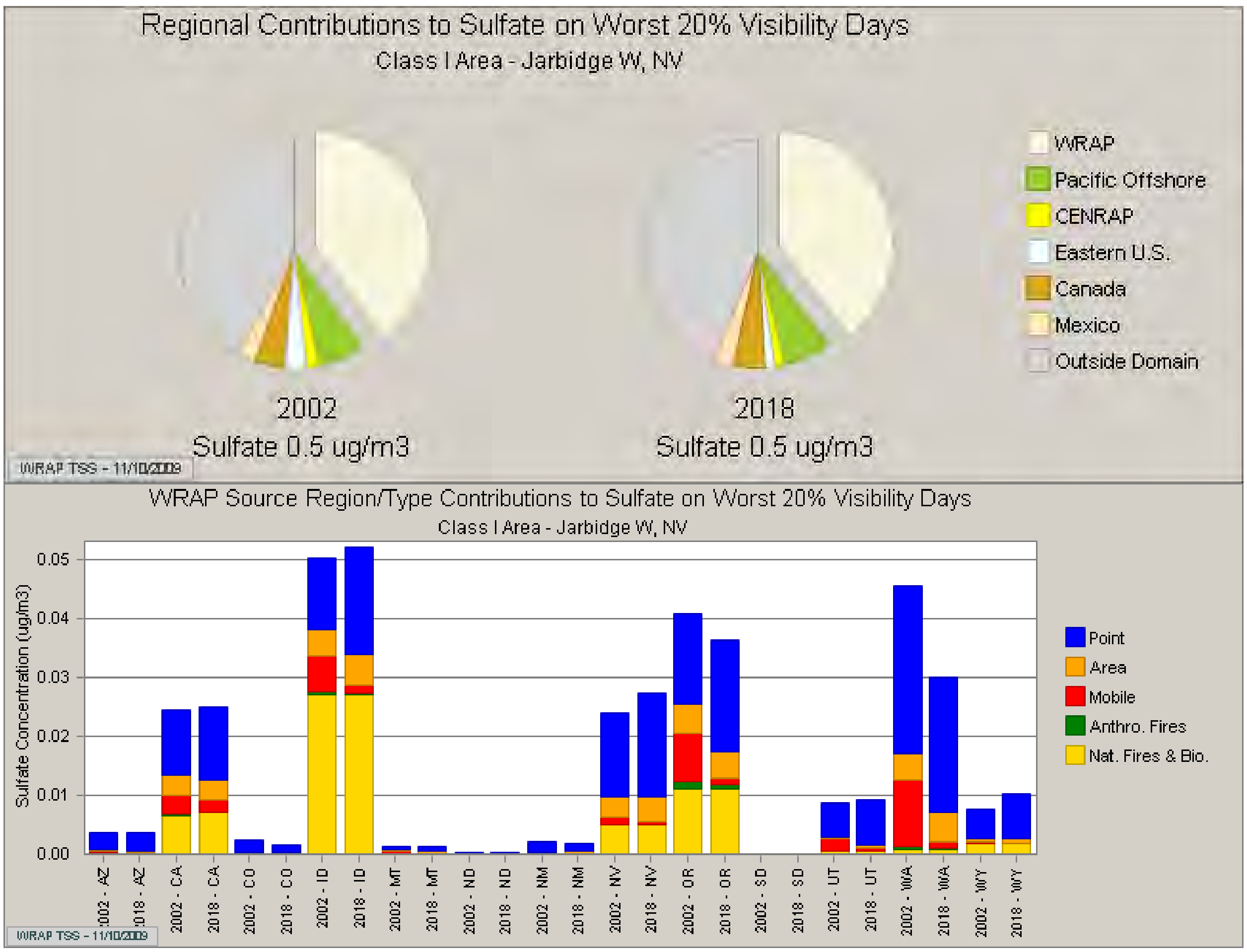


Figure 9-156 PSAT Sulfate Concentrations at Jarbidge Wilderness 20% Worst Days

Since we know it is highly unlikely that an EGU will be built in Idaho during the first planning period, and the updated emissions inventory is showing a reduction in future sulfate coming from point sources, actual sulfate concentrations coming from Idaho should be decreasing over time and not increasing as shown in the graphics. As shown in figure 9-157, the WEP analysis depicts roughly a 6% expected reduction in sulfates coming from Idaho.

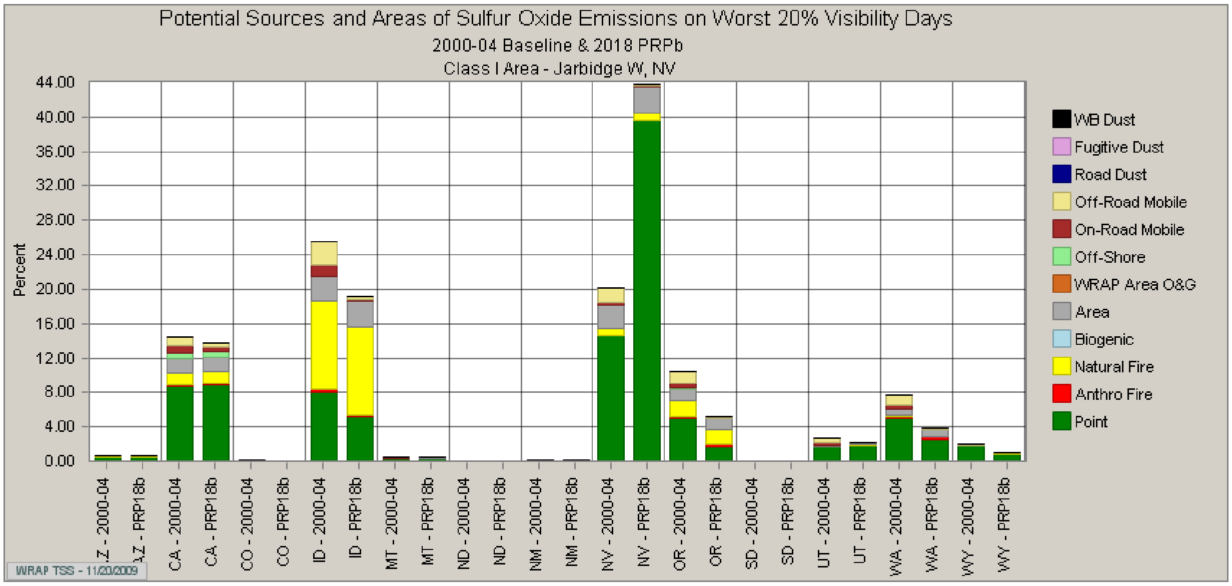


Figure 9-157 WEP Sulfate at Jarbidge Wilderness 20% Worst Days

Figure 9-158 shows very low concentrations of sulfate expected to come from individual WRAP states during the 20% best visibility days. Overall, concentrations are expected to decrease in most states with only a slight increase expected from Nevada and Idaho. These increases are overstated since the emissions inventory includes future EGU growth that is very unlikely to occur and it also does not include the expected reductions from installation of BART in Idaho.

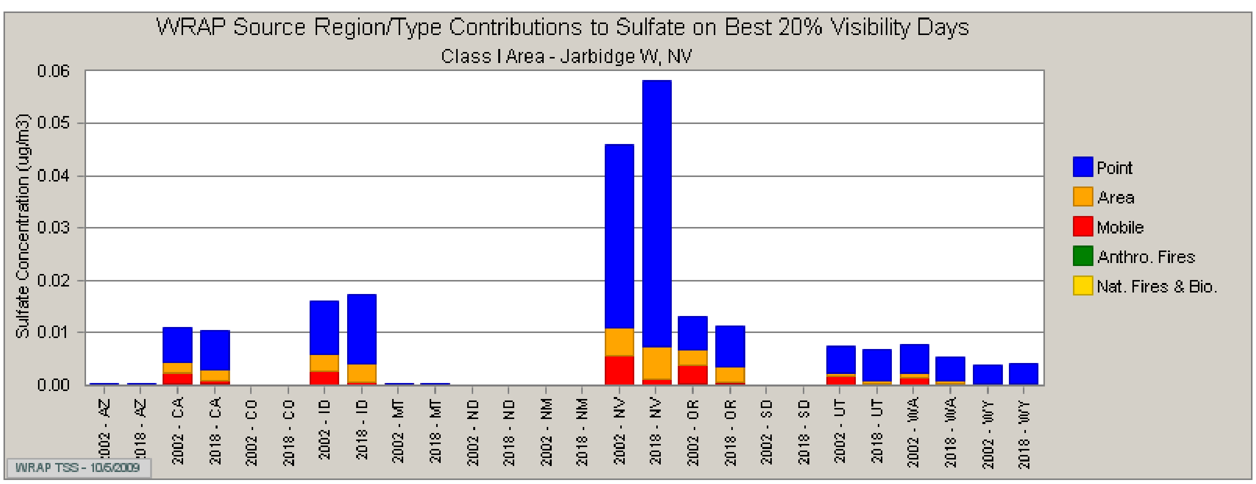


Figure 9-158 PSAT Sulfate Concentrations at Jarbidge 20% Best Days

Nitrate at Jarbidge Wilderness Based on PSAT Modeling

The regional source contribution pie charts in Figure 9-159 show the WRAP states are expected to contribute roughly two thirds of the nitrate concentrations on the 20% worst days in the Jarbidge Wilderness. Through the consultation process, the WRAP states can work together on reducing the WRAP region's contribution; the remaining contributions are outside the regulatory authority of the WRAP states.

Figure 9-159 shows Idaho and then Utah and Nevada as the largest expected contributors of nitrate at Jarbidge Wilderness in 2002. Overall, the expected concentration levels attributed to individual WRAP states are very low and decreasing over time due to reductions from primarily mobile sources. Idaho is showing an overall reduction in contribution of roughly 25% over the first planning period and that is with the emissions from the EGU for future demand placed in Jerome County, still included, although they were removed from later emissions inventories and are now not expected, as discussed earlier. It also does not include emission reductions expected from all the subject-to-BART sources.

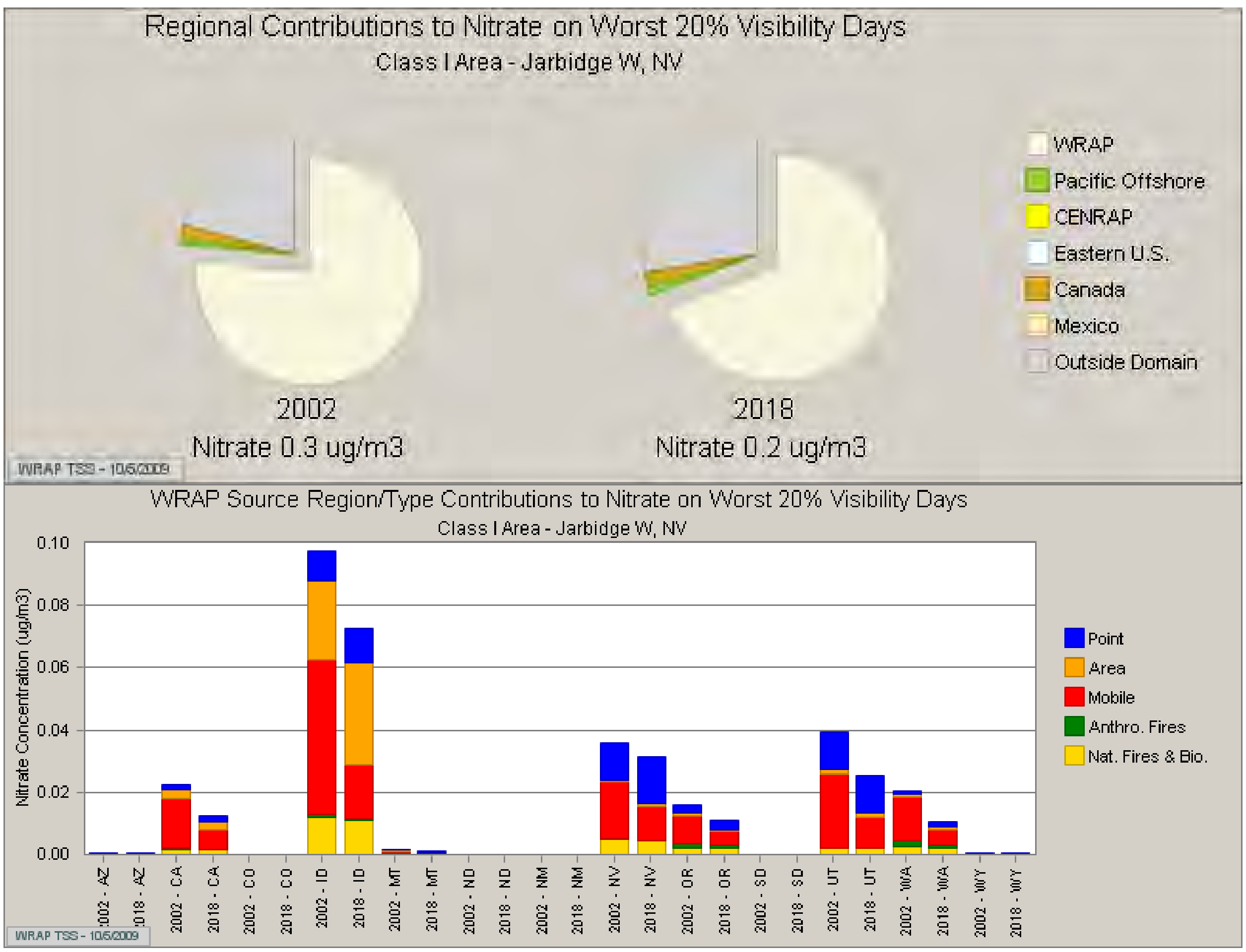


Figure 9-159 PSAT Nitrate Concentrations at Jarbidge 20% Worst Days

Figure 9-160 shows all WRAP states are expecting reductions in future contributions to Jarbidge Wilderness, so overall the 20% best days should be improving.

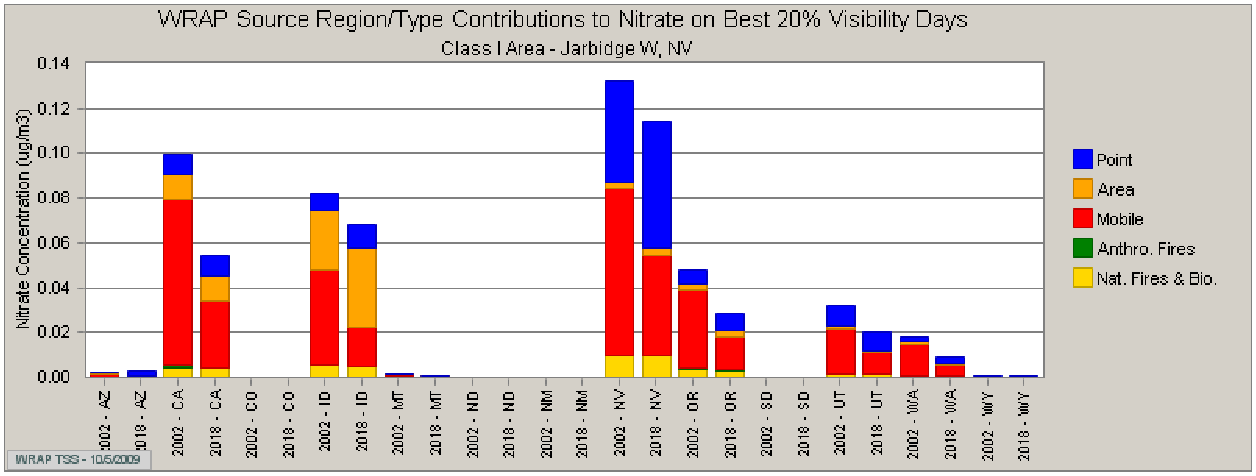


Figure 9-160 PSAT Nitrate Concentrations at Jarbidge 20% Best Days

Primary Organic Aerosol at Jarbidge Wilderness Based on WEP

For the 20% worst visibility days at Jarbidge Wilderness, Idaho shows a sizeable expected contribution to the primary elemental aerosol coming from natural fire. Idaho's overall contribution is expected to decline over time due to reductions from anthropogenic fire as shown in figure 9-161.

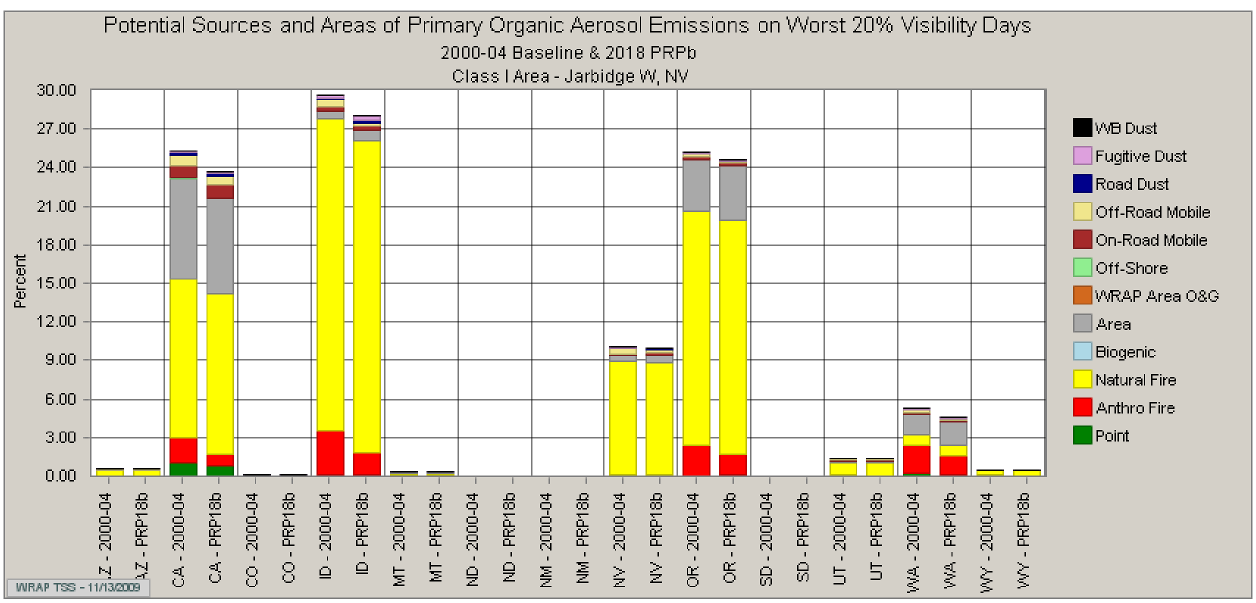


Figure 9-161 WEP Primary Organic Aerosol at Jarbidge Wilderness 20% Worst Days

Similar to the worst days, Idaho is showing a large expected contribution of the primary organic aerosol at Jarbidge Wilderness area on the 20% best visibility days. Overall, the primary organic aerosol is expected to go down at Jarbidge Wilderness area on the 20% best visibility days as shown in figure 9-162.

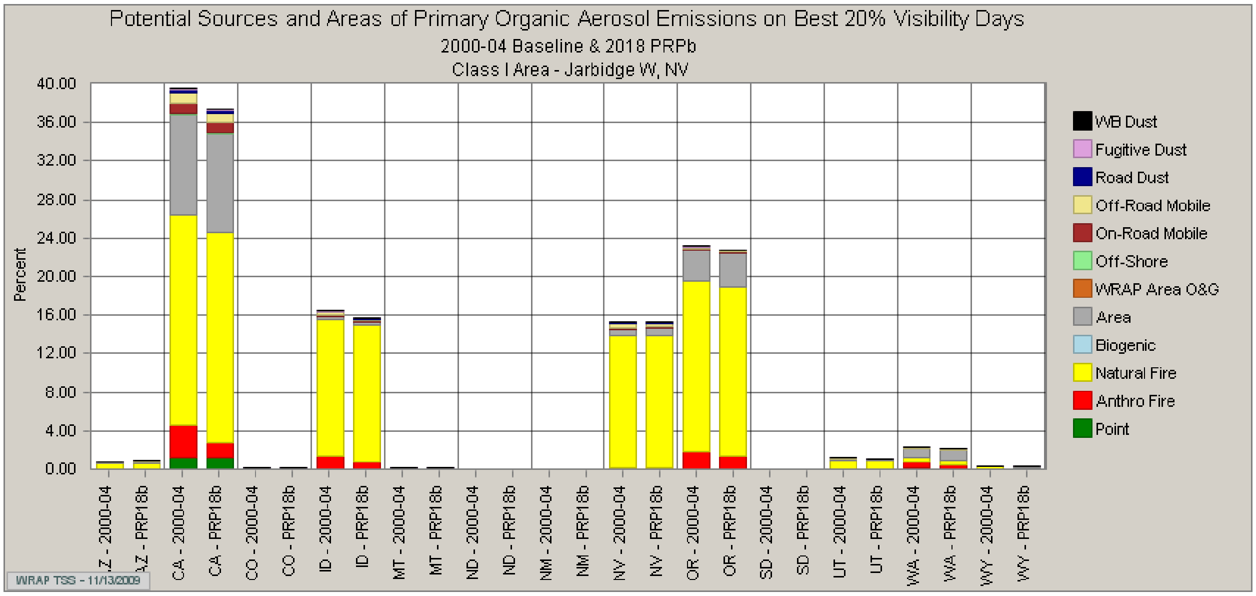


Figure 9-162 WEP Primary Organic Aerosol at Jarbidge Wilderness 20% Best Days

Elemental Carbon at Jarbidge Wilderness Based on WEP

For the 20% worst visibility days at Jarbidge Wilderness, Idaho is showing a sizeable expected contribution to the elemental carbon coming from natural fire. Idaho and the other WRAP states' overall contribution is expected to decline over time due to reductions from anthropogenic fire as shown in figure 9-163.

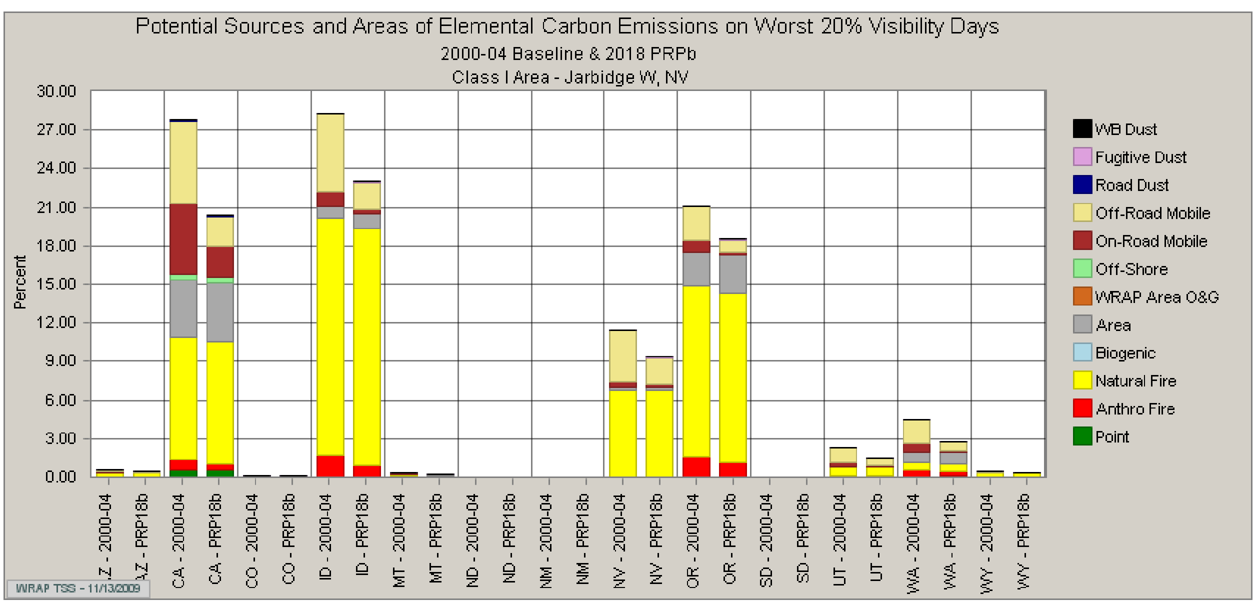


Figure 9-163 WEP Elemental Carbon at Jarbidge Wilderness 20% Worst Days

Figure 9-164 is showing a large percentage of the expected contribution of elemental carbon in the Jarbidge Wilderness area on the 20% best visibility days is from natural fire. Overall, the WRAP states are expected to reduce elemental carbon on the 20% best visibility days in the Jarbidge Wilderness.

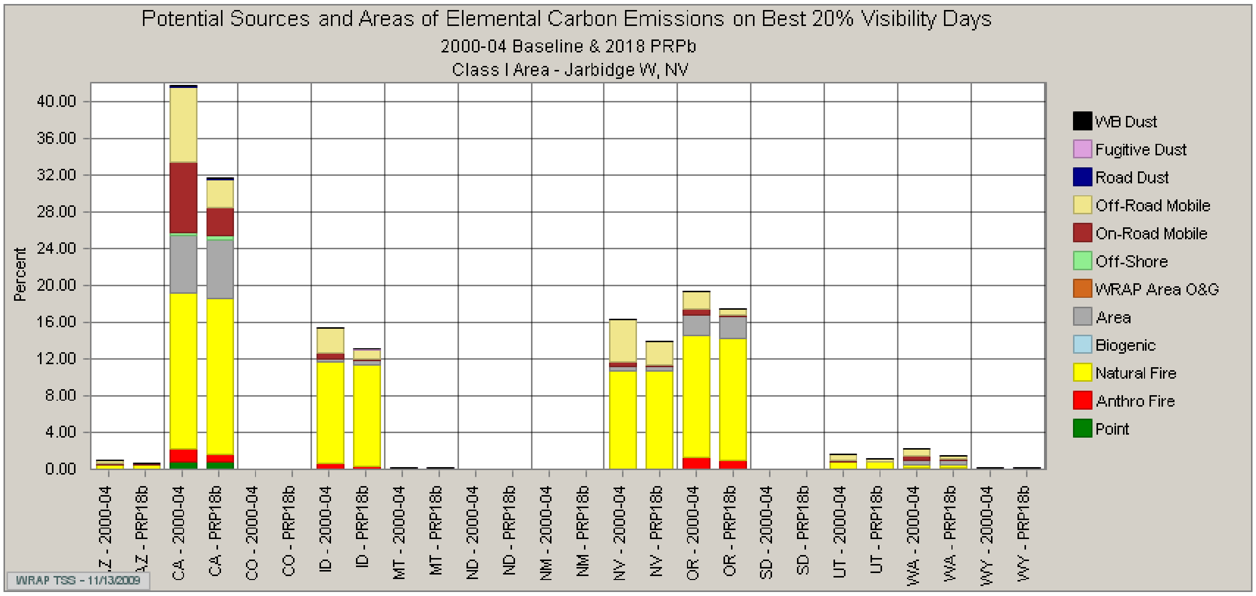


Figure 9-164 WEP Elemental Carbon at Jarbidge Wilderness 20% Best Days

Fine Particulate Matter at Jarbidge Wilderness Based on WEP

Figure 9-165 shows Idaho is expected to contribute over 30% of the fine particulate matter to Jarbidge Wilderness during the 20% worst visibility days. Idaho's emissions from area sources and road dust are expected to increase during the first planning period. Overall, fine particulate should slightly increase over time.

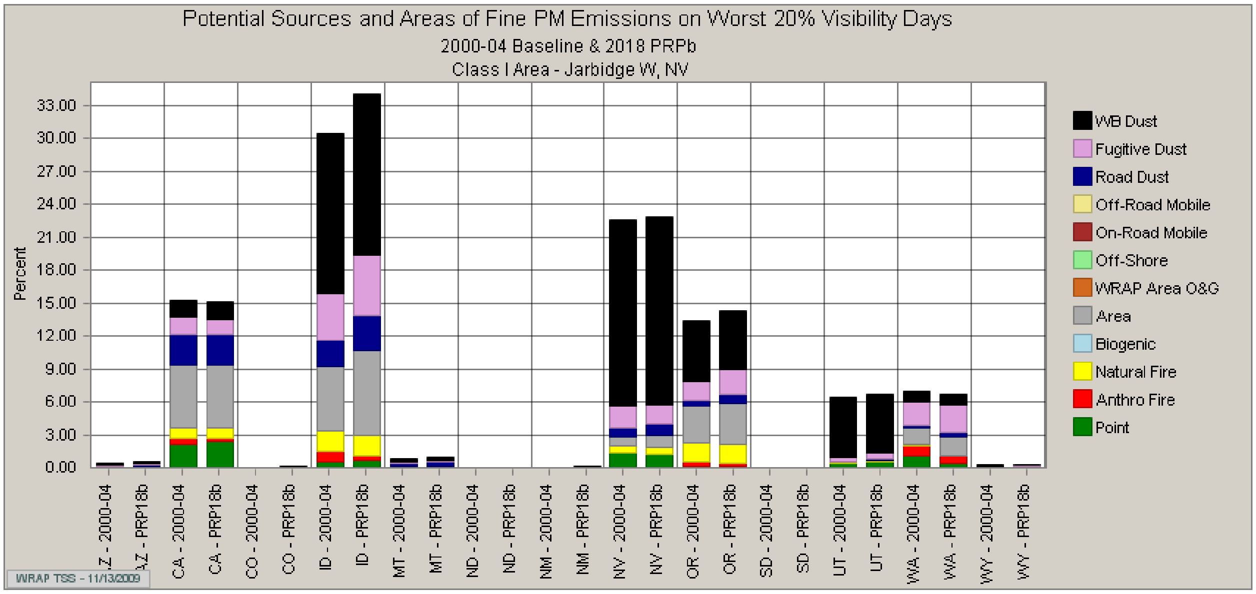


Figure 9-165 WEP Fine Particulate Matter at Jarbidge Wilderness Worst 20% Days

Figure 9-166 shows Nevada is expected to contribute over 30% in fine particulate on the best visibility days and Idaho is expected to contribute over 20%. Because of increases in emission from area sources and fugitive dust the contributions from fine particulate is expected to increase in the future.

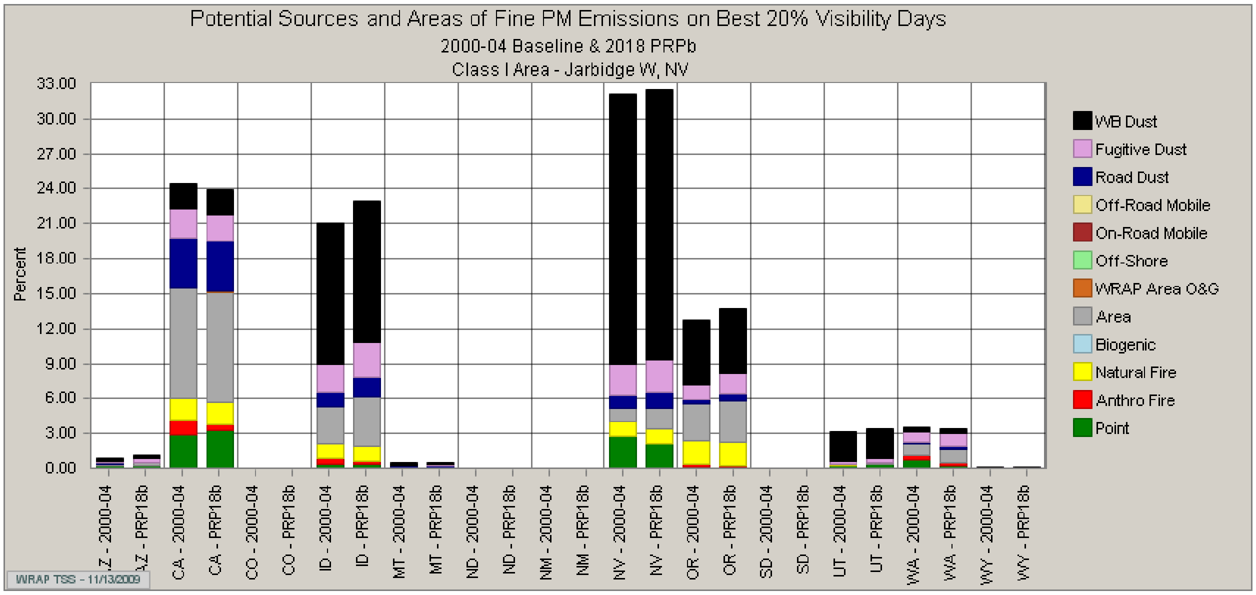


Figure 9-166 WEP Fine Particulate Matter at Jarbidge Wilderness Best 20% Days

Coarse Particulate Matter at Jarbidge Wilderness Based on WEP

Figure 9-167 is showing wind blown dust from all WRAP states is expected to be the highest contributing source category of coarse particulate at the Jarbidge Wilderness on the 20% worst visibility days. Idaho and Nevada are projecting increases in area fugitive dust. Overall, coarse particulate is expected to increase at Jarbidge Wilderness.

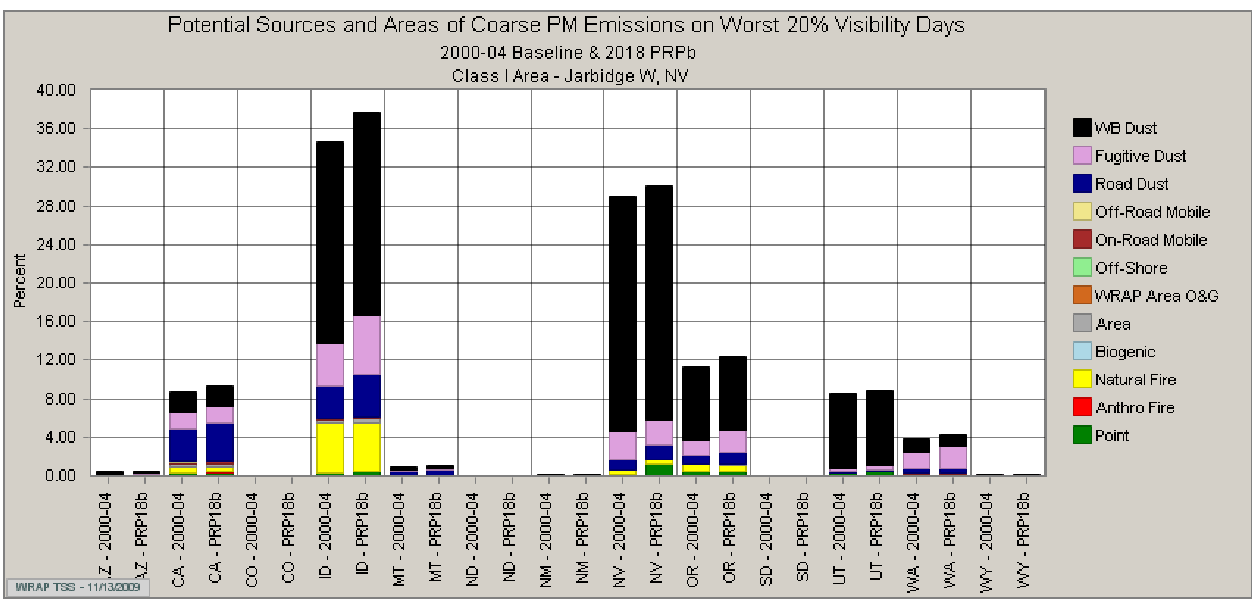


Figure 9-167 WEP Coarse Particulate Matter at Jarbidge Wilderness 20% Worst Days

Figure 9-168 is showing 20% best visibility days at Jarbidge Wilderness are trending the same as the 20% worst visibility days with similar contributions from Nevada and Idaho.

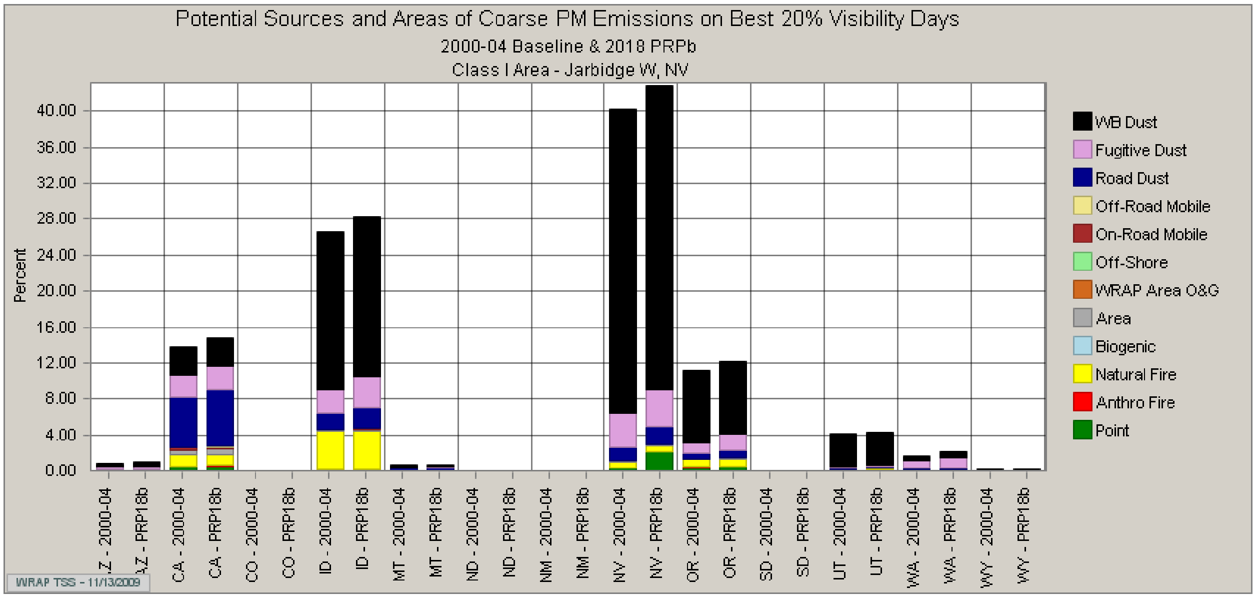


Figure 9-168 WEP Coarse Particulate Matter at Jarbidge Wilderness 20% Best Days

9.4 2018 Projected Visibility in Idaho Class I Areas Based on CMAQ Modeling

Before jumping into the modeling results, a review of the models that were used and how the information is used in this section may be helpful. As discussed in the first section of this chapter, CAMx PSAT modeling was used to track each visibility-impairing pollutant from the emissions source. Based on the tracking of visibility-impairing pollutants from the sources, the concentrations of the visibility-impairing pollutants were allocated to the state of origin and the emissions source category. This process is known as source apportionment. The PSAT modeling used early versions of emissions inventories so it is a good source of information for the source apportionment of visibility-impairing pollutants.

The CMAQ model was run using more up-to-date emissions inventories that included control strategies such as BART. Because of limited funding, WRAP was unable to rerun source apportionment using the later versions of the emissions inventories. The CMAQ model was therefore used for projecting future visibility-impairing pollutant concentrations at Class I areas based on the updated emission inventory. This information was used to compare the projected visibility-impairing pollutant concentrations and associated visibility impacts to the uniform rate of progress (URP) for each Class I area. The URP is discussed further in Chapter 11.

Based on CMAQ modeling, most of the Class I areas analyzed in this chapter are expected to have similar outcomes in meeting the URP. Of all the visibility-impairing pollutants, sulfate and nitrate have the greatest potential to be controlled because they are usually closely linked to anthropogenic sources, which can be controlled while natural sources cannot.

The PSAT modeling results show small reductions in sulfate by 2018 in Idaho's Class I areas due to the relatively small sulfate contributions from WRAP states and the influence of natural fire. A concern with the PSAT modeling for sulfate is that it used an older emissions inventory that included the emissions for an anticipated coal-fired electrical generation unit (EGU) to meet future demand that won't be built during the timeframe of this plan. Although the WEP analysis isn't as robust as the PSAT modeling, it does give an indication of future potential percentage reductions. Based on WEP analysis, the change in emissions from Idaho's anthropogenic sources in most Class I areas are expected to be greater than 40%. In general, WRAP states are contributing roughly one-third of the sulfate contributions. So even if the WRAP states were to reduce their sulfate visibility impairment contributions by 20% on the worst days, it is unlikely that the CMAQ-projected 2018 visibility impacts from sulfate would meet the sulfate URP, because of sulfate emissions contributions from areas outside of the WRAP states.

The PSAT modeling shows expected improvements between 15 and 28% for nitrate concentrations from on- and off-road mobile and point sources coming from Idaho. In general, the WRAP states are contributing roughly three-quarters of the total nitrate contribution so the total reduction made by WRAP states has a greater impact on the overall nitrate concentrations and visibility improvement than for sulfate. In some cases, the expected nitrate improvements are better than would be achieved in accordance with the URP.

As seen throughout this document, impacts from fire are expected to overshadow reductions expected from anthropogenic carbon sources. The CMAQ modeling further illustrates the impacts from organic mass carbon.

The remainder of this chapter will review the CMAQ modeling results for each Class I area in Idaho and several Class I areas in surrounding states. The review will look at the URP for each visibility-impairing pollutant and the progress projected to have occurred by 2018. For each Class I area, there is a graph followed by a table that display the progress projected by 2018 as a percentage of the progress that would have been achieved by 2018 according to the URP.

The 2018 projections include emissions reductions expected from the addition of best available control technologies on facilities subject to the Regional Haze BART requirements (covered in Chapter 10), and reductions expected due to both federal and state regulations currently on the books or expected to take effect during the first planning period (covered in Chapter 11). In Chapter 12 on Long Term Strategies, several source categories have been identified as candidates for future controls. If these categories prove to be causing or contributing to visibility impairment at Class I areas, and the emissions from these sources can reasonably be controlled, some facilities within these source categories may need to install additional emission controls. The emissions reductions from the source categories have not been included during this planning period because of the time necessary to show these source categories may be causing or contributing to visibility impairment through modeling and then develop state rules to implement control strategies.

As the following tables and graphs will show, in most instances the URP has been met for NO_x. Reviewing the emission inventory information in Chapter 8 for NO_x, most of these expectedemission reductions can be attributed to reductions coming from emission controls on motor vehicles. There is a slight increase in point sources emissions (570 tons) over the first planning period based on growth factors. The increases coming from point sources will be subject to New Source Review and prevention of significant deterioration (PSD) requirements as explained in Chapter 12. Concentrations of NO_x from areas sources are also expected to increase during the first planning period based on population growth factors. Home heating and other minor source activities that require the burning of fossil fuels is the primary cause of this growth. Because of the rising cost of fossil fuels, homeowners and small business owners are installing more fuel-efficient equipment as a cost-saving measure so the projections for NO_x coming from area sources may prove to be overstated. Even with increases expected from point and area sources, the overall NOx emissions from Idaho as well as most other WRAP states is expected to drop which translates into meeting the URP for most Class I areas impacted by Idaho emissions.

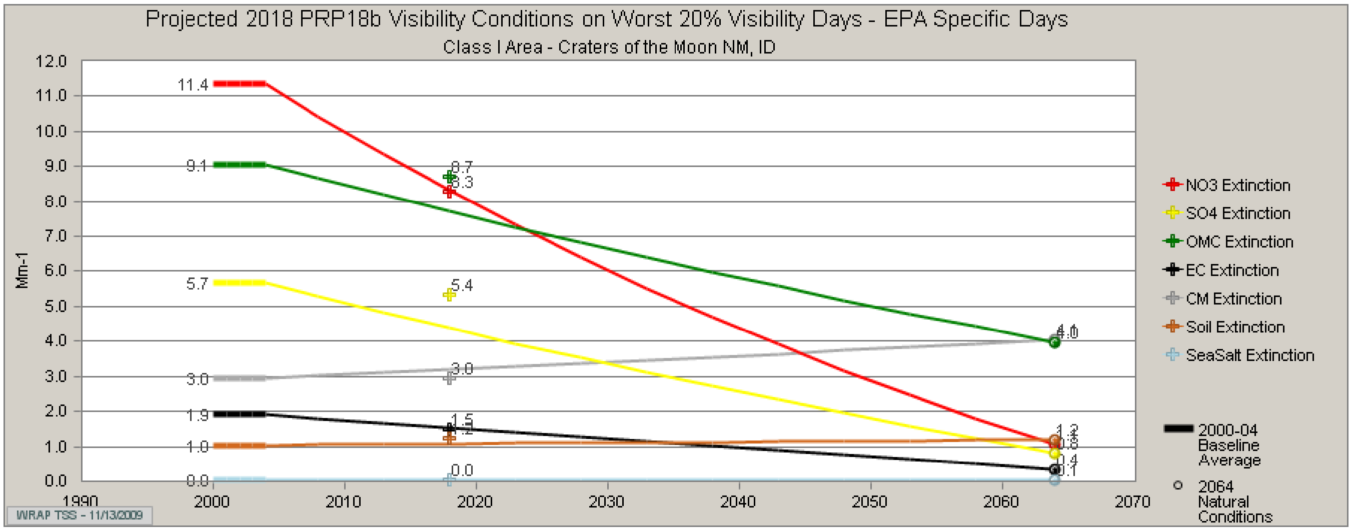
Idaho and most other WRAP states showing expected reduction in SO_x anthropogenic emissions greater than 20%. Unfortunately, the large contribution from natural fire at 31% (which is held constant as recommended by the WRAP Fire Forum) and sources outside the WRAP region are expected to overwhelm the overall emissions, preventing the Class I areas from meeting the URP for SO_x.

As mentioned in Chapter 8, future area source VOC emissions are expected to increase based on future population growth factors. This source category includes a multitude of activities ranging from dry cleaners and personal care products to road-building. Most of the area source categories contribute less than 500 tons each which is not very conducive to rule development for control strategies and enforcement actions. This category is better suited to best management practices which will more than likely occur on its own due to the cost of paints and solvents. Businesses are finding cost savings in replacing things like paint sprayer nozzles with more efficient equipment. Even if the emissions from area source were to remain flat and not grow due to population increases, the expected emissions from natural fire overwhelm the organic carbon categories, which makes reaching the URP extremely difficult. Natural fire contributes 32% of the VOC emissions and 82% of the organic carbon emissions as shown in Chapter 8. Because of the influence of natural fire on organic mass carbon and sulfate, meeting the URP is not expected in Idaho Class I areas and those surrounding the state, as shown in the following figures.

Fine and coarse particulate are very interesting in the fact that many of the Class I areas in Idaho and surrounding states are cleaner during the baseline period than projected natural conditions. This creates a situation where the amounts of pollutants that would exist under the URP are actually greater than during the baseline period. In comparison to other visibility-impairing pollutants, fine and coarse particulate are not large contributors to visibility impairment. Because of these issues, fine and coarse particulate have not been included in the following tables shown with the figures.

9.4.1 CMAQ-Projected Visibility on 20% Worst Days at Craters of the Moon National Monument

Figure 9-169 shows nitrates and elemental carbon are expected to meet the uniform rate of progress. Even though Idaho and WRAP states have reduced upwind emissions more than 25%, it isn't enough to overcome the 75% of the emissions coming from outside the WRAP states' regulatory area. Expected organic mass carbon is also above the URP due to the major contribution coming from natural fire. Coarse matter and fine soil are unique since natural conditions are actually higher than baseline.



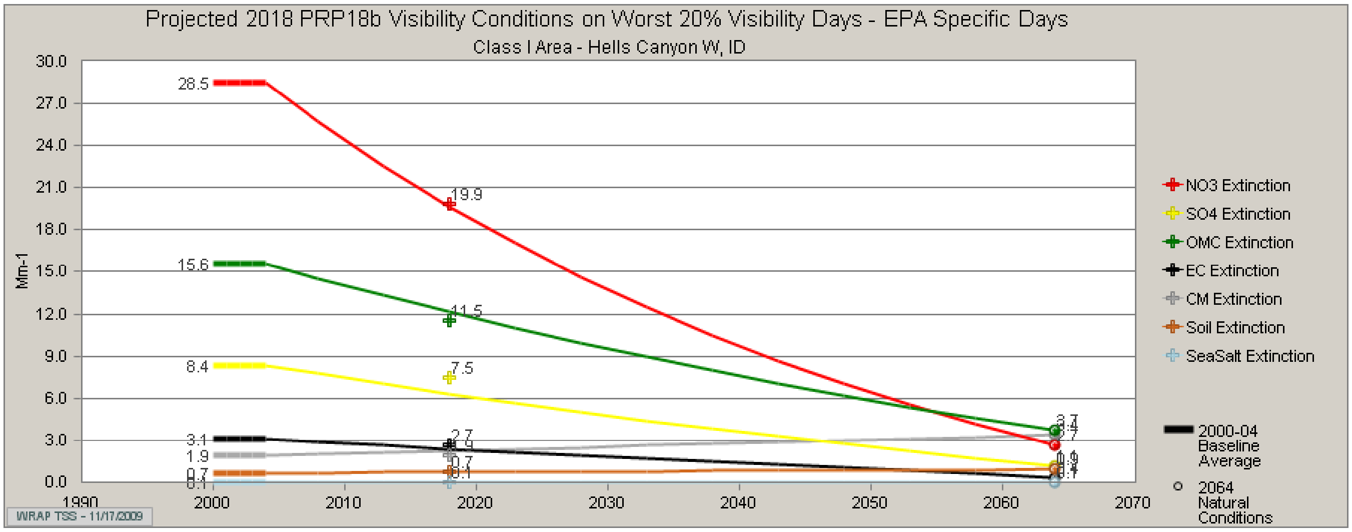
	Craters of the Moon National Monument				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	5.69	4.39	0.83	5.35	26.15%
Ammonium Nitrate	11.35	8.31	1.05	8.3	100.33%
Organic Carbon	9.06	7.73	3.98	8.73	24.81%
Elemental Carbon	1.92	1.54	0.36	1.51	107.89%
Fine Soil	1.04	1.08	1.2	1.23	*%
Coarse Material[3]	2.95	3.2	4.05	Not Applicable	
Sea Salt[3]	0.03	0.04	0.06		

1. MM-1 – inverse megameters

Figure 9-169 CMAQ Pollutant Projections 20% Worst Days at Craters of the Moon National Monument

9.4.2 CMAQ-Projected Visibility on 20% Worst Days at Hells Canyon Wilderness

Figure 9-170 is shows many of the pollutants expected to meet the URP for Hells Canyon Wilderness. Expected levels of Elemental Carbon are above the URP primarily due to the large contribution from natural fire. Sulfate projections may be overstated because expected emissions were included from a once-anticipated EGU in Idaho that is now not expected to be built.



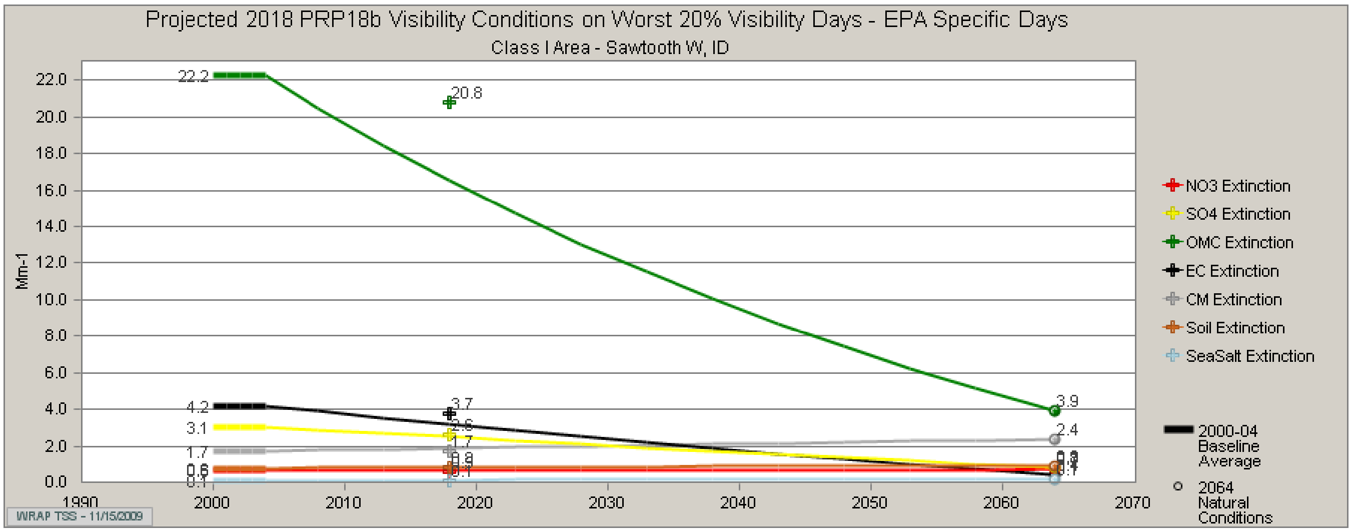
	Hells Canyon Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	8.37	6.35	1.14	7.49	43.56%
Ammonium Nitrate	28.47	19.69	2.67	19.91	97.49%
Organic Carbon	15.6	12.12	3.69	11.54	116.67%
Elemental Carbon	3.06	2.37	0.37	2.65	59.42%
Fine Soil	0.66	0.72	0.92	0.74	*%
Coarse Material[3]	1.93	2.26	3.4	Not Applicable	
Sea Salt[3]	0.05	0.05	0.05		

1. MM-1 – inverse megameters

Figure 9-170 CMAQ Pollutant Projections 20% Worst Days at Hells Canyon Wilderness

9.4.3 CMAQ-Projected Visibility on 20% Worst Days at Sawtooth Wilderness

The visibility-impairing pollutants sulfate and nitrate are the two pollutants for which we have the greatest control over emissions reductions since they are usually closely linked to anthropogenic sources. Figure 9-171 shows excellent improvements expected due to reductions of sulfate and nitrate. Sawtooth Wilderness is not expected to meet the overall URP because of organic mass carbon and the contributions of natural fire.



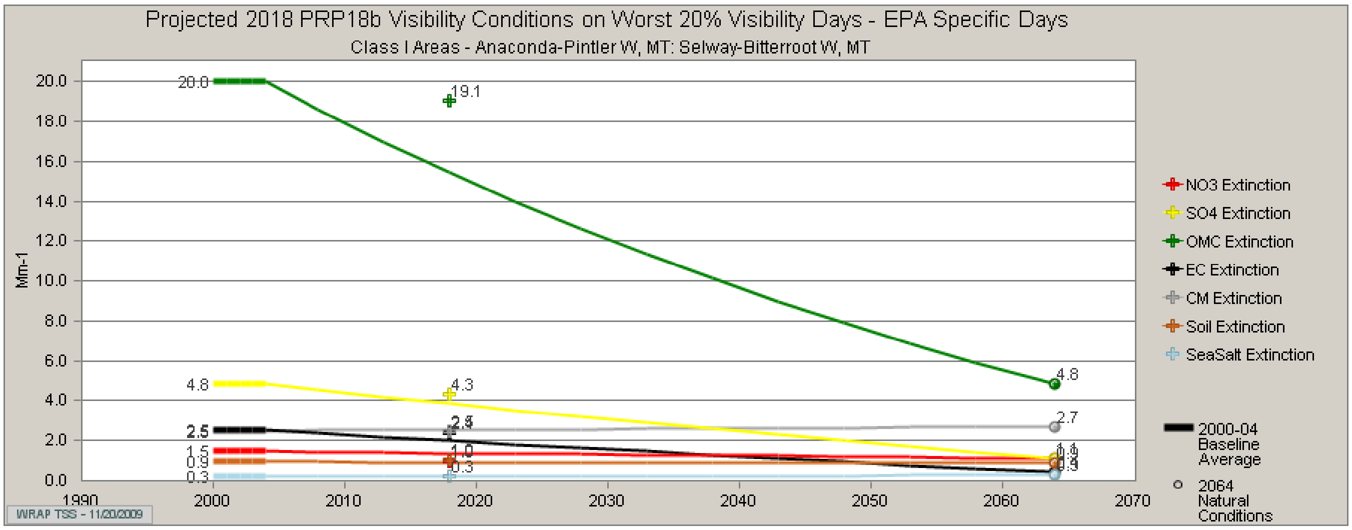
`	Sawtooth Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	3.06	2.5	0.81	2.59	83.93%
Ammonium Nitrate	0.63	0.65	0.7	0.54	-450.00%
Organic Carbon	22.24	16.51	3.94	20.81	24.96%
Elemental Carbon	4.2	3.2	0.38	3.73	47.00%
Fine Soil	0.77	0.81	0.94	0.79	*.%
Coarse Material[3]	1.74	1.89	2.39	Not Applicable	
Sea Salt[3]	0.12	0.12	0.13		

1. MM-1 – inverse megameters

Figure 9-171 CMAQ Pollutant Projections 20% Worst Days at Sawtooth Wilderness

9.4.4 CMAQ-Projected Visibility on 20% Worst Days at Selway-Bitterroot Wilderness

The Selway-Bitterroot Wilderness is very similar to the Sawtooth Wilderness in the pollutants impacting the area. The reductions in ammonium nitrate are expected to improve beyond the natural condition. The expected anthropogenic reductions in sulfate and organic carbon are overshadowed by expected increases attributed to natural fire as seen in Figure 9-172.



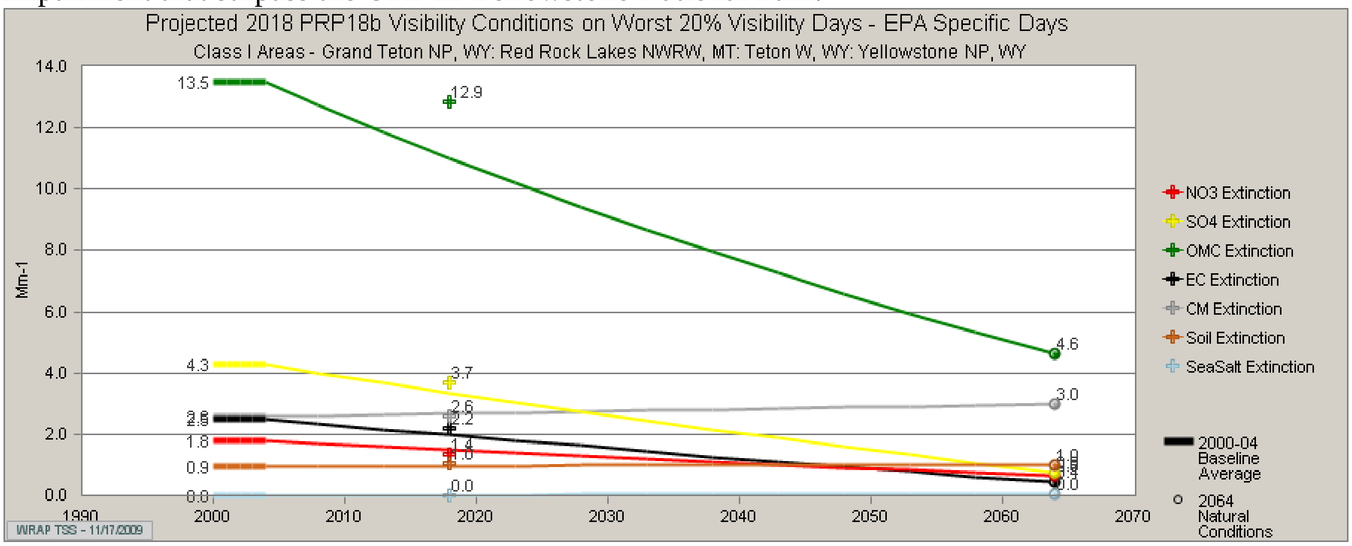
	Selway-Bitterroot Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	4.83	3.86	1.1	4.32	52.58%
Ammonium Nitrate	1.46	1.38	1.12	0.96	625.00%
Organic Carbon	20.01	15.46	4.84	19.09	20.22%
Elemental Carbon	2.52	2	0.43	2.4	23.08%
Fine Soil	0.94	0.93	0.91	1.02	-800.00%
Coarse Material[3]	2.49	2.54	2.7	Not Applicable	
Sea Salt[3]	0.26	0.26	0.27		

1. MM-1 – inverse megameters

Figure 9-172 CMAQ Pollutant Projections 20% Worst Days at Selway-Bitterroot Wilderness

9.4.5 CMAQ-Projected Visibility on 20% Worst Days at Yellowstone National Park, Grand Teton NP, Red Rock Lakes Wilderness, and Teton Wilderness

The CMAQ analysis for Yellowstone National Park on the 20% worst days show large expected improvements in sulfate; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-173 shows expected improvements in nitrate visibility impairment that surpass the URP in Yellowstone National Park.



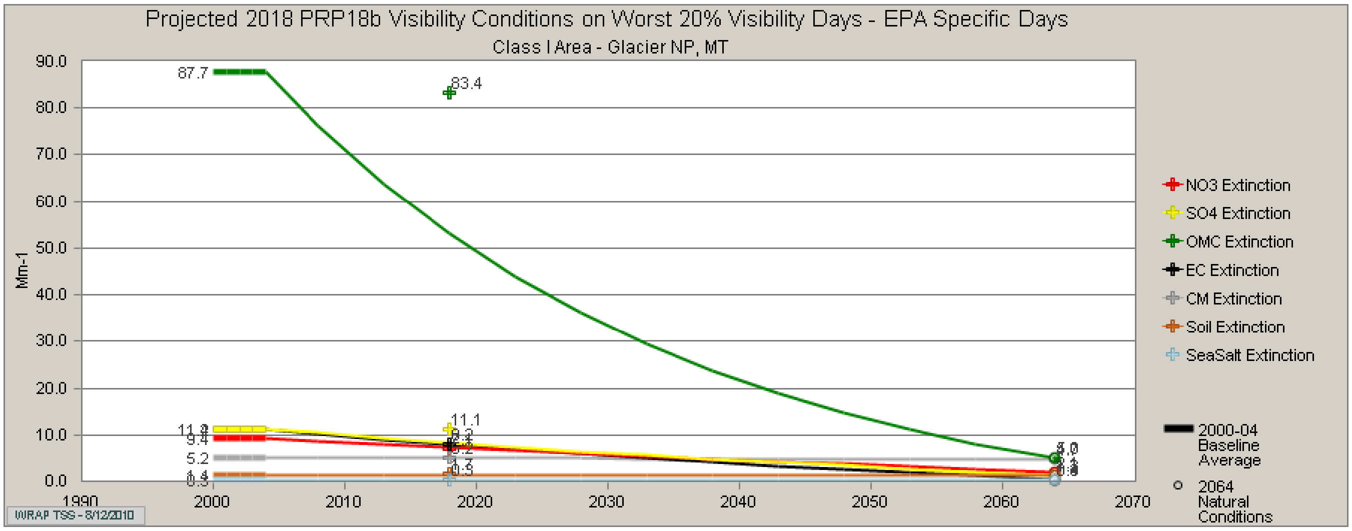
	Yellowstone National Park				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	4.26	3.35	0.76	3.71	60.44%
Ammonium Nitrate	1.77	1.5	0.63	1.36	151.85%
Organic Carbon	13.48	11.02	4.61	12.87	24.80%
Elemental Carbon	2.48	1.97	0.43	2.2	54.90%
Fine Soil	0.95	0.97	1.02	1.04	450.00%
Coarse Material[3]	2.58	2.67	2.99	Not Applicable	
Sea Salt[3]	0.02	0.02	0.03		

. MM-1 – inverse megameters

Figure 9-173 CMAQ Pollutant Projections 20% Worst Days at Yellowstone National Park

9.4.6 CMAQ-Projected Visibility on 20% Worst Days at Glacier National Park

The CMAQ analysis for Glacier National Park on the 20% worst days show large improvements in nitrate are expected; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-174 shows expected improvements in nitrate visibility impairment that surpass the URP in Glacier National Park.



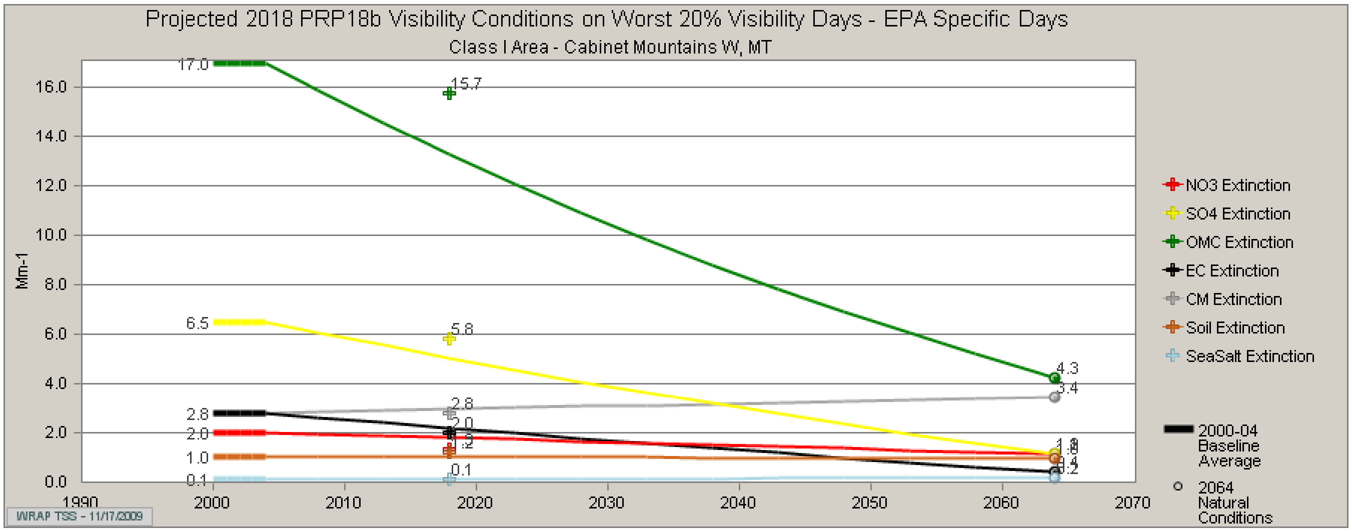
	Glacier Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	11.37	8.41	1.29	11.09	9.46%
Ammonium Nitrate	9.36	7.34	2.07	7.1	111.88%
Organic Carbon	87.68	53.08	4.99	83.36	12.49%
Elemental Carbon	11.2	7.95	0.39	8.16	93.54%
Fine Soil	1.4	1.38	1.32	1.74	*%
Coarse Material[3]	5.22	5.08	4.65	Not Applicable	
Sea Salt[3]	0.28	0.28	0.27		

1. MM-1 – inverse megameters

Figure 9-174 CMAQ Pollutant Projections 20% Worst Days at Glacier

9.4.7 CMAQ-Projected Visibility on 20% Worst Days at Cabinet Mountain Wilderness

Figure 9-175 shows expected results similar to Idaho's other Class I areas. Nitrate and elemental carbon are expected to meet the URP. Natural fire is expected to prevent sulfate and organic carbon from reaching the URP in the Cabinet Mountain Wilderness.



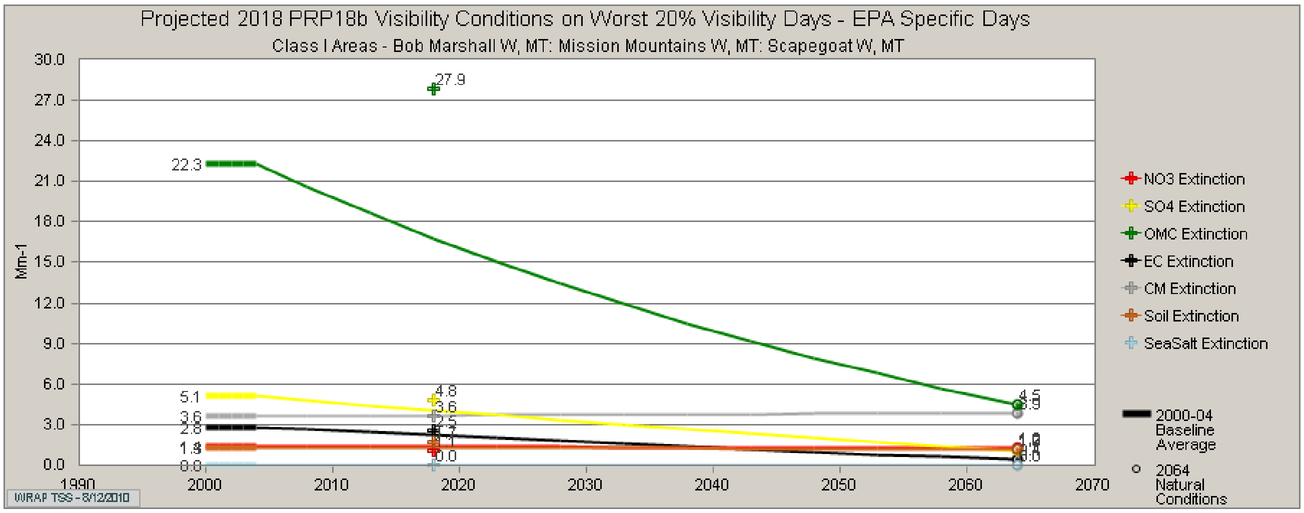
	Cabinet Mountain Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Variance from 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	6.48	5.03	1.12	5.81	46.21%
Ammonium Nitrate	2.02	1.81	1.15	1.31	338.10%
Organic Carbon	16.95	13.22	4.25	15.73	32.71%
Elemental Carbon	2.79	2.19	0.4	2	131.67%
Fine Soil	1.03	1.01	0.97	1.18	-750.00%
Coarse Material[3]	2.81	2.95	3.43	Not Applicable	
Sea Salt[3]	0.1	0.12	0.2		

1. MM-1 – inverse megameters

Figure 9-175 CMAQ Pollutant Projections 20% Worst Days at Cabinet Mountain Wilderness

9.4.8 CMAQ-Projected Visibility on 20% Worst Days at Bob Marshall Wilderness, Mission Mountain Wilderness, Scapegoat Wilderness

The CMAQ analysis for Bob Marshall Wilderness on the 20% worst days shows expected improvements in nitrate and sulfate; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-176 shows expected improvements in nitrate visibility impairment that surpass the URP in Bob Marshall Wilderness.



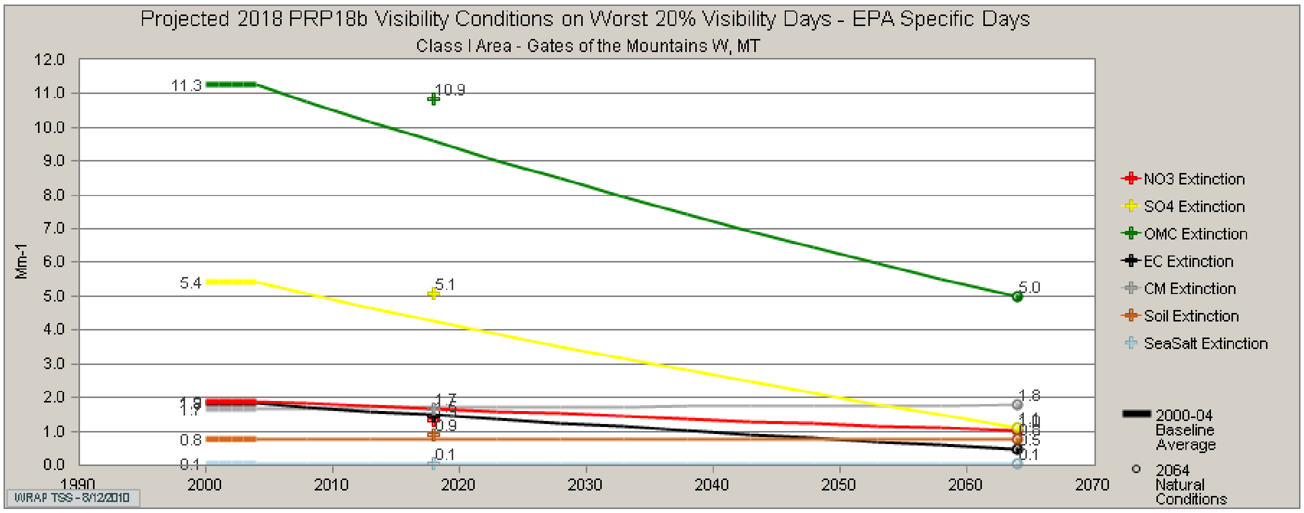
	Bob Marshall Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	5.12	4.05	1.04	4.84	26.17%
Ammonium Nitrate	1.43	1.38	1.23	1.06	740.00%
Organic Carbon	22.29	16.78	4.48	27.85	-100.91%
Elemental Carbon	2.8	2.19	0.39	2.53	44.26%
Fine Soil	1.29	1.27	1.19	1.71	-2100.00%
Coarse Material[3]	3.6	3.67	3.89	Not Applicable	
Sea Salt[3]	0.03	0.02	0.02		

1. M-1 – inverse megameters

Figure 9-176 CMAQ Pollutant Projections 20% Worst Days at Bob Marshall Wilderness

CMAQ-Projected Visibility on 20% Worst Days at Gates of the Mountains Wilderness

The CMAQ analysis for Gates of the Mountains Wilderness on the 20% worst days show expected improvements in nitrate and sulfate; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-177 shows expected improvements in nitrate visibility impairment that surpass the URP in Gates of the Mountain Wilderness.



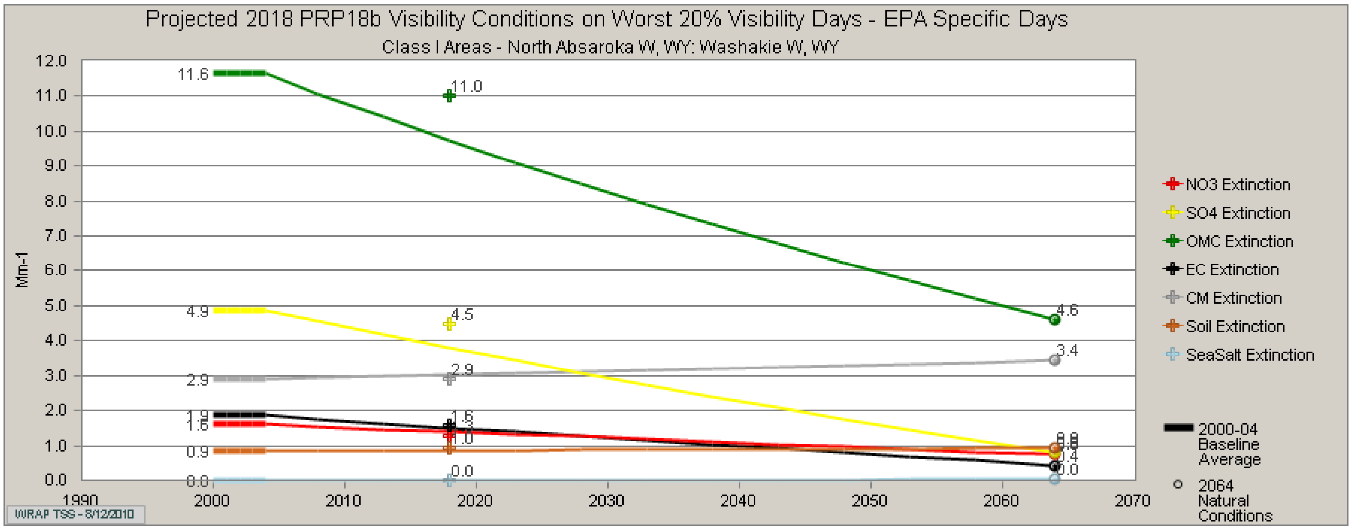
	Gates of the Mountains Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	5.41	4.28	1.12	5.1	27.43%
Ammonium Nitrate	1.88	1.67	1.01	1.34	257.14%
Organic Carbon	11.26	9.59	4.98	10.85	24.55%
Elemental Carbon	1.82	1.48	0.45	1.45	108.82%
Fine Soil	0.75	0.76	0.79	0.89	*%
Coarse Material[3]	1.68	1.7	1.78	Not Applicable	
Sea Salt[3]	0.06	0.06	0.65		

1. MM-1 – inverse megameters

Figure 9-177 CMAQ Pollutant Projections 20% Worst Days at Gates of the Mountains Wilderness

9.4.10 CMAQ-Projected Visibility on 20% Worst Days at North Absaroka Wilderness

The CMAQ analysis for North Absaroka Wilderness on the 20% worst days show expected improvements in nitrate and sulfate; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-178 shows expected improvements in nitrate visibility impairment that surpass the URP in Gates of the Mountain Wilderness.



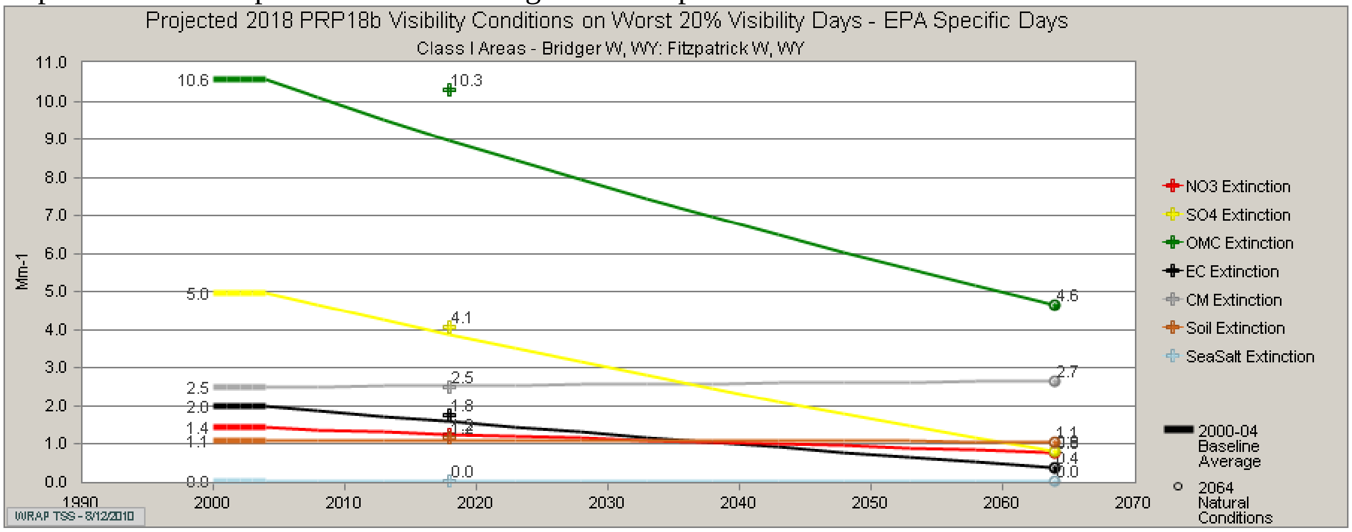
	North Absaroka Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	4.87	3.8	0.81	4.5	34.58%
Ammonium Nitrate	1.61	1.4	0.75	1.29	152.38%
Organic Carbon	11.64	9.75	4.62	11	33.86%
Elemental Carbon	1.86	1.51	0.44	1.59	77.14%
Fine Soil	0.85	0.86	0.92	0.95	*%
Coarse Material[3]	2.91	3.03	3.44	Not Applicable	
Sea Salt[3]	0.01	0.01	0.03		

2. MM-1 – inverse megameters

Figure 9-178 CMAQ Pollutant Projections 20% Worst Days at North Absaroka Wilderness

9.4.11 CMAQ-Projected Visibility on 20% Worst Days at Bridger Wilderness and Fitzpatrick Wilderness

The CMAQ analysis for Bridger Wilderness on the 20% worst days shows expected improvements in nitrate and sulfate; however, these may not translate into meeting the URP because of the contributions from outside the WRAP region and natural fire. Similar to other Class I areas, Figure 9-179 shows expected improvements in nitrate visibility impairment that surpass the URP in Bridger and Fitzpatrick Wildernesses.



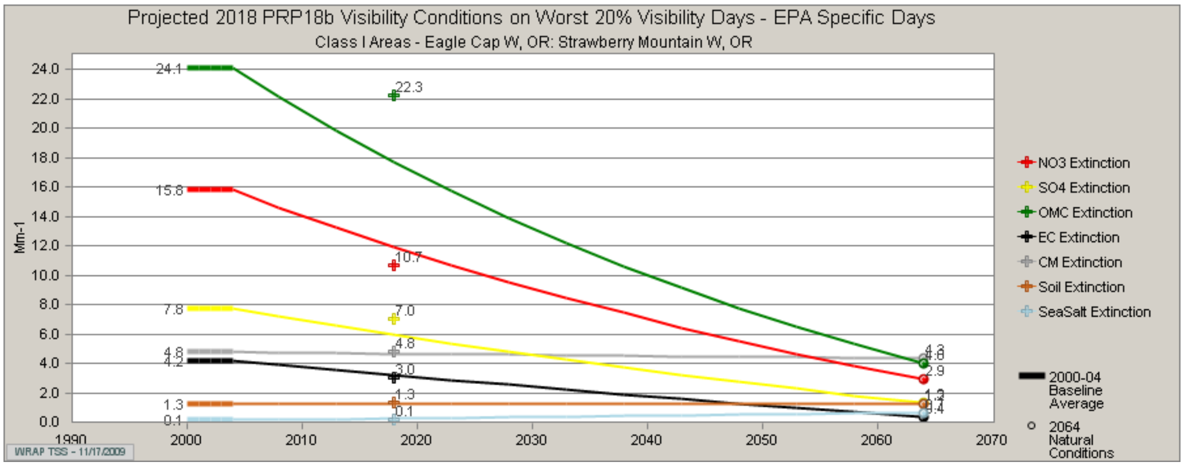
	Bridger Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	4.99	3.89	0.82	4.06	84.55%
Ammonium Nitrate	1.43	1.27	0.79	1.24	118.75%
Organic Carbon	10.55	8.98	4.64	10.31	15.29%
Elemental Carbon	1.99	1.59	0.39	1.77	55.00%
Fine Soil	1.1	1.1	1.07	1.19	*%
Coarse Material[3]	2.51	2.55	2.67	Not Applicable	
Sea Salt[3]	0.04	0.04	0.04		

3. MM-1 – inverse megameters

Figure 9-179 CMAQ Pollutant Projections 20% Worst Days at Bridger Wilderness

9.4.12 CMAQ-Projected Visibility on 20% Worst Days at Eagle Cap Wilderness and Strawberry Mountain Wilderness

Figure 9-180 shows expected results similar to Idaho's other Class I areas. Natural fire is expected to prevent sulfate, organic carbon, and elemental carbon from reaching the URP in the Eagle Cap Wilderness.



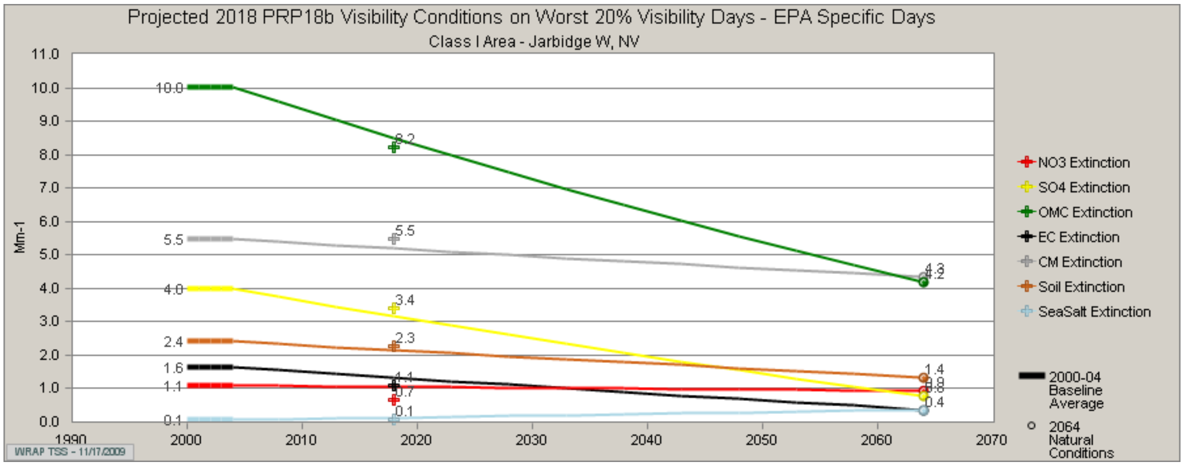
	Eagle Cap Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	5.12	4.05	1.04	4.84	26.17%
Ammonium Nitrate	1.43	1.38	1.23	1.06	740.00%
Organic Carbon	22.29	16.78	4.48	27.85	-100.91%
Elemental Carbon	2.8	2.19	0.39	2.53	44.26%
Fine Soil	1.29	1.27	1.19	1.71	-2100.00%
Coarse Material[3]	3.6	3.67	3.89	Not Applicable	
Sea Salt[3]	0.03	0.02	0.02		

1. MM-1 – inverse megaview

Figure 9-180 CMAQ Pollutant Projections 20% Worst Days at Eagle Cap Wilderness

9.4.13 CMAQ projected Visibility on 20% Worst Days at Jarbidge Wilderness

Figure 9-181 shows expected results similar to Idaho's other Class I areas. Natural fire is expected to prevent sulfate, organic carbon, and elemental carbon from reaching the URP in the Jarbidge Wilderness.



	Jarbidge Wilderness				
Pollutant	2000-04 Baseline Conditions	2018 Uniform Rate of Progress Target	2064 Natural Conditions	2018 Projected Visibility Conditions	Percent of 2018 URP Goal
	(Mm-1)	(Mm-1)[1]	(Mm-1)	(Mm-1)	
Ammonium Sulfate	4	3.17	0.78	3.41	71.08%
Ammonium Nitrate	1.1	1.06	0.94	0.68	1050.00%
Organic Carbon	10.04	8.49	4.2	8.21	118.06%
Elemental Carbon	1.65	1.34	0.37	1.11	174.19%
Fine Soil	2.41	2.15	1.35	2.27	53.85%
Coarse Material[3]	5.47	5.2	4.34	Not Applicable	
Sea Salt[3]	0.06	0.13	0.37		

1. MM-1 – inverse megaview

Figure 9-181 CMAQ Pollutant Projections 20% Worst Days at Jarbidge Wilderness

Chapter 10. BEST AVAILABLE RETROFIT TECHNOLOGY (BART) EVALUATION

10.1 Description of Process for Determining BART in Idaho

10.1.1 History of BART Process

The 1977 Clean Air Act amendments created Part C of the act, entitled Prevention of Significant Deterioration of Air Quality, which includes Sections 160-169. The intent of the Prevention of Significant Deterioration (PSD) provisions is to maintain good air quality in areas that attain the national air quality standards and provide special protections for national parks and wilderness areas. Part C is divided into two subparts.

Subpart 1

Subpart 1 established the initial classification of Class I and Class II areas. Class I areas include:

> *"(1)International Parks,*
>
> *(2) national wilderness areas which exceed 5,000 acres in size,*
>
> *(3) national memorial parks which exceed 5,000 acres in size, and*
>
> *(4) national parks which exceed six thousand acres in size and which are in existence on the date of the enactment of the Clean Air Act Amendments of 1977 shall be class I areas and may not be redesignated….*
>
> *(b) All areas in such State designated … as attainment or unclassifiable which are not established as class I under subsection (a) shall be class II areas …"*

The Class I areas that met this criteria and were in existence in or before 1977 became known as "mandatory class I federal areas." Although states could designate other areas as Class I areas after 1977, PSD and other portions of the Regional Haze Rule focus on those Class I areas in existence in or before 1977.

Based on the classification of an area, the allowable amount of degradation caused by new or modified air pollution sources is determined. In national parks and other Class I areas, smaller amounts of degradation known as "increment" are allowed. The PSD program under Part C, Subpart 1 primarily focuses on emissions from 1977 forward and will be further discussed in the chapters on Reasonable Progress and Long Term Strategies.

Subpart 2

Visibility is called out much stronger in Subpart 2, which sets the following national 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 manmade air pollution" (CAA Section 169(A). In an effort to remediate the existing impairments to visibility, Section 169(A)(2)(A) include "a requirement that each major stationary source which is in existence on the date of enactment of this section, but which has not been in operation for more than fifteen years as of such date, … emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area, shall procure, install and operate, as expeditiously as practicable (and maintain thereafter) the Best Available Retrofit Technology (BART), as determined by the state."

To carry out Congress's intent to have BART installed on certain emission sources, EPA promulgated the "Regional Haze Rule" [64 FR 35714 (July 1, 1999)]. The rule was challenged and on May 24, 2002, the U.S. Court of Appeals for the District of Columbia vacated the Regional Haze Rule and remanded the BART provisions in the Rule. Revisions to the rule were published on July 6, 2005 [70 FR 39104 (July 6, 2005)]. The BART rule can also be found under 40 CFR 51.308(e). As part of the July 6, 2005, rule revisions, EPA published Appendix Y guidance for the implementation of BART, which is typically Appendix Y. The Appendix Y guidance can be found beginning at 70 FR 39156 (July 6, 2005).

10.1.2 Summary of BART Process

BART-eligible

The BART provision applies to "major stationary sources" from 26 identified source categories which have the potential to emit 250 tons per year or more of any visibility impairing pollutant. As amended, the Clean Air Act (CAA) requires only sources which were built or in operation during a specific 15-year time interval to be subject to BART. The BART provision applies to sources that existed as of August 7, 1977, and extended back 15 years to August 7, 1962. The first phase of the BART process is the development of a list of "BART-eligible" facilities that identifies those major facilities from the 26 identified source categories that have a potential to emit 250 tons per year of any light-impairing pollutant and were in operation during that period.

Subject to BART

The CAA requires BART review when any source meeting the above description "emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility" in any Class I area. In most cases, the determination of whether a facility is causing or contributing to visibility impairment is based on modeling, using the following threshold values: Any BART-eligible facility with an impact of 1 deciview is considered to be "causing" visibility impairment; anyBART-eligible facility with an impact of 0.5 deciview is considered to be "contributing" to visibility impairment. Any BART-eligible facility causing or contributing to visibility impairment is considered a source that is "subject" to BART."

For each source that is subject to BART, 40 CFR 308(e)(1)(ii)(A) requires that States identify the level of control representing BART after considering the factors set out in CAA section 169A(g), as follows:

> *"States must identify the best system of continuous emission control technology for each source subject to BART taking into account the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of visibility improvement that may be expected from available control technology."*

Idaho followed the Appendix Y guidance in the determination phase of the BART as described above. As with all states, the control technologies that were determined appropriate and technically feasible during the BART determination for Idaho sources are required to be installed no later than five years after the regional haze SIPs are approved by EPA.

Idaho has satisfied the BART requirements in the Regional Haze Rule. The following sections lists which facilities were identified as BART-eligible sources; facilities are subject to BART including the modeling procedures. and the determination process to identify emissions control technologies that satisfy BART.

10.2 Idaho BART-Eligible Sources

The three steps in determining if a major facility is a BART-eligible source are:
1) determine if it is in one of 26 predetermined categories, 2) determine when it was built, and 3) determine the amount of pollution emitted (known as the "potential to emit" [PTE]). Idaho followed EPA's Appendix Y Guidance under the Regional Haze Rule to identify BART-eligible sources.

Step 1

Is the facility or any unit at the facility in one of the following 26 categories?

(1) Fossil-fuel fired steam electric plants of more than 250 million British thermal units (MMBtu) per hour heat input,

(2) Coal cleaning plants (thermal dryers),

(3) Kraft pulp mills,

(4) Portland cement plants,

(5) Primary zinc smelters,

(6) Iron and steel mill plants,

(7) Primary aluminum ore reduction plants,

(8) Primary copper smelters,

(9) Municipal incinerators capable of incinerating more than 250 tons of refuse per day,

(10) Hydrofluoric, sulfuric, and nitric acid plants,

(11) Petroleum refineries,

(12) Lime plants,

(13) Phosphate rock processing plants,

(14) Coke oven batteries,

(15) Sulfur recovery plants,

(16) Carbon black plants (furnace process),

(17) Primary lead smelters,

(18) Fuel conversion plants,

(19) Sintering plants,

(20) Secondary metal production facilities,

(21) Chemical process plants,

(22) Fossil-fuel boilers of more than 250 MMBtu per hour heat input,

(23) Petroleum storage and transfer facilities with a capacity exceeding 300,000 barrels,

(24) Taconite ore processing facilities,

(25) Glass fiber processing plants, and

(26) Charcoal production facilities.

Step 2

Determine whether the unit or source was "in existence" on August 7, 1977 but not "in operation" before August 7, 1962, according to the following definitions.

- "In existence": "the owner or operator has obtained all necessary preconstruction approvals or permits required by Federal, State, or local air pollution emissions and air quality laws or regulations and either has (1) begun, or caused to begin, a continuous program of physical on-site construction of the facility or(2) entered into binding agreements or contractual obligations , which cannot be canceled or modified without substantial loss to the owner or operator …"
- "In operation": "engaged in activity related to the primary design function of the source."

Step 3

Determine whether the total emissions represent a current potential to emit that is greater than 250 tons per year of any single visibility-impairing pollutant. Fugitive emissions, to the extent quantifiable, must be counted.

Visibility impairing pollutants include the following:

(1) Sulfur dioxide (SO_2),

(2) Nitrogen oxides (NO_x), and

(3) Particulate matter.

As directed in Appendix Y, judgment should be used to determine whether the following pollutants impair visibility

(4) Volatile organic compounds (VOC), and

(5) Ammonia and ammonia compounds.

If a facility has a combined total of potential to emit 250 tons of any one of the above visibility impairing pollutants, it is BART-eligible. If a facility or unit is BART-eligible under one pollutant(emits 250tpy), the other pollutants it emits are also included even though the other pollutants emissions may be less that 250 tons per year.

Sources likely to be subject to BART

In an effort to be consistent with other WRAP states, Idaho participated in a study conducted by Eastern Research Group (ERG) to identify BART-eligible sources and units. The study identified 46 possible BART-eligible sources in Idaho which were refined to six sources confirmed, one potential and four facilities with several unknowns to be answered (See table 10-1).

Company Name	Category	Date	Date Eligible?	Size (PTE) Eligible?
TASCO (Amalgamated Sugar), Twin Falls	BART 12	1973	Y	Y
J. R. Simplot Company Don Siding Complex	BART 13	1966, 1965-1974, 1976, 1977, 1986	Y	Y
Nu West Industries	BART 13	1974	Y	Y
TASCO (Amalgamated Sugar), Nampa	BART 12		Y	Y
TASCO (Amalgamated Sugar), Paul	BART 12		Y	Y
Evergreen Forests & Tamarack Energy Partnership	BART 01	1983	M	D
Ash Grove Cement Co.	BART 04	Pre-1997.	D	D
Lignetics of Idaho	BART 18		D	D
P4 Production LLC	BART 13		D	D
Potlatch Corp - Potlatch Idaho	BART 03, BART 22	1950, 1977, 1981, and 1991	D	D
Sinclair Oil Corp	BART 23		D	D

Table 10-1 BART-Eligible Source Determinationss (ERG List)*

* Y – Yes, M – Maybe, D- Do not Know, N-NO

DEQ engineers requested additional information from the 11 likely sources to confirm dates of operation and emissions amounts. Evergreen/Tamarack Energy, Lignetics of Idaho, and Sinclair Oil were removed from the list because their potential to emit (PTE) was less than 250 tons per year for any single BART eligible pollutant. Ash Grove Cement was removed from the eligible list because the plant was built before 1952 and therefore pre-dates the BART requirements.

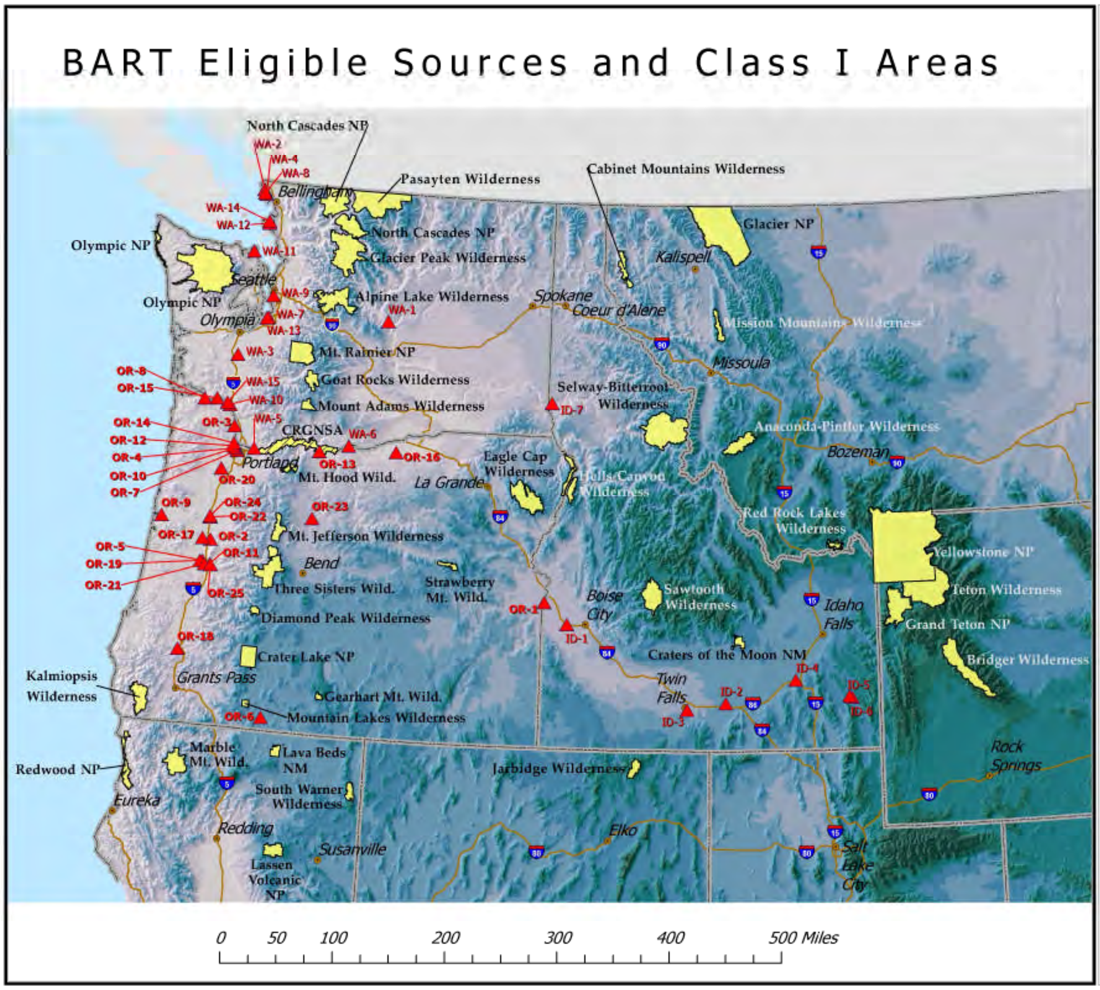
The final list was reduced to seven BART-eligible sources, which are: Amalgamated Sugar Company in Rupert, in Twin Falls, and in Nampa, Potlatch Corporation, Nu West/Agrium, Monsanto/P4 Production, and Simplot Don Plant (Don Siding Complex). The table below lists the BART-eligible sources and pollutants.

Table 10-2 List of BART Eligible Sources

Company Name	BART Units (Year in Operation)	Tons per year		
		NOx	SOx	PM
Amalgamated Sugar (Nampa)	Riley Boiler (1969)	1,708	2,770	55
Amalgamated Sugar (Paul)	Erie City Boiler (1964)	1,314	1,051	272
Amalgamated Sugar (Twin Falls)	Foster Wheeler Boiler (1973)	962	1,648	138
Nu West/ Agrium	East Sulfuric Acid Plant (1973)		945	
J. R. Simplot Don Plant	Granulation No 2 (1964), East Cooling Tower (1966), West Cooling Tower(1976), Ammonium (1964) Sulfate ID1, ? Ammonia Plant ID1 (1964)	7.4		842.4
Monsanto/P4 Production LLC	No. 5 Kiln (1965) No. 9 Furnace and flare(1960)	1,625	1,230	51
Potlatch Pulp & Paper	No 4. Recovery Furnace (1970), No 4. Smelt Dissolving Tank (1970), No. 4 Lime Kiln (1976)	237	821	289

The seven BART-eligible sources are located throughout Idaho. Figure 10-1 displays the locations of BART-eligible sources throughout the Northwest.

Figure 10-1 BART Eligible Sources in Idaho and Washington



10.3 Sources Subject to BART

A source is *subject to BART* if it is reasonably anticipated to cause or contribute to impairment of visibility in a Class I area. According to the Appendix Y guidance (Guidelines for Best Available Retrofit Technology (BART) Determinations contained in 40 CFR Part 51), a source is considered to contribute to visibility impairment if the modeled 98th percentile change in *deciviews* (delta-deciview) is equal to or greater than a contribution threshold of 0.5 deciviews. Although the Appendix Y guidance does provide for thresholds less than 0.5 deciviews and cumulative impacts, it was determined through negotiated rulemaking with industry, federal land management agencies, DEQ, and the public that the "contribute" threshold for a single source would be established at 0.5 deciviews. (See IDAPA 58.01.01.668.02.b.) As suggested in the Appendix Y guidance, the determination was made by modeling.

DEQ used the CALPUFF air dispersion modeling system (version 6.112) to determine if the 0.5-deciview threshold is exceeded by any of the BART-eligible sources in Idaho. The modeling of BART-eligible sources was performed in accordance with the *BART Modeling Protocol13*, which was jointly developed by the states of Idaho, Washington, and Oregon, and which has undergone public review and revision. Refer to the *BART Modeling Protocol* for details on the modeling methodology used in this subject-to-BART analysis (see Appendix F).

Idaho DEQ, in cooperation with Washington State of Ecology and Oregon Department of Environmental Quality, contracted with Geomatrix Consultants to develop CALMET datasets to use for the CALPUFF BART modeling. The CALMET datasets were based on runs of the Penn State and National Center of Atmospheric Research Mesoscale Model (MM5) performed at Washington University. There were two CALMET datasets produced, one using 12-kilometer (km) mesh size and another using 4-km mesh size14 (See Appendix F).

As part of the contract, Geomatrix Consultants ran MESTAT (meteorology model) to quantify the quality of the MM5 files used as the meteorological dataset in CALMET, which was used in the CALPUFF modeling. MESOSTAT pairs the MM5 forecasted data with meteorological observations and then performs various statistical manipulations and aggregates the results for output15 (see Appendix F).

Subject-to-BART analysis results with the two threshold values:

- 8th highest value for each of the years modeled (2003-2005; 365 days each), representing the 98th percentile (8/365 = 0.02) cutoff for delta-deciview in the each year.

1. 22nd highest value for the entire period from 2003 through 2005, representing the 98th percentile (22/1095 days = 0.02) cutoff for delta-deciview over three years.

10.3.1 Pollutants to Consider

The Appendix Y guidance specifies that sulfur dioxide (SO_2), oxides of nitrogen (NOx), and direct particulate matter (PM) emissions, including both PM_{10} and $PM_{2.5}$, should be included for BART exemption and BART determination modeling analyses.

The Appendix Y guidance also discusses the inclusion of volatile organic compounds (VOCs), and ammonia and ammonia compounds, and suggests the pollutants be included if it is determined that they are reasonably anticipated to cause or contribute to visibility impairment. During the development of the Modeling Protocol, Idaho and Oregon

---

13 *Modeling Protocol for Washington, Oregon and Idaho: Protocol for the Application of the CALPUFF Modeling System Pursuant to the Best Available Retrofit Technology (BART) Regulation.*
http://www.deq.idaho.gov/air/prog_issues/pollutants/haze_BART_modeling_protocol.pdf

14 *Modeling Protocol for BART CALMET datasets, Idaho Oregon and Washington,* Geomatrix Consultants Inc., July 12, 2006

15 *INITIAL METSTAT REPORT CALMET Fields for BART Idaho, Oregon and Washington,* Geomatrix Consultants

determined that they have no significant sources of VOC, ammonia, or ammonia compounds that require a full BART exemption analysis.

10.3.2 Emissions and Facility Parameters

The Appendix Y guidance states, *"the emission estimates used in the models are intended to reflect steady-state operating conditions during periods of high capacity utilization."* These emissions estimates should not generally include start-up, shutdown, or malfunction conditions. The Appendix Y guidance recommends that states use the 24-hour average actual emission rate from the highest-emitting day of the meteorological period modeled. The meteorological period is 2003 – 2005.

Throughout 2006, DEQ worked with BART-eligible sources to identify the maximum 24-hour emissions and facility parameters such as stack heights, stack velocities, and temperatures. This information was refined and used in the subject-to-BART modeling. A separate "Subject-to-BART Analysis" was developed for each of the BART-eligible facilities (See Appendix F). The analysis shows all but Amalgamated Sugar's (TASCO's) Nampa facility were exempt from BART with a threshold of less than 0.5 deciviews. For each of the BART-eligible facilities, the following tables show the subject-to-BART modeling results for the Class I areas within 300 kilometers.

Table 10-3 Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the TASCO Riley Boiler, Nampa.

Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest[a]	Total days[b]	8th highest	Total days	8th highest	Total days	22nd Highest[c]	Number of Days[d] (2003,2004,2005)
Craters of the Moon	0.161	2	0.224	2	0.153	0	0.196	2
Eagle Cap Wilderness, OR	0.87	20	1.355	46	1.302	46	1.325	112
Hells Canyon Wilderness, ID-OR	0.772	13	1.031	27	0.9	21	0.936	61
Jarbidge Wilderness, NV	0.151	0	0.198	1	0.201	1	0.179	2
Sawtooth Wilderness, ID	0.239	2	0.294	4	0.265	0	0.271	6
Selway-Bitterroot Wilderness, ID and MT	0.186	0	0.305	1	0.264	2	0.243	3
Strawberry Mountain Wilderness, OR	0.782	12	0.639	13	1.596	31	0.943	56

a. The 8th highest delta-deciview for the calendar year.
b. Total number of days in 1 year that exceeded 0.5 delta-deciviews.
c. The 22nd highest delta-deciview value for the 3-year period.
d. Total number of days in the 3-year period that exceed 0.5 delta-deciviews.

Table 10-4. Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the TASCO Erie City Boiler, Paul, Idaho.

Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value greater than 0.5 from one year period						Delta-Deciview Value greater than 0.5 from 3 year period	
	2003		2004		2005			
	8th highest	Total days	8th highest	Total days	8th highest	Total days	22nd Highest	Number of Days (2003, 2004, 2005)
Yellowstone NP, WY	0.079	1	0.087	0	0.1	0	0.086	1
Red Rock Lakes, MT	0.073	0	0.088	0	0.08	0	0.081	0
Sawtooth, ID	0.046	0	0.045	0	0.063	0	0.053	0
Teton Wilderness, WY	0.051	0	0.053	0	0.067	0	0.056	0
Jarbidge Wilderness, NV	0.05	0	0.061	0	0.071	0	0.061	0
Yellowstone NP, WY	0.079	1	0.087	0	0.117	0	0.086	1
Craters of the Moon, ID	0.398	4	0.412	3	0.324	4	0.380	11

Table 10-5. . Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the TASCO Foster Wheeler Boiler, Twin Falls, Idaho.

Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005			
	8th highest	Total days	8th highest	Total days	8th highest	Total days	22nd Highest	Number of Days (2003,2004,2005)
Great Teton NP, WY	0.076	0	0.073	0	0.085	0	0.073	0
Red Rock Lakes, MT	0.072	0	0.072	0	0.066	0	0.072	0
Sawtooth Wilderness, ID	0.033	0	0.061	0	0.05	0	0.047	0
Jarbidge Wilderness, NV	0.107	0	0.152	2	0.101	0	0.124	2
Craters of the Moon, ID	0.211	0	0.381	3	0.256	1	0.270	4

Table 10-6. . Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the Nu-West East Sulfuric Acid Plant.

Source Name: ID6, Nu-West East Sulfuric Acid Plant								
Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest	Total days	8th highest	Total days	8th highest	Total days	22nd Highest	Number of Days (2003-2005)
Sawtooth Wilderness, ID	0.012	0	0.029	0	0.035	0	0.027	0
Red Rock Lakes Wilderness, MT	0.051	0	0.069	0	0.059	0	0.057	0
North Absaroka Wilderness, WY	0.024	0	0.038	0	0.044	0	0.038	0
Craters of the Moon Wilderness, ID	0.048	0	0.056	0	0.08	0	0.073	0
Bridger Wilderness, WY	0.046	0	0.044	0	0.051	0	0.049	0
Fitzpatrick Wilderness	0.032	0	0.022	0	0.038	0	0.032	0
Grand Teton National Park, WY	0.099	0	0.114	0	0.126	0	0.120	0
Teton Wilderness, WY	0.057	0	0.072	0	0.073	0	0.069	0
Washakie Wilderness, WY	0.026	0	0.041	0	0.045	0	0.038	0
Yellowstone National Park, WY	0.062	0	0.102	0	0.11	0	0.101	0

Table 10-7. . Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the J.R. Simplot Pocatello facility, Idaho.

Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest	Total days	8th highest	Total days	8th highest	Total days	22nd Highest	Number of Days
Bridger Wilderness, WY	0.048	0	0.033	0	0.041	0	0.041	0
Craters of the Moon, ID	0.237	0	0.376	4	0.244	0	0.278	4
Fitzpatrick Wilderness	0.036	0	0.027	0	0.03	0	0.031	0
Grand Teton NP, WY	0.121	0	0.084	0	0.101	0	0.105	0
Jarbidge Wilderness, NV	0.026	0	0.015	0	0.039	0	0.028	0
North Absaroka Wilderness, WY	0.035	0	0.025	0	0.034	0	0.033	0
Red Rock Lakes, MT	0.11	0	0.11	0	0.107	0	0.11	0
Sawtooth, ID	0.024	0	0.038	0	0.039	0	0.038	0
Teton Wilderness, WY	0.06	0	0.055	0	0.063	0	0.06	0
Washakie Wilderness, WY	0.038	0	0.031	0	0.038	0	0.037	0
Yellowstone NP, WY	0.117	0	0.106	0	0.139	0	0.116	0

Table 10-8. . Change in Visibility Compared Against 20% Best Days Natural Background Conditions for Class I areas within 300 km from the Potlatch No. 4 Recovery Furnace, No. 4 Smelt Dissolving Tank, and Lime Kiln 4, Lewiston, Idaho.

Source Name: ID7 Potlatch, ID								
Class I Area	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest	Total days	8th highest	Total days	8th highest	Total days	22nd Highest	Number of Days
Alpine Lakes Wilderness, WA	0.115	0	0.176	0	0.166	0	0.159	0
Anaconda-Pintler Wilderness, WY	0.058	0	0.057	0	0.051	0	0.057	0
Bob Marshall Wilderness, MT	0.056	0	0.065	0	0.049	0	0.057	0
Cabinet Mountains Wilderness, MT	0.101	0	0.137	0	0.1	0	0.109	0
Eagle Cap, OR	0.14	0	0.17	1	0.209	0	0.171	1
Hells Canyon, ID	0.31	2	0.323	5	0.213	1	0.292	8
Mission Mountain Wilderness, MT	0.08	0	0.08	0	0.056	0	0.078	0
Saw Tooth, ID	0.023	0	0.033	0	0.028	0	0.028	0
Scapegoat Wilderness, MT	0.036	0	0.056	0	0.039	0	0.044	0
Selway-Bitterroot, ID-MT	0.196	0	0.224	1	0.173	1	0.207	2
Strawberry Mountain, OR	0.064	0	0.055	0	0.1	0	0.07	0

Monsanto/P4 Production (P4 Production) did not go through the subject-to-BART determination process because the facility had recently undertaken a Best Available Control Technology (BACT) analysis and it was believed the “Best” BART control technologies had been installed during this process. DEQ and P4 agreed to move directly to the BART determination process.

All of the Idaho BART-eligible facilities were exempted from the BART determination process because they were below the 0.5 deciview threshold with the exceptions of TASCO Nampa and P4 Production.

10.4 BART Control Determination Process

The third phase of the BART process is the determination of technically feasible control technologies. The Clean Air Act defines five factors in making this determination. They include:

- The cost of compliance,
- The energy and non-air quality environmental impacts of compliance,
- Any existing pollution control technology in use at the source,
- The remaining useful life of the source, and
- The degree of visibility improvement which may reasonably be anticipated from the use of BART.

To make the BART determination, DEQ asked TASCO and P4 Production to follow the Appendix Y guidance for the implementation of BART as found at 70 FR 39156 (July 6, 2005). Although use of this guidance was required for electrical generation units (EGUs), EPA has determined there is no reason the guidance cannot be used for other BART categories.

The five BART determination steps described in the Appendix Y guidance can be summarized as follows:

Step 1 – Identify all available retrofit emissions control techniques (three categories)

- Pollution prevention (use of inherently lower-emitting processes/practices)
- Use of (and where already in place, improvement in the performance of) add-on controls
- Combination of pollution prevention and add-on controls

Step 2 – Determine technically feasible options – those that are

- Available (commercial availability)
- Applicable (Has it been used on the same or a similar source type?)

Step 3 – Evaluate technically feasible options

- Express the degree of control using a metric that ensures an "apples to apples" comparison of emissions performance levels among options; one example would be to evaluate all options in terms of pound of sulfur dioxide per million British thermal units (lb SO_2/MMBtu).
- Give appropriate treatment and consideration of control techniques that can operate over a wide range of emissions performance levels (evaluate the most stringent control level that the technology is capable of achieving plus other scenarios).

Step 4 – Impact analysis

- Cost of compliance (Identify emissions units and design parameters, and develop cost estimates.)
  - The baseline emissions rate should represent a realistic depiction of anticipated annual emissions from the source. In general, for the existing sources that are subject to BART, estimate the anticipated annual emissions based upon actual emissions from a baseline period.
- Energy impacts
  - Include only the direct energy consumption for the control device, not indirect energy impacts
- Non-air quality environmental impacts
  - Include solid or hazardous waste generation or discharges of polluted water from a control device
- Remaining useful life
  - Can be included in the cost analysis

Step 5 – Determine visibility impacts (improvements projected by modeling)

- Run the model at pre-control and post-control emissions rates
  - Pre-control emissions rates = max 24-hour used in subject-to-BART modeling
  - Post-control emissions rates = % of pre-control rates (e.g., if the technology has 95% control efficiency, the post-control emissions rate equals 95% of pre-control rate)
  - Calculate results for each receptor as the change in deciviews compared against natural visibility
- Determine net visibility improvement
  - Consider frequency, magnitude, and duration components of impairment
  - Can compare 98th percent days

10.5 TASCO BART Determination

After numerous consultations between DEQ and TASCO concerning emissions rates, facility parameters, and the BART process, TASCO submitted a "Best Available Retrofit Technology Determination – Riley Boiler" on November 20, 2007. After reviewing TASCO's proposed determination, DEQ requested that TASCO revise it to include some additional control technologies that DEQ considered technically feasible, evaluate them using the five steps listed above, and provide additional cost and financial detail. TASCO revised their proposed determination and resubmitted the information on February 6, 2009 (This document is included in Appendix F). As part of the revisions, DEQ performed the CALPUFF modeling to identify changes in visibility based on the emissions estimates and facility parameters provided by TASCO for each of the technically feasible control technologies for each pollutant identified as requiring BART determination.

The TASCO BART determination involves only the Riley Boiler at the TASCO facility in Nampa, Idaho. The other units at TASCO were not constructed or started production within the BART eligible time frame.

Throughout the BART determination process, TASCO has claimed financial hardship and the inability to pay for BART controls. DEQ relied upon an EPA Region X economist to provide the technical expertise in reviewing TASCO's claims and the supporting documentation. The economist's executive summary can be found in Appendix F.

10.5.1 TASCO NO_x Controls

In 2006, TASCO installed a new pulp steam dryer system which better utilized current steam production and allowed several old pulp dryers to shut down. The pulp drying typically occurs during the fall and winter months, which is when TASCO's emissions have the greatest impact on the 20% worst days. Table 10-9 is a summary of the emission reductions attributed to the shutdown of the old pulp dryers.

Table 10-9 Pollution Reductions from Shutdown of Old Pulp Dryers

Pollutant	Maximum Hourly (lbs/hr)	Average Annual (tons/year)
Particulate Matter (PM)	98.1	113
SO_2	17.8	20.6
NO_x	191	221

There are no incremental costs associated with the shutdown of the old pulp dryers since they were installed in 2006 and actually save the company money. As part of the determination of impact and visibility improvements TASCO requested that DEQ consider the visibility improvements associated with shutting down the old pulp dryers and determine that the emissions reductions resulting from using the new steam dryers instead could be accepted as an alternative to BART.

As part of the BART determination modeling, DEQ ran the model with and without emissions from the old pulp dryers and compared the visibility to determine the amount of improvement expected. Since some of the old pulp dryers have been shut down since 2006, the modeling scenario for establishing the baseline included the reductions from shutting them down. For each control scenario, plant-specific parameters were taken into consideration. The different control scenarios include changes in stack flow and temperatures. Table 10-10 depicts the modeled visibility changes for several scenarios with different combinations of technically feasible NOx controls and the shutdown of the old pulp dryers, and the costs associated with each scenario. The highest impacts from TASCO occur at Eagle Cap Wilderness. Although Eagle Cap Wilderness is outside of Idaho, the regional haze rule requires the state to address impacts in other states.

Table 10-10. NO_x Visibility Improvements Expected from BART at TASCO Nampa

Eagle Cap Wilderness, OR	Change in Visibility Compared Against 20% Best Days Natural Background Conditions									
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period		Change in Visibility	Incremental Cost
	2003		2004		2005		2003-2005		2003-2005	($/ton)
	8^{th} highest[a]	Total days[b]	8^{th} highest	Total days	8^{th} highest	Total days	22^{nd} Highest	Number of Days[d] (2003-2005)		
Baseline Riley Boiler Plus Pulp Dryer Full Operation Scenario (wzl10469)	0.956	23	1.454	49	1.388	55	1.399	127	0.000	
Baseline Riley Boiler Scenario (wzl10471)	0.721	15	1.086	41	1.109	41	1.086	97	0.313	$0
NOx Control Scenario 1 – LNB* (wzl10472)	0.511	11	0.822	29	0.871	29	0.816	69	0.270	$0
NOx Control Scenario 2 – LNB w/ OFA* (wzl10473)	0.454	7	0.743	24	0.803	25	0.736	56	0.350	$2,431
NOx Control Scenario 3 – SCR* (wzl10474)	0.383	6	0.625	16	0.653	18	0.613	40	0.473	$10,245

LNB – Low NOx burners; LNB w/ OFA -- Low NOx burners with Over-Fire Air; SCR – selective catalytic reduction

Looking at projected changes in visibility improvements, the shutdown of the old pulp dryers has provided more visibility improvement than low NO_x burners (LNB) would and nearly the improvement that would be expected from LNB with over-fire-air (LNB w/ OFA). The largest expected improvement in visibility attributed to NO_x controls would come from selective catalytic reduction (SCR). However, the incremental cost of $10,000 per ton for the additional 15% removal efficiency is relatively high. An option for TASCO would be to accept permanent permit limits that account for the shutdown of all the old pulp dryers and installation of LNB w/OFA.

10.5.2 TASCO SO_x Controls

Options among potential controls for SO_x were not as clear-cut. As part of the impact analysis, non-air quality environmental concerns msut be taken into consideration, as directed in the Appendix Y guidance. Wet flue gas desulfurization (FGD) has a 15% greater efficiency for removal of SO_x compared with the next most-efficient SOx removal control technology, which is spray-dry FGD. However, using wet FGD has the potential to reverse the current trend of improvements in ground water quality due to TASCO land-applying some of their wastewater, and the need to avoid this reversal outweighs the environmental benefits that could be expected with wet FGD. TASCO is currently sending pretreated wastewater to the City of Nampa (in addition to land-applying a different portion of their wastewater). There is a high likelihood that an increase in TASCO's wastewater stream would be greater than the city can currently handle. This would more than likely lead to TASCO requesting an increase in the amount of wastewater they are permitted to land-apply, which would have a negative impact on ground water quality. For these reasons, DEQ has not included wet FGD in the control options considered even though the technology is technically feasible for improvements in air quality and visibility.

10.5.3 TASCO Particulate Matter Controls

For particulate matter (PM) controls, it was determined that the current baghouse (particulate filtration system) at TASCO provides the same emissions reductions as all other technically feasible control technologies. Therefore, it was determined the current baghouse is the "best" BART control technology.

10.5.4 TASCO BART Determination Conclusion

DEQ recommends the following BART controls for TASCO Nampa.

- *NOx controls*. TASCO has two options for NO_x controls. It can install SCR on the Riley Boiler or install LNB w/ OFA and accept permanent permit limits that account for shutting down all the old pulp dryers.
- *SOx controls.* Although wet FGD has the promise of providing greater emissions reductions than spray-dry FGD, the benefits of wet FGD are outweighed by the likelihood of requiring additional land application of wastewater.
- *Particulate matter controls*. The current baghouse provides the same emissions reductions as other options would, at no additional expense.

All together, DEQ recommends a combination of retaining the current baghouse, adding low NOx burners with over-fire-air (plus permit limits reflecting shut down of all pulp dryers), and adding spray-dry FGD as the "best" of BART technologies for TASCO Nampa. Below is a summary table showing the visibility improvements expected from the "best" of BART control technologies identified in this determination and recommended by DEQ. It should be noted the Base Riley Boiler scenario includes the current baghouse and pulp dryer shutdown.

Based on the "best" BART controls recommended by DEQ (current baghouse, LNB w/ OFA, spray-dry FGD), Table 10-11 shows visibility improvements expected at Eagle Cap Wilderness (the Class I area with the greatest impact from TASCO Nampa emissions).

TASCO Nampa BART permits can be found on the DEQ website at the following locations:

http://www.deq.idaho.gov/air/permits_forms/t2_final/amalgamated_sugar_nampa_t2_0910_statement.pdf

http://www.deq.idaho.gov/air/permits_forms/t2_final/amalgamated_sugar_nampa_t2_0910_permit.pdf

Table 10-11 Visibility Improvement – TASCO Nampa Best BART Alternatives

Eagle Cap Wilderness, Oregon	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-deciview value larger than 0.5 from one year period						Delta-deciview value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest[a]	Total days[b]	8th highest	Total days	8th highest	Total days	22nd Highest[c]	Number of Days[d] (2003,2004,2005)
Baseline Riley Boiler* Scenario (wzi10471)	0.721	15	1.086	41	1.109	41	1.086	97
Baseline Riley Boiler Plus Pulp Dryer Full Operation Scenario** (wzi10469)	0.956	23	1.454	49	1.388	55	1.399	127
NO_x Scenario 2 + SO2 Scenario 4 (wzi10484)	0.228	1	0.319	1	0.330	1	0.319	3

a. The 8th highest delta-deciview for the calendar year.
b. Total number of days in 1 year that exceeded 0.5 delta-deciviews.
c. The 22nd highest delta-deciview value for the 3-year period.
d. Total number of days in the 3-year period that exceed 0.5 delta-deciviews.

The baseline Riley Boiler scenario includes operation of the current baghouse and shutdown of the old pulp dryers/

** This scenario does not include shutdown of the old pulp dryers

10.6 P4 Production BART determination

In September of 2006, DEQ began discussion with P4 Production, LLC (P4; formerly Monsanto/P4) regarding whether their facility was BART-eligible and what controls would be required if it was determined they were subject to BART. At the time, DEQ was reviewing a BACT permit application for P4 and it was believed the BACT controls were equivalent to the "best" of BART controls. To streamline the process, DEQ requested that P4 provide documentation showing that no other technically feasible emissions control systems had the potential to provide greater emissions reductions than those controls installed to meet BACT. A BART determination was still done.

The two emissions units identified in Table 10-12 were identified as fitting the BART-eligible time frames and emissions.

Table 10-12 P4 Potential BART-Eligible Emissions Units

P4 Production LLC				
Emission Units	Original Installation Date	Regional Haze Pollutant	2004 CEER Actual Emissions (typ)	Current Potential to Emit
#5 Rotary Kiln	1965	SO_2	12,252	626
		NO_x	1,625	2,721
		PM_{10}	38	89

# 9 Furnace and Flare	1966	SO_2	0.12	48
		NO_x	0.13	53
		PM_{10}	0.65	256

10.6.1 P4 NO_x Controls

P4 conducted and DEQ reviewed a search of EPA's RACT/BACT/LEAR16 clearinghouse (RBLC) in an effort to identify BART control options for NO_x. P4's search identified selective non-catalytic reduction (SNCR) as the only potential NO_x control for rotary kilns as listed in the clearing house. Upon further investigation, it was determined the off gas temperatures of the #5 rotary kiln (#5 kiln) are too low for SNCR to function properly. Low NO_x burner (LNB) technology was also reviewed but it was determined the LNB burner temperatures are too low for P4's purposes.

The clearinghouse also did not identify any technically feasible NO_x control options for #9 furnace and flare. There may be some control technologies that might work on the #9 furnace flare but DEQ concluded that reducing the flare emissions, which are already less than 23 tons per year, is not economically feasible. Since there are no technically feasible NOx control options for either of these two units, no new BART controls will be required for that purpose.

10.6.2 P4 SO_x Controls

The #5 kiln uses four parallel hydro-sonic scrubbers for removal of submicron particles. The exhaust gases exit the scrubbers and pass through cyclonic separators and fans prior to exiting the atmosphere. In addition, a lime-concentrated dual-alkali (LCDA) scrubber to control SO_2 emissions from the kiln was installed by P4 in 2005. The LCDA scrubbing process uses the hydro-sonic scrubbers to absorb SO_2 with a solution of sodium salts.

In support of a BACT analysis submitted in 2006, P4 searched the RBLC for all permits issued since 2001 that included SO_2 controls. After reviewing all the technically feasible options, it was determined, that because the current control efficiency of the LCDA scrubber, at roughly 97%, is similar to the control efficiencies of the other technologies, the additional expense of installing other technologies and disposing of current technologies wasn't warranted.

The #9 furnace and flare were also reviewed for BART controls. Emissions from this source can be vented through the existing Tap Hole Fume Collector Scrubber, or through the existing CO Flare. After reviewing the available controls listed in the RBLC, it was determined there are no technically feasible control technologies for the #9 furnace and CO flare.

10.6.3 P4 Particulate Matter Controls

Currently, particulate emissions from the #5 kiln are controlled by four Hydro-Sonic scrubbers. The #9 furnace is controlled by a cyclonic separator and venturi scrubber unit known as the Tap Hole Fume Collector Scrubber. The current control technologies in place

16 Information on EPA's clearinghouse is available at: http://www.epa.gov/ttncatc1/

at P4 provide emissions reductions similar to those provided by the other options, so no additional controls are required for this purpose at P4.

10.6.4 P4 BART Determination Conclusion

The “four factor analysis” shows there are no technically feasible NO_x controls and the controls included in P4’s BACT determination also meet the “best” of BART for particulate and SO_x controls. The hydro-sonic and LCDA scrubbers on Kiln #5 have reduced emissions from 12,252 tons per year (tpy) in 2004 to a permitted potential to emit of only 626 tpy as shown in table 10-12. The emissions reductions from the #5 kiln are substantial and account for a reduction of more than 50% of the base year point source emissions shown in table 8-1 in Chapter 8. Table 10-14 below shows the number of days that are no longer have visibility impacts greater than 0.5 deciview due to the SOx control technologies that have been put in place at P4. The P4 BART determination is available in Appendix F.

P4’s BART permits can be found on the DEQ website at the following locations:

http://www.deq.idaho.gov/air/permits_forms/t2_final/p4_soda_springs_t2_1109_statement.pdf

http://www.deq.idaho.gov/air/permits_forms/t2_final/p4_soda_springs_t2_1109_permit.pdf

10.7 BART Enforceable Emissions Limits

Based on the “best” BART controls at TASCO Nampa and P4 Production, the enforceable emissions limits shown in Table 10-14 are established as found in federally enforceable permits. (The TASCO permit is currently in draft, so those limits are included here as an example.) While these permits may change over time, the underlying BART permit requirements will be retained and included in federally enforceable permits.

Table 10-13 BART Enforceable Emission Limits

TASCO Nampa	Emissions Unit	In Lb/hr	In Other Units	Notes
NOx	Riley Boiler	186		
SOx		115		
PM		14		
P4 Production	#5 Kiln			
NOx				
SOx		143	626 tpy	
PM				

10.8 Visibility Improvements Based on Emission Limits

The following tables show the visibility improvements at Monsanto/P4 and TASCO based on the before emission controls and after BART technologies have or will be installed. These tables look at the visibility improvements at all of the class I areas within 300km from the source. The BART controls at P4 reduced the total number of days over 0.5 deciviews impact by 317 days as shown in table 10-14.

Table 10-14 Difference in the number of days with visibility impairment of more than 0.5 decivew between base year and future controls

Impacted Class I Areas within 300km range from P4 Facility	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Improvement in Highest Delta-Deciview Values and Reduction in Days > 0.5ΔDV for Individual Years						Improvement over 3 year Period	
	2003		2004		2005		2003-2005	
	Decrease in 8th Highest	Days >0.5ΔDV Reduced	Decrease in 8th highest	Days >0.5ΔDV Reduced	Decrease in 8th highest	Days >0.5ΔDV Reduced	Decrease in 22nd Highest	Total days > 0.5ΔDV Reduced
Bridger Wilderness, WY	0.207	14	0.219	8	0.285	19	0.237	41
Craters of the Moon NM, ID	0.147	4	0.517	10	0.963	19	0.595	33
Fitzpatrick Wilderness, WY	0.185	5	0.155	4	0.211	8	0.199	17
Grand Teton NP, WY	0.484	10	0.578	16	0.585	16	0.542	42
Jarbidge Wilderness, NV	0.064	1	0.073	1	0.273	3	0.159	5
North Absaroka Wilderness, WY	0.095	4	0.27	7	0.265	7	0.241	18
Red Rock Lakes Wilderness, MT	0.39	6	0.553	9	0.602	15	0.404	30
Sawtooth Wilderness, ID	0.099	1	0.247	5	0.297	9	0.224	15
Teton Wilderness, WY	0.311	11	0.4	19	0.373	20	0.383	50
Washakie Wilderness, WY	0.144	3	0.269	9	0.262	8	0.254	20
Yellowstone NP, WY	0.366	13	0.498	11	0.569	22	0.572	46
Total Reduction in Days > 0.5 ΔDV		**72**		**99**		**146**		**317**

The visibility modeling for TASCO looked at the scenarios of the Riley boiler emissions with the shutdown of the old pulp dryers (present emissions), the Riley boiler emissions including the old pulp dryer (baseline conditions), and the Riley Boiler with projected emission reductions from the selected BART technologies. The modeling analysis included all of the class I areas within 300km.

Table 10-15 TASCO, Nampa - BART Visibility Improvements

Class I Area/Scenario	Change in Visibility Compared Against 20% Best Days Natural Background Conditions							
	Delta-Deciview Value larger than 0.5 from one year period						Delta-Deciview Value larger than 0.5 from 3 year period	
	2003		2004		2005		2003-2005	
	8th highest[a]	Total days[b]	8th highest	Total days	8th highest	Total days	22nd Highest[c]	Number of Days[d] (2003,2004,2005)
Eagle Cap Wilderness, Oregon								
Base Riley Boiler Scenario (wzl10471)	0.721	15	1.086	41	1.109	41	1.086	97
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.956	23	1.454	49	1.388	55	1.399	127
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.228	1	0.319	1	0.330	1	0.319	3
Hells Canyon National Recreation Area, ID/OR								
Base Riley Boiler Scenario (wzl10471)	0.577	9	0.888	20	0.763	19	0.786	48
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.799	16	1.056	30	0.954	32	1.018	78
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.187	1	0.255	0	0.214	0	0.228	1
Sawtooth Wilderness Area								
Base Riley Boiler Scenario (wzl10471)	0.207	1	0.249	1	0.208	0	0.224	2
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.318	2	0.327	3	0.268	0	0.317	5
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.064	0	0.066	0	0.057	0	0.064	0
Jarbidge Wilderness, NV								
Base Riley Boiler Scenario (wzl10471)	0.131	0	0.181	0	0.202	0	0.172	0
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.166	1	0.237	2	0.251	2	0.230	5
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.038	0	0.047	0	0.054	0	0.047	0
Craters of the Moon National Monument, ID								
Base Riley Boiler Scenario (wzl10471)	0.183	0	0.197	0	0.144	0	0.192	0
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.215	0	0.245	3	0.208	1	0.232	4
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.054	0	0.060	0	0.041	0	0.054	0
Selway-Bitterroot, ID								
Base Riley Boiler Scenario (wzl10471)	0.151	0	0.289	0	0.235	1	0.219	1

Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.197	0	0.337	1	0.294	2	0.255	3
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.042	0	0.076	0	0.064	0	0.058	0
Strawberry Mountain Wilderness, OR								
Base Riley Boiler Scenario (wzl10471)	0.517	8	0.410	6	1.168	23	0.685	37
Base Riley Boiler plus Pulp dryer full operation Scenario (wzl10469)	0.912	13	0.680	16	1.550	31	0.992	60
NOx scenario 2 + SO2 scenario 4 (wzl10484)	0.189	0	0.112	0	0.351	2	0.217	2

Chapter 11. Idaho REASONABLE PROGRESS GOAL DEMONSTRATION

11.1 Overview

The intent of the Regional Haze Rule is to improve visibility back to natural conditions over a 60-year time frame. The starting point for this improvement is the base period from 2000 through 2004 with the goal of reaching natural conditions by 2064. Over this time period, states are required to show "reasonable progress" every ten years with the first planning period ending in 2018.

For each planning period, the State is required to establish reasonable progress goals (RPGs; expressed in deciviews) for each Class I area. These goals must show an improvement in the 20% worst visibility-impaired days and not allow any degradation of visibility on the 20% best visibility days.

In developing the RPGs, the state must take four factors into consideration: the cost of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of the potentially affected sources. The state must provide a demonstration that describes how these four factors were considered.

In establishing RPGs, the states must also take into consideration the Uniform Rate of Progress (URP) which is the slope of the line between the starting point of the baseline visibility conditions and the end point of natural visibility conditions. This is also referred to as the glide slope. If the state establishes an RPG with a slower rate of improvement than the URP, the state must provide an assessment of the number of years it will take to reach natural conditions based on the rate of progress established by the URP. The state must also demonstrate why the URP is unreasonable based on the four factors.

As noted before, each state is required to consult with other states regarding those other states' visibility impacts on Class I areas within the state and also regarding the state's visibility impacts on Class I areas residing in other states. There have been a number of Class I areas included in this SIP as part of analyzing Idaho's impacts on Class I areas outside the State. However, Idaho is only responsible for setting the reasonable progress goals for Craters of the Moon, Sawtooth Wilderness Area, and Selway-Bitterroot Wilderness Area. The state responsible for setting the RPGs for each Class I area is the state that contains the largest portion of the Class I area. For the other Class I areas that are partially in Idaho, the largest portion of Hells Canyon Wilderness Area resides in Oregon and Yellowstone National Park is primarily within Wyoming.

11.2 Steps in Demonstrating Reasonable Progress

The following steps were followed in setting the RPGs for each Class I area in Idaho:

1. Compare baseline conditions to natural conditions and establish the uniform rate of progress

Identify visibility levels during the baseline period (2000-2004) and natural conditions to be reached in 2064 for the 20% worst and 20% best days at each of the Class I areas for which Idaho has responsibility for the reasonable progress goals. The URP, which is the slope of the line between the baseline conditions and natural conditions was also determined for each of Idaho's Class I areas. For a full description of the IMPROVE monitoring network that provided the data used to establish baseline conditions and the estimates of natural conditions, see Chapter 6.

2. Identify the uniform rate of progress

For each Class I area, calculate the URP glide path from baseline to 2064 including the 2018 planning milestone, for the 20% worst days. Then identify the improvement needed in deciviews by 2018 and 2062. Details are presented in Chapter 6.

3. Identify contributing pollutant species

Analyze the IMPROVE monitoring data to determine the contribution of each visibility impairing pollutant species to the baseline period 20% best and 20% worst days. The full analysis of the pollutants contributing to visibility impairment is presented in Chapter 7.

4. Identify significant emissions sources

Analyze visibility-impairing pollutants coming from point, area, mobile, and fires sources. The base year of 2002 emissions inventory was developed from the emissions inventory submitted by states for EPA's National Environmental Inventory and adjusted by WRAP based on input from the States. Emission inventories projected for 2018 were developed by WRAP in conjunction with states. Details are presented in Chapter 8.

5. Analyze significant sources contributing to impairment

For each Class I area, identify contribution of anthropogenic and natural visibility-impairing pollutants coming from Idaho and from the surrounding states for the 20% worst and 20% best days. Chapter 9 reviews the base year attributions using IMPROVE monitoring data. Also in Chapter 9, the 2018 attribution projections based on reductions resulting from BART controls and "on-the-books" reductions were analyzed using a combination of source apportionment and Weight of Evidence Projection (WEP) modeling.

6. Document the emissions reductions from BART

Determine the emissions reductions associated with BART control strategies that have been or will be installed at the subject-to-BART facilities. Chapter 10 reviews the modeling results for BART-eligible and subject-to-BART facilities and documents the required BART controls that expected to be installed during the first planning period.

7. Identify significant contributing sources and/or source categories and apply the four factor analysis

For each Class I area, review the source attribution information gathered in Chapter 9, and identify significant contributions from anthropogenic source categories for each pollutant. Apply the four factor analysis to those sources and source categories that are identified as significant contributors. A discussion of the source categories identified as significant contributors is provided in section 11.4

8. Establish the reasonable progress goals

Set RPGs (in deciviews) for the 20% worst and 20% best days for each of Idaho's Class I areas. The RPGs will be based on expected BART controls, "on-the-books" controls both in place and expected, and reductions from long term strategies identified in Chapter 12. The RPGs for each of Idaho's Class I areas can be found in Section 11.5

9. Compare the RPG to the 2018 URP milestone.

For each Class I area, compare the established RPG with the milestone that would be achieved in 2018 according to the URP. As described in the opening summary, if the rate represented by the RPG is less than the URP, the state must identify how long it would take to reach natural conditions at the rate represented by the RPG and explain why meeting the URP is not reasonable based on the four factor analysis. This information can be found in section 11.5

11.3 Summary of Four Factor Analysis for Significant Anthropogenic Source Categories

The previous chapters have laid the foundation for establishing reasonable progress. The URP was identified in Chapter 6. The pollutants impacting visibility were analyzed in Chapter 6 and the emissions were outlined in Chapter 7. Chapter 8 was an in-depth analysis of the sources and source categories to which visibility impairments are attributed and the states where the pollutants originated. The next step in establishing RPGs is to determine the visibility impacts of BART, long term strategies, and additional control strategies on anthropogenic sources that are reasonable.

In identifying additional control strategies, EPA's guidance states,

> *"There are numerous possible conceptual approaches that you can use to identify control measures for the long-term strategy and the related RPG. We suggest beginning* ***by concentrating on possible emissions reductions of several pollutant species*** *from a few* ***selected source sectors****,* ***focusing on those source categories that may have the greatest impact on visibility at Class I areas****,* ***considering cost and the other factors …"***
>
> *"The RHR gives the States wide latitude to determine additional control requirements, and there are many ways to approach identifying additional reasonable measures: however, you must at a minimum, consider the four statutory factors. Based on the contribution from certain source categories and the magnitude of their emissions you may determine that little additional analysis is required to determine further controls are not warranted for that category. As discussed further, you have considerable flexibility in how you take these factors into consideration" 17*

Boiled down, the guidance suggests looking at several pollutant species, determining source categories and controls with the greatest impacts on visibility at Class I areas, and using the four factor analysis to determine what is reasonable. Section 308(d)(1)(i)(A) of

17 U.S. Environmental Protection Agency, Guidance for Setting Reasonable Progress Goals under the Regional Haze Program", page 4-1, June 1, 2007.

the Regional Haze Rule instructs that the following four factors be taken into consideration in selecting the goal:

1. cost of compliance,
2. time necessary for compliance,
3. the energy impacts of compliance,
4. and the remaining useful life of any potentially affected sources.

11.3.1 Review of Pollutants and Source Apportionment for the 20% Worst Days

In selecting which visibility-impairing pollutants that should be included as part of the "source sector selection," a review of the pollutants impacting Idaho's Class I areas should be done. The following graphs18, which are taken from Chapter 7, show the major pollutants and their contribution to visibility impairment at Craters of the Moon National Monument, Sawtooth Wilderness, and Selway-Bitterroot Wilderness.

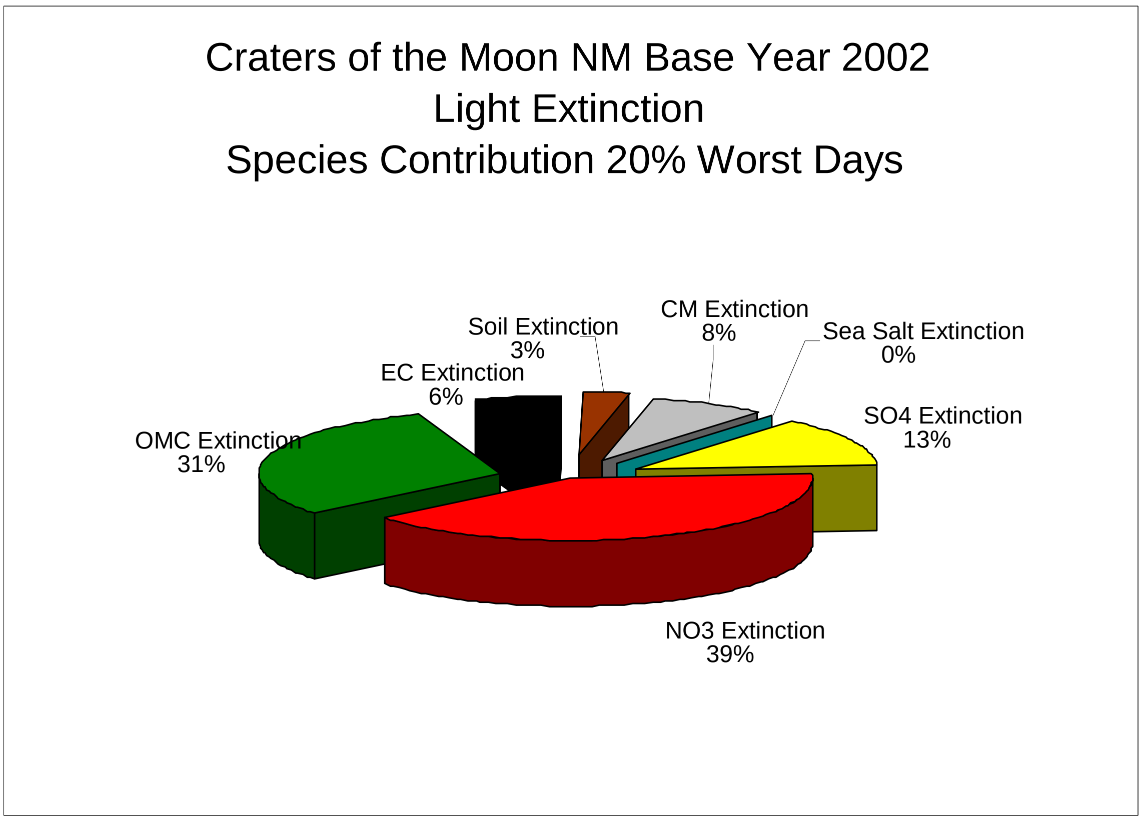


Figure 11-1 Craters of the Moon National Monument 2002 20% Worst Days Species Contribution

18 The visibility pie charts were created using data gathered from the WRAP TSS at: http://vista.cira.colostate.edu/tss/. To view the data, click on "Monitoring", then select the location from the map and select "total light extinction" from the pull down table .

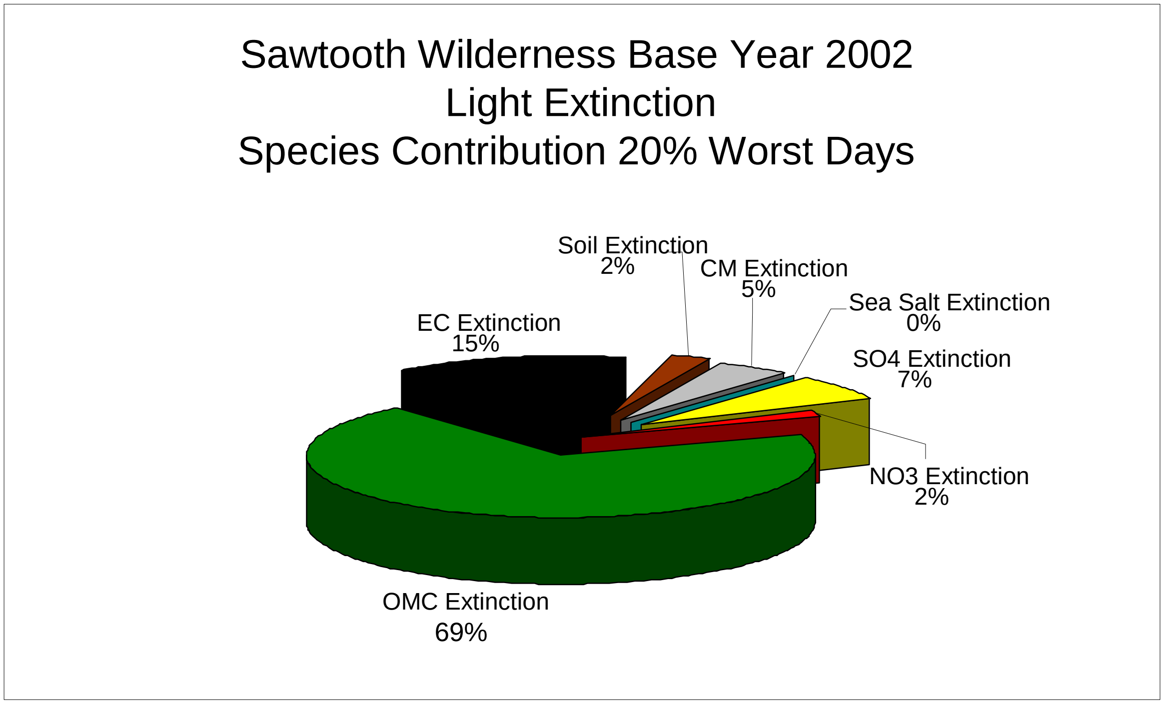


Figure 11-2 Sawtooth Wilderness 20% Worst Days Species Contribution

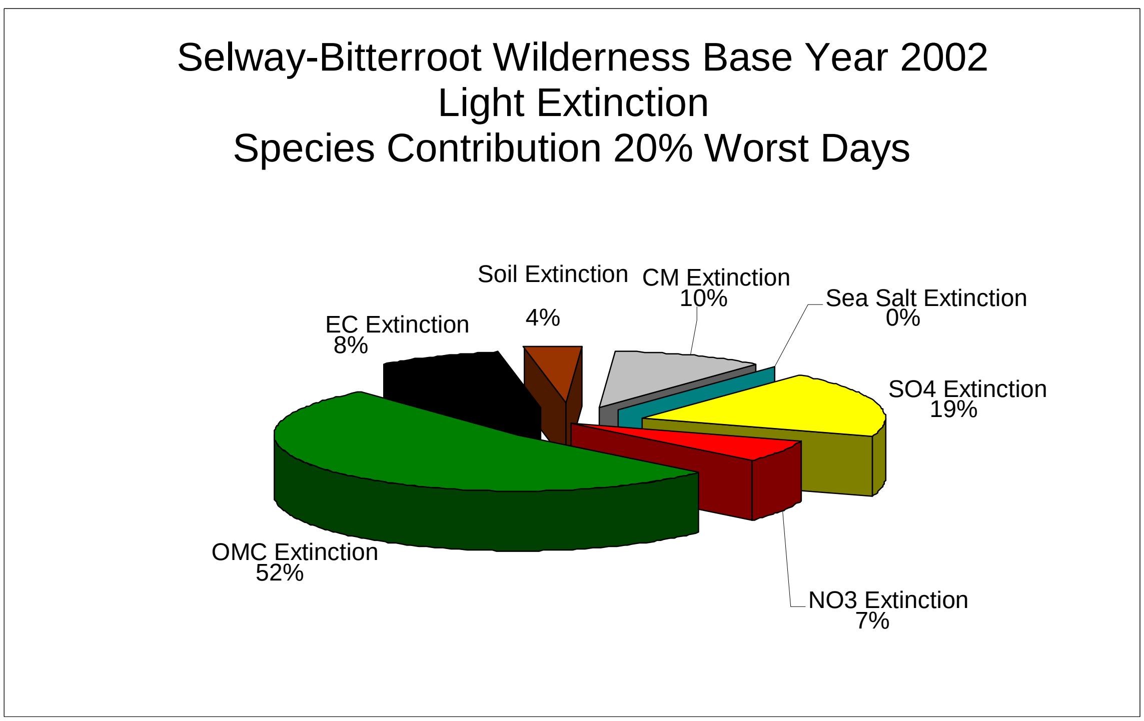


Figure 11-3 Selway-Bitterroot Wilderness 20% Worst Days Species Contribution

The organic mass carbon (OMC) contribution to visibility impairment at The Sawtooth Wilderness and Selway Bitterroot Wilderness is more than 50% (Figures 11-2 and 11-3). At Craters of the Moon National Monument (Figure 11-1), OMC's contribution to visibility impairment is more than 30%. While organic carbon may be a major contributor of visibility impairment, it is almost exclusively from wildfire and therefore isn't a prime pollutant to look at for reductions from anthropogenic sources at this time. However, organic carbon emissions during the winter months deserve further investigation to see if a woodstove program may be helpful in the Sawtooth Wilderness due to the location of the monitor and the proximity of Stanley, Idaho. The state will work with the U.S Forest Service visitor center for local observations during air stagnation periods. The contribution to organic carbon from wild fire was discussed in Chapter 9 and figures 9-10, 9-33, and 9-45 visually show the impacts from wild fire. Anthropogenic fire, is also discussed in the long term strategies in Chapter 12.

Elemental carbon is contributing between 6 and 15% of the visibility impairment in Idaho's Class I areas as shown in figures 11-1, 11-2, and 11-3 above. Referring back to Chapter 9, the WEP analysis shows that wild fire is by far the largest contributor of elemental carbon. Figures 9-23, 9-35, and 9-47 are showing that anthropogenic fire and off-road mobile are slight contributors. Controls for these two source categories will be included in the long term strategies (Chapter 12), so elemental carbon is not a good candidate for additional controls on anthropogenic sources.

Fine soil is contributing between 2 and 4% of visibility impairment in Idaho's Class I areas as shown in figures 11-1, 11-2, and 11-3 above. Since fine soil comes from a variety of sources such as windblown dust from agriculture or storage piles, and it contributes such a small percentage of the visibility impairment, this pollutant is also not a prime candidate for additional controls on source categories at this time. However, there are rules in place that will address these emissions in the long term strategies.

The coarse matter is contribution slightly more than the fine soil contribution, which is between 5 and 10% of the visibility impairment. The WEP analysis in Chapter 9 is showing windblown dust, fugitive dust, and road dust, in that order, as the primary sources of coarse matter (see figures 9-15 and 9-39) contributing to visibility impairment on the 20% worst days, except in the Selway-Bitterroot Wilderness, where the primary coarse matter impacts are coming from wild fire as shown in figure 9-51. Since the fugitive dust and road dust coming from Idaho are small percentages of the overall contribution of coarse matter, and coarse matter itself is a smaller contributor of visibility impairment, these categories are not good candidates for the four factor analysis. They will, however, be addressed in the long term strategies.

The remaining pollutants to review for inclusion in the four factor analysis for RPGs are sulfate, nitrate, and the fine particulate created when these pollutants interact with ammonia. Sulfate and nitrate are include because there is usually an ample amount of ammonia available for the conversion of sulfate and nitrate into ammonium sulfate and ammonium nitrate, both of which cause visibility impairment. Sulfate and nitrate are the two pollutants most closely associated with human caused visibility impairment. The source pie charts in figures 11-1, 11-2, and 11-3 show that combined visibility impairment on the 20% worst days in Idaho's Class I areas ranges between a high of 52% at the Craters of the Moon National Monument to a low of 9% at the Sawtooth Wilderness. Because of the contribution to visibility impairment and the association of these two pollutants with human cause visibility impairment, they will be the primary focus of the four factor analysis used to establish the RPGs.

11.3.2 Review of Idaho's 2002 Anthropogenic Emissions

Reviewing Idaho's 2002 emissions inventory is another way of re-affirming the selection of pollutants and anthropogenic source categories that should undergo the "four factor analysis." Table 11-1 shows source contributions by pollutant and by source category.

Table 11-1 Idaho 2002 Statewide Emissions by Pollutant and Source Category19

Idaho Statewide Emissions (tons/year) Plan02d (2002)								
Source Category	Pollutant							
	SO_2	NO_x	VOC	Primary Organic Aerosol	Elemental Carbon	Fine Particulate	Coarse Particulate	Ammonia
Point	45%	7%	1%	0%	0%	2%	1%	1%
Area	8%	19%	46%	1%	1%	24%	3%	85%
On-Road Mobile	4%	28%	10%	1%	3%	0%	0%	2%
Off-Road Mobile	9%	18%	9%	1%	14%	0%	0%	0%
Anthropogenic Fire	2%	2%	3%	15%	10%	8%	1%	2%
Natural Fire	31%	25%	32%	82%	72%	15%	22%	10%
Road Dust	0%	0%	0%	0%	0%	11%	17%	0%
Fugitive Dust	0%	0%	0%	0%	0%	14%	15%	0%
Wind Blown Dust	0%	0%	0%	0%	0%	26%	40%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%

This table also provides further support for the selection of sulfate and nitrate as the primary pollutants to focus on. Sulfate and nitrate are the two pollutants showing the highest emissions coming from anthropogenic sources. As stated above, ammonia is heavily impacted by area sources but this source will be dealt with in the long term strategies. Open burning is the primary area source contributing to volatile organic carbon, which will also be discussed in the long term strategies.

11.3.3 Selection of Source Categories for the Four Factor Analysis

The third step in this process is to look at the source categories that are the largest contributors of sulfate and nitrate. On-road and off-road mobile sources are controlled under federal regulations and are showing dramatic decreases expected over the first planning period. The state is in the process of implementing Idaho rules for on-road mobile sources, which will be discussed in the long term strategies. That leaves point and area source categories to be reviewed to see if they merit undergoing the four factor analysis.

The WRAP has developed pivot tables that provide source emissions data by standard industrial classification (SIC) for point and area sources. This information can be used to identify key industries and area source actives that are contributing to visibility impairment and are candidates for the four factor analysis. These WRAP pivot tables for Idaho are presented here as Table 11-3 through 11-5.

Table 11-2 identifies several source categories that contribute 250 tons or more of sulfate. The three source categories above this threshold include "elemental phosphate" (12,210

---

19 The percentages of Idaho emissions were determined from information taken from the WRAP technical support document at: http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx. To view the data, first choose Emissions and Source Apportionment, then choose the Emissions Review Tool, and then select pollutants, source times, and states.

tons per year [tpy]), "sulfuric acid contact processing plants" (364 tpy), and "external combustion boilers using coal" (2,976 tpy) which together total 5,460 tpy. Sulfate from all point source categories totals 17,597 tpy, which means the three categories listed above account for 88% of the total point source emissions of sulfate. Since these three categories are above the threshold and account for a majority of the emissions they should undergo the four factor analysis.

Table 11-2 Idaho Statewide 2002 Point Source SO_2 Emissions[20]

State	ID		
Sum of SumOfSO2_ANN			
SCC1_DESC	SCC3_DESC	SCC6_DESC	Total tpy
Industrial Processes	Chemical Manufacturing	Elemental Phosphorous Total	12,210
		Sulfuric Acid (Contact Process) Total	364
External Combustion Boilers	Industrial	Bituminous/Subbituminous Coal Total	3,118
All other point sources			1,905
Grand Total			17,597

Nitrogen oxides are usually associated with combustion of various fuels. There are a number of source categories more than 250 tpy of NOx emissions that use a variety of fuels and combustion methods to support a wide range of industrial processes. The point source categories shown in table 11-3 that exceed the threshold of 250 tpy of NOx include:

- external combustion industrial boilers burning coal, natural gas, and wood/bark waste
- industrial processes
  elemental phosphate production
  pulp paper and wood products – pulp board and Kraft pulping
  cement manufacturing (wet process)
  sugar beet processing
- Industrial combustion engines natural gas compressor stations

These NO_x point source categories account for 92% of the NOx emissions and should undergo the four factor analysis.

Table 11-3 Idaho Statewide 2002 Point Source NO_x Emissions

State	ID		
Sum of SumOfNOX_ANN			
SCC1_DESC	SCC3_DESC	SCC6_DESC	Total tpy
External Combustion Boilers	Industrial	Bituminous/Subbituminous Coal Total	3,268
		Natural Gas Total	919
		Wood/Bark Waste Total	460
Industrial Processes	Chemical Manufacturing	Elemental Phosphorous Total	1,551

20 Idaho 2002 statewide point source emissions as shown in Tables 11-2 through 11-5, are available on the WRAP website at: http://www.wrapair.org/forums/ssjf/pivot.html The most recent and up to date version, Plan02d, is represented in Tables 11-2 through 11-5..

State	ID		
Sum of SumOfNOX_ANN			
SCC1_DESC	SCC3_DESC	SCC6_DESC	Total tpy
	Pulp and Paper and Wood Products	Pulpboard Manufacture & Sulfate Pulping Total	861
	Mineral Products	Cement Manufacturing (Wet Process)	461
	Food and Agriculture	Sugar Beet Processing	401
Internal Combustion Engines	Industrial	Natural Gas Total	2,590
All other point sources			975
Grand Total			11,486

In addition to point sources, area sources should be reviewed to determine which nitrate and sulfate sources should be reviewed to determine whether they should undergo the four factor analysis as part of establishing the RPG for Idaho's Class I areas. Tables 11-4 and 11-5 shows the largest Idaho area sources and emissions levels.

Table 11-4 Idaho Statewide 2002 Area Source SO_2 Emissions

Pollutant	SO2			
Sum of Emissions				State-ID
SCC_L1_DESC	SCC_L2_DESC	SCC_L3_DESC	SCC_L4_DESC	tpy
Stationary Source Fuel Combustion	Industrial	Bituminous/Sub bituminous Coal	Total: All Boiler Types	1,746
		Distillate Oil		90
		Residual Oil		7
		Natural Gas	Total: Boilers and IC Engines	2
		Kerosene		1
		Wood		1
	Residential	Distillate Oil		750
		Wood		26
		Natural Gas	Residential Furnaces	6
		Liquefied Petroleum Gas (LPG)		3
	Commercial/Institutional			131
Waste Disposal, Treatment, and Recovery				153
Grand Total				2,916

Table 11-5 Idaho Statewide 2002 Area Source NOx Emissions

Pollutant	NOX			
Sum of Emissions				State-ID
SCC_L1_DESC	SCC_L2_DESC	SCC_L3_DESC	SCC_L4_DESC	tpy
Stationary Source Fuel Combustion	Industrial	Wood	Total: All Boiler Types	22,057
		Bituminous/Sub bituminous Coal	Total: All Boiler Types	1,631
		Distillate Oil		1,508
		Natural Gas	Total: Boilers and IC Engines	1,067
		Liquefied Petroleum Gas (LPG)		160
		Residual Oil		2
		Kerosene		1
	Residential	Natural Gas	Residential Furnaces	958
		Liquefied Petroleum Gas (LPG)		421
		Distillate Oil		190
		Wood	Total: Woodstoves and Fireplaces	170
	Commercial/Institutional			1,212
Waste Disposal, Treatment, and Recovery				919
Miscellaneous Area Sources				23
Grand Total				30,318

At this time, DEQ believes the amount of emissions from industrial wood combustion boilers is overstated and believes that most of these emissions should be captured in the point source emissions inventory that will be reviewed under a four factor analysis for point source boilers and not area source.

Table 11-8 summarizes Idaho's source categories that will undergo the four factor analysis.

Table 11-6 Idaho Sources for Four-Factor Analysis.

Sulfate	Nitrate
External Combustion Boilers (coal)	External Combustion Boilers coal, natural gas, wood/bark waste
Elemental Phosphate Production	Elemental Phosphate Production
Sulfuric Acid Contact Processing Plants	Pulp and Paper Wood Products
	Cement Manufacturing
	Sugar Beet Processing
	Industrial Combustion Natural Gas (compressor stations)

11.4 The Four Factor Analysis

In an effort to provide some consistency in the four factor analyses among the WRAP states, ER/C Incorporated was contracted to analyze the source categories defined by the states. The important source categories were compiled and a list of potential additional control technologies was identified using a number of publications and guidance documents21. The considerations used to analyze the four factors included:

- **Cost of compliance**

  Control costs include both the capital costs associated with the purchase and installation of the technology and the annual costs associated with running the equipment. The information on costs followed the EPA's *Guidance for Setting Reasonable Progress Goals under Regional Haze Rule (June 1, 2007)* as well as the methodologies provided in *EPA Air Pollution Control Cost Manual*.

- **Time necessary for compliance**

The amount of time needed for full implementation of the different control strategies. This includes the time needed to develop and implement the regulations and the time needed to install the necessary control equipment.

- **Energy and non-air quality impacts of compliance**

The direct energy consumption of the emission control device, solid waste generated, wastewater discharged, acid deposition, nitrogen deposition and climate impacts (e.g. generation and mitigation of greenhouse gas emissions).

- **Remaining useful life of any potentially affected sources**

Economic impact that will occur if the remaining expected life of a particular emissions source is less than the expected useful life of the proposed pollution control device. The capital costs of the emission control equipment can only be amortized over the remaining useful life of the emission source.

Each of the following sections provides a summary of the four factor analysis for one of the source categories identified in section 11.3.3.

11.4.1 External Combustion Boilers Four Factor Analysis

This category includes boilers that are used in manufacturing, process, mining, refining or any other industry to provide steam, hot water, and/or electricity. It includes boilers using coal, natural gas, and bark/wood waste. As discussed above, the significant pollutants from boilers are sulfate.

- Cost of compliance

---

21 EC/R Incorporated, "Supplementary Information for Four Factor Analysis by WRAP States, May 4, 2009. This document is available at: http://www.wrapair.org/forums/iwg/documents/2009-05_Draft_report_for_4-Factor_Analysis-Source_Categories_5-04%20rev5.pdf

Table 11-7 identifies the controls for each pollutant based on the fuel used and summarizes the associated costs.

Table 11-7 Summary of External Boiler Controls and Costs

Source Type	Pollutant Controlled	Control Technology	Estimated Control Efficiency (%)	Estimated Capital Cost per heat unit (lbs/MMBtu**)	Estimated Annual Cost ($Million)	Cost Effectiveness ($/ton)
Coal-Fired	NO_x	Low NOx Burners (LNB)	50	3,435 – 6,856	0.175 – 0.317	344 – 4,080
		LNB w/ Over Fire Air (OFA)	50-60	4,908 – 9,794	NA	412 – 4,611
		Selective Non-Catalytic Reduction (SNCR)	30-75	3,550 – 7,083	0.333 – 0.419	1,728 – 6,685
		Selective Catalytic Reduction (SCR)	40-90	9,817 – 19,587	0.738 – 1.32	1,178 – 7,968
	SO_2	Physical coal cleaning	10-40	NA	NA	70 - 563
		Chemical coal cleaning	50-89	NA	NA	NA
		Switch to low-sulfur fuel	20-90	NA	NA	NA
		Dry sorbent injection	50-90	11,633 - 39,096	NA	851 – 5,761
		Spray dryer absorber	90	27,272 – 73,549	7.93 – 9.26	3,885 – 8,317
		Wet Flue Gas Desulfurization (FGD)	90	40,203 – 86,410	10.10 – 11.71	4,687 – 10,040
Natural Gas-Fired	NO_x	LNB	40	1,722 – 3,435	0.190 – 0.346	412 – 7,075
		LNB w/ OFA	30 – 50	1,722 – 3,435	NA	412 – 7,075
		LNB w/ OFA an Flue Gas Reduction FGR	30-50	2,690 – 5,368	NA	439 – 6,689
		SNCR	30 – 75	2,840 – 5,666	0.206 – 0.355	1,997 – 9,952
		SCR	40- 90	5,399 – 10,773	0.484 – 0.831	1,022 – 24,944
Wood-Fired	NO_x	LNB w/ OFA	30 – 50	1,722 – 3,435	NA	412 – 7,075
		LNB w/ OFA and FGR	30-50	2,690 – 5,368	NA	439 – 6,689
		SNCR	30 – 75	2,840 – 5,666	0.206 – 0.355	1,997 – 9,952
		SCR	40- 90	5,399 – 10,773	0.484 – 0.831	1,022 – 24,944

* MMBtu – million British thermal units

- Time necessary for compliance

It is estimated to take 4 -5 years for compliance if it is determined external combustion boilers are a significant source category. It would take 1-2 years to model the possible impacts and adopt appropriate rules. It would take another 2-3 years for facilities to secure the necessary capital and install emission controls.

- Energy and non-air quality impacts

In general low NOx burners (LNB), over-fire air (OFA), and flue gas reduction (FGR) do not require steam or generate solid waste or wastewater. Controls using SNCR and SCR require additional power to operate, which would cause an increase in CO_2 emissions, given the sources of power used in Idaho. Some of the potential SO_x controls may cause an increase in solid waste and/or wastewater volume.

- Remaining useful life

The remaining useful life of industrial boilers is not expected to affect the cost impact of control technologies.

11.4.2 Elemental Phosphate Production Four Factor Analysis

While emissions from this source category were large enough to merit the four factor analysis based on size, the analysis isn't necessary because the primary point source in this category has undergone a review for considerations relating to prevention of significant deterioration (PSD) and for a BART permit. The BART controls at P4 reduced SO_x emissions by roughly 9,000 tons per year (tpy) which was over half the total point source SO_x emissions in 2002. The BART review of technically feasible technologies also determined that there is not an appropriate NOx technology at this time due to the high temperatures involved in the industrial process at this point source.

11.4.3 Sulfuric Acid Contact Processing Plants Four Factor Analysis

Sulfuric acid is a strong mineral acid and is one of the top products of the chemical industry. Sulfuric acid is primarily used in lead acid batteries for cars.

- Cost of compliance.

A summary of costs for potential controls is shown in table 11-8.

Table 11-8 Summary of Sulfuric Acid Contact Processing Controls and Costs

Source Type	Pollutant Controlled	Control Technology	Estimated Control Efficiency (%)	Estimated Total Capital Cost($M)	Estimated Annual Cost ($Million)	Cost Effectiveness ($/ton)
Sulfuric Acid Manufacturing at 93% baseline efficiency	SO_x	Increase absorption efficiency to NSPS level	96.4	NA	NA	1,600
		Tail gas treatment unit	98.6			928

- Time necessary for compliance

It is estimated it would take 4 -5 years for compliance if it is determined sulfuric acid plants are a significant source category. It would take 1-2 years to model the possible impacts and adopt appropriate rules. It would take another 2-3 years for facilities to secure the necessary capital and install emission controls.

- Energy and non-air quality impacts

Adding absorption stages to increase efficiency would require additional electricity and steam as would a tail gas treatment unit. Depending on the source of electricity, this could increase CO_2 emissions.

- Remaining useful life

The remaining useful life expectancy of most equipment is expected to exceed the lifetime of the control equipment. Therefore, there are no increases in the amortized capital cost of the pollution controls.

11.4.4 Cement Manufacturing Four Factor Analysis

The main emissions sources at cement plants are the kilns used to heat limestone to form clinkers. The clinkers are cooled, ground, and mixed with gypsum to form cement.

- Cost of compliance

A cost summary is shown in table 11-8.

Table 11-9 Summary of Cement Kilns Controls and Costs

Source Type	Pollutant Controlled	Control Technology	Estimated Control Efficiency (%)	Estimated Total Capital Cost (M$)	Estimated Annual Cost ($Million)	Cost Effectiveness ($/ton) ton clinker
Cement Wet Kiln	NO_x	Low NO_x Indirect fire	20 – 47	401 – 564	83,000 – 135,000	270 - 620
		Low NO_x Direct fire	20 – 47	1,910	376,000 – 343,500	855 – 1,005
		Mid-kiln firing	20 – 50	613 – 3,205	183,500 – (192,300	(460) – 730
		SCR* w/ ammonia	80 – 90	15,100	5,780 – 4,105,000	3,370
		LoTOx*	80 – 90	N/A		3,155 – 3,891

* SCR – Selective catalytic reduction

- Time necessary for compliance

It is estimated it would take 4 -5 years for compliance if it is determined cement plants are a significant source category. It would take 1-2 years to model the possible impacts and adopt appropriate rules. It would take another 2-3 years for facilities to secure the necessary capital and install emission controls.

- Energy and non-air quality impacts

In general, control technologies on cement plants would require additional electricity. Depending on the source of electricity, this could increase CO_2 emissions.

- Remaining useful life

The remaining useful like expectancy of most equipment is expected to exceed the lifetime of the control equipment. Therefore, there are no increases in the amortized capital cost of the pollution controls.

11.4.5 Sugar Beet Processing Four Factor Analysis

Boilers and pulp dryers are the two primary emissions sources involved in sugar beet processing. The boilers for sugar beet processing are addressed under the "four factor analysis" of external fired boilers.

11.4.6 Industrial Combustion Natural Gas (Compressor Stations)

There are several natural gas processing operations in Idaho where turbines and natural gas reciprocating engines compress and drive natural gas along transmission pipelines.

- Cost of compliance

Table 11-10 shows a summary of natural gas compressor controls and costs.

Table 11-10 Summary of Natural Gas Compressor Controls and Costs

Source Type	Pollutant Controlled	Control Technology	Estimated Control Efficiency (%)	Estimated Total Capital Cost	Estimated Annual Cost ($Million)	Cost Effectiveness ($/hp)
Reciprocating engines	NO_x	Air-fuel ratio adjustment	10 – 40	5.3 – 42	0.9 – 6.8	68 – 2,500
		Ignition timing retard	15 – 30	Not available	1 – 3	42 – 1,200
		Low Emission Combustion LEC* retrofit	80 – 90	120 – 820	30 – 120	320 - 210
		SCR*	90	100 – 450	40 – 270	870 – 31,00
		NSCR*	90 – 99	17 – 35	3 – 6	16 - 36
Turbines Units-TU/hr		Water or steam injection	68 – 90	4.4 – 16	2 – 5	560 – 3,100
		Low NO_x burners	68 – 84	8 – 22	2.7 – 8.5	5,200 – 16,200
		SCR	90	13 – 24	5.1 – 33	1,000 – 6,700
		Water/Steam injection w/ SCR	93 – 96	13 – 34	5.1 – 33	1,000 – 6,700

* LEC – Low Emission Combustion________; SCR – selective catalytic reduction; NSCR – non-selective catalytic reduction

- Time necessary for compliance

It is estimated to take 4 -5 years for compliance if it is determined that natural gas combustion for compressor stations are a significant source category. It would take 1-2 years to model the possible impacts and adopt appropriate rules. It would take another 2-3 years for facilities to secure the necessary capital and install emission controls.

- Energy and non-air quality impacts

Some of the control technologies require an increase in fuel consumption of up to 5%, which may result in an increase in CO_2 consumption.

- Remaining useful life

The remaining useful life expectancy of most equipment is expected to exceed the lifetime of the control equipment. Therefore, there would be no increases in the amortized capital cost of the pollution controls.

11.4.7 Summary and Conclusion of Point Source Four Factor Analysis and RPG Conclusion

As discussed at the beginning of this chapter, NO_x and SO_x emissions from anthropogenic sources are the two visibility impairing pollutants that Idaho has the greatest control over. Although Idaho is expecting to reduce NO_x emissions by 21% and SO_x emissions by 34% (see Tables 8-1 and 8-2), under implementation of BART, and other on-the-books controls, the state must look at additional controls for RPG.

At first glance, table 11-11 is showing minor contributions from point sources. Idaho's point source NO_x contribution ranges from 1.41% at Selway-Bitterroot Wilderness to 5.96% at Craters of the Moon National Monument. The point source SO_x contribution ranges from 0.83% at the Selway Bitterroot Wilderness to 13.5% at Craters of the Moon. The contributions at Craters of the Moon are elevated due to an EGU that was proposed, but ultimately not constructed, in Jerome which is in close proximity to the Monument.

Table 11-11 Idaho Future Contribution of SO_x NO_x

2018 Idaho Percent Contribution and Change 2002/2018 PSAT modeling										
State	**Class I Area**	**Pollutant**	**Nat. Fires & Bio.**	**Anthro. Fires**	**Mobile**	**Area**	**Point**	**Outside Domain**	**Idaho Total**	**Percent Change 02/018**
Idaho	**Sawtooth**	SOx	**3.60%**	**0.26%**	**0.51%**	**1.80%**	**2.31%**	**0.00%**	8.48%	-15.38%
		NOx	4.70%	0.67%	6.71%	14.77%	2.01%	0.00%	28.86%	-17.31%
	Craters Of the Moon	SOx	**2.19%**	**0.18%**	**0.73%**	**1.82%**	**13.50%**	**0.00%**	18.43%	14.77%
		NOx	5.21%	0.37%	10.55%	14.89%	5.96%	0.00%	36.97%	-28.02%
	Selway-Bitterroot	SOx	10.41%	0.17%	0.17%	0.50%	0.83%	0.00%	12.07%	-3.95%
		NOx	5.99%	0.35%	2.82%	3.17%	1.41%	0.00%	13.73%	-27.78%

The point source contributions at Craters of the Moon National Monument may be similar to the other Idaho Class I areas once the BART emission reductions from Amalgamated Sugar and Monsanto are included.

The state is still required to identify significant sources or source categories causing or contributing to impairment in Class I areas, and apply the four factor analysis. As part of that process, Idaho has identified, external boilers, elemental phosphate production, sulfuric acid contact processing plants, pulp and paper production, cement manufacturing, sugar beet processing, and internal combustion natural gas compressor stations as source categories that should under go the four factor analysis. The preliminary search shows several control strategies may be cost effective based on the WRAP contract that identified potential controls for source categories. Unfortunately the WRAP analysis considered a wide range of specific sources (i.e. different source locations and configurations) with a wide range of costs. In order to complete the cost effectiveness analysis and "cost of compliance" the state must first determine if the individual source categories located within Idaho are causing or contributing to visibility impairment.

It is anticipated that if a source category is causing or contribution to visibility impairment, the facilities within that category may have difficulty meeting the new National Ambient Air Quality Standards for $PM_{2.5}$, NO_x or SO_x. In the event a source within the category is causing or contributing to visibility impairment and meeting all the new NAAQS, Idaho will be required to undertake a negotiated rule making process to develop rules to implement cost effective emission controls on those facilities. The negotiated rule making process giving Idaho the authority to require those emission controls would take an additional 2 years to develop.

To determine the "cost of compliance," it will take 1-2 years to model all the identified source categories to see if they are causing or contributing to visibility impairment, and identify costs associated with the installation of control technologies at individual facilities within the source category. The “time necessary for compliance” may include an additional 2 years to develop Idaho rules that would require the installation of controls for the sources causing or contributing to visibility impairment, and another 2-3 years for facilities to secure the necessary capitol and install the emission controls. Developing the “cost of compliance” and the “time necessary for compliance” will take between 3 to 7 years. Based on the four-factor analysis and the time “necessary for compliance,” Idaho is not requiring additional controls for source categories at this time so they have not been included in establishing the RPG. The state will be developing a process for conducting a more thorough review of the categories listed above and as briefly described in section 12.6.3.

While Idaho would have preferred completing this process prior to submitting the Regional Haze SIP, the State’s experience with the “time necessary for compliance” to implement BART is a prime example of how much time is need to implement controls even when the process is fairly well prescribed. Since Idaho will be developing state specific rules, additional time is warranted. EPA’s Reasonable Progress Guidance (June, 2007 p. 5-2) seems to anticipate these issues in the statement, “It may be appropriate for you to use this factor (time necessary for compliance) to adjust the RPG to reflect the degree of improvement in visibility achievable within the period of the first SIP if the time needed for full implementation of a control measure (or measure) will extend beyond 2018.”

11.5 Determination of Reasonable Progress Goals for Idaho’s Class I Areas.

The Regional Haze Rule section 308(d)(1) requires, “For each mandatory Class I Federal area located within the State, The State must establish goals (expressed in deciviews) that provide for reasonable progress towards achieving natural visibility conditions.” These goals must provide for improvement on the 20% worst visibility days and not allow degradation on the 20% best visibility days. For the Class I areas for which Idaho is responsible for establishing reasonable progress goals, the goals for the first planning period ending in 2018, are presented below in table 11-11. The goals are based on steps outlined in section 11.2 of this chapter.

The expected visibility improvements during the first planning period are based on expected emissions reductions associated with:

- BART controls at TASCO Nampa and P4 Production,
- current regulations,
- on-going control strategies, and
- results of the four factor analysis/long term strategies.

These emissions reductions were taken together and included in the visibility projections on a per-pollutant basis using “weighted emission potential” (WEP) and CMAQ modeling as described in Chapter 9. The results shown in table 11-12 are the projected cumulative impacts of those emissions reductions based on CMAQ modeling estimates of visibility improvement.

Table 11-12 Reasonable Progress Goals for Idaho Class I Areas22.

Idaho Class I Area	20% Worst Days			20% Best Days	
	Baseline Condition [deciviews]	2018 Goal Based on Uniform Rate of Progress [deciviews]	2018 Reasonable Progress Goal [deciviews]	Baseline Condition [deciviews]	2018 Reasonable Progress Goal [deciviews]
Craters of the Moon National Monument	14	12.49	13.06	4.31	3.886
Sawtooth Wilderness	13.78	12.06	13.22	3.99	3.78
Selway-Bitterroot Wilderness Area	13.41	12.02	12.94	2.58	2.48

As shown in Table 11-11, the goals are set to achieve visibility improvements at all three Class I areas on the 20% best days. The table also shows the goals for improvement in the 20% worst days but these goals are less than the URP.

11.5.1 Demonstration Indicating That the RPGs for the 20% Worst Days are Reasonable

The Regional Haze Rule section 308(d)(1)(B)(ii) requires, “the State must demonstrate, based on the factors in paragraph (d)(1)(A) of this section that the rate of progress for the implementation plan to attain natural conditions by 2064 is not reasonable, and the progress goal is reasonable.” The state believes the goals established for each of Idaho’s Class I areas are reasonable based upon the review of the controls of anthropogenic sources, the four factor analysis as required under 308(d)(1)(A), long term strategies, and the substantial but uncontrollable impacts from natural emissions sources.

Impacts from natural emissions sources

The pie charts at the beginning of section 11.3.1 show the large impacts of organic mass carbon and elemental carbon during the base year of 2002. The Sawtooth and Selway-Bitterroot Class I areas are showing impacts from organic and elemental carbon ranging from 84% to 60%. At the Craters of the Moon Class I area, impacts from organic and elemental carbon account for 37% of the visibility impact. Table 11-1 shows natural fire as the primary source of Idaho’s organic carbon (82%) and elemental carbon (72%). The contribution from natural fires to primary organic carbon and elemental carbon makes achieving the URP unreasonable.

Impacts from anthropogenic sources

The focus of the Regional Haze Rule is to identify anthropogenic sources of emissions and establish reasonable progress goals toward achieving natural conditions based upon controlling those emissions through the application of the four factor analyses, reductions

22 Reasonable Progress Goals are based on baseline IMPROVE monitoring data and CMAQ modeling using the plan02d & 2018 PRP18d emissions inventories. The data is available on the TSS website at: http://vista.cira.colostate.edu/tss/. To view the data, select modeling visibility, projection tools, the Class I site from the map, and summary tables.

associated with the application of CAA requirements, on-the-books controls, and long term strategies. Table 11-1 shows that nitrates and sulfates are the two pollutants with the largest impacts from anthropogenic sources, and sections ll.3.1 and 11.3.2 identify nitrates and sulfates as the two pollutants that should be the focus of anthropogenic emissions reductions. The question is whether Idaho would achieve a 20% reduction in sulfate and nitrate emissions, which would be required for each planning period according to the URP.

While Idaho's Class I areas are not meeting the URP overall, Table 11-13 shows expected emissions reductions for nitrates and sulfates from Idaho are near or greater than the URP for these two individual pollutants. The expected reduction in emissions for the combination of nitrates and sulfates from Idaho is well above 20%. The WEP analysis also shows an improvement greater than 20% in upwind anthropogenic emissions. That means Idaho and those states upwind of Idaho's Class I areas are expected to exceed the emissions reductions from anthropogenic sources of sulfate and nitrate that would be required by the URP.

Table 11-13 Summary of Idaho Class I Area Sulfate and Nitrate Visibility Improvement 20% Worst Days23

	Visibility Conditions: Worst 20% Days						
	RRF Calculation Method: Specific Days (EPA)						
	Monitored	Estimated		Projected			
	2000-04 Baseline Conditions	2064 Natural Conditions	2018 Uniform Rate of Progress Target	2018 Projected Visibility Conditions	Baseline to 2018 Change In Statewide Emissions	Baseline to 2018 Change In Upwind Weighted Emissions[2]	Baseline to 2018 Change In Anthropogenic Upwind Weighted Emissions[2]
	(Mm^{-1})*	(Mm^{-1})	(Mm^{-1})[1]	(Mm^{-1})	(tons / %)	(%)	(%)
	Craters of the Moon NM						
Sulfate	5.69	0.83	4.39	5.35	-13,272 -34%	-25%	-30%
Nitrate	11.35	1.05	8.31	8.3	-32,418 -19%	-27%	-34%
	Sawtooth Wilderness						
Sulfate	3.06	0.81	2.5	2.59	-13,272 -34%	-27%	-35%
Nitrate	0.63	0.7	0.65	0.54	-32,418 -19%	-25%	-32%
	Selway-Bitterroot Wilderness						
Sulfate	4.83	1.1	3.86	4.32	-6,128 -12%	-15%	-29%
Nitrate	1.46	1.12	1.38	0.96	-63,099 -26%	-21%	-37%

* Inverse megameters

* RRF – Relative Reduction Factor – see section 9.1.1 or Appendix E page 15 and 19

Four Factor Analysis and Long Term Strategies

Section 11.4 of this chapter summarized the four factor analysis. Based upon the "time necessary for compliance," additional controls are unreasonable at this time. A discussion of the process used to determine if a source category is significantly contributing to visibility impairment and should undergo rule development and implementation will be discussed in the long term strategies in Chapter 21.

Based on the contribution of visibility impairment coming from natural sources rather than anthropogenic sources, the emissions reductions that can be expected from anthropogenic

23 Information was compiled based on CMAQ and WEP modeling using plan02(d) & 2018PRP(18d) emission inventory. This information is available on the WRAP TSS website as described in the previous footnote.

sources of nitrate and sulfate, the results of the four factor analysis, and "on-the-books" controls and long term strategies, Idaho's visibility goals are reasonable.

11.5.2 Number of Years Needed to Reach Natural Conditions at Goal Rate

While states are allowed to set reasonable progress goals which allow for a slower rate of progress than the URP, there are additional requirements. The Regional Haze Rule section 308(d)(1)(B)(ii) requires, "an assessment of the number of years it would take to attain natural conditions if visibility improvements continues at the rate of progress selected by the State as reasonable." This information must be provided to the public as part of the review process.

The formula for determining the number of years necessary to meet natural conditions is:

(Base Line – RPG)/ 14 years (n years in first planning period) = Annual Rate of Progress

Base Line – Natural Conditions = Needed Improvement from Baseline to Natural Conditions

Needed Improvement / Annual Rate of Progress = Years Needed to Meet Natural Conditions

Table 11-14 Reasonable Progress Goals – Years Needed to Meet Natural Conditions

Class I Area	2000-04 Baseline Conditions	Proposed Reasonable Progress Goal	Annual Rate of ProgressBased on Reasonable Progress Goal	Natural Conditions	Needed Improvement From Baseline to Natural Conditions	Years Need to Meet Natural Conditions Based on Idaho's Reasonable Progress Goal
	(dv)*	(dv)	(dv)	(dv)	(dv)	Years
Craters of the Moon National Monument	14	13.06	0.07	7.53	6	112
Sawtooth Wilderness	13.78	13.22	0.04	6.42	7	161
Selway-Bitterroot Wilderness	13.41	12.94	0.03	7.43	6	221

* deciview

Table 11-14 shows it would take 112 years to meet natural conditions at Craters of the Moon, 161 years at Sawtooth Wilderness, and 221 years at Selway-Bitterroot Wilderness based on the proposed reasonable progress goals.

Chapter 12. LONG TERM STRATEGY

12.1 Overview of the Long Term Strategy

The Regional Haze Rule requires each state to submit an implementation plan (generally called a state implementation plan [SIP]) to address visibility impairment every 10 years. As part of its regional haze plan, each state must include a long term strategy (LTS) to address regional haze visibility impairment in each Class I area in the state, and for each Class I area outside the state that may be affected by emissions from the state. The LTS must include enforceable measures necessary to achieve reasonable progress goals. It must identify all anthropogenic sources of emissions, including major and minor stationary sources, mobile sources, and area sources. If a state's emissions are contributing to visibility impairment in other states, the state must consult with those states and coordinate all measures necessary to address its portion of necessary emissions reductions. If the state has participated in a regional haze planning process, the state must ensure it has included all measures needed to achieve its apportionment of emissions-reduction obligations agreed upon through that process.

The state must document the technical basis, including modeling and emissions information, that the state has relied on to determine its apportionment of emissions reduction obligations necessary for achieving reasonable progress in each mandatory Class I area it affects. The state may meet this requirement by relying on technical analyses developed by the regional planning organization and approved by all state participants.

Idaho participated in the WRAP regional haze planning process and the development of the model, emissions inventory, monitoring information, and technical information used to develop this SIP. Full documentation and explanation of the WRAP consultation process and meetings can be found in Chapter 2 and Appendix B. Information on modeling, monitoring, and emissions can be found in the following locations:

- Modeling (Apportionment) Chapter 9 and Appendix E
- Monitoring (IMPROVE) Chapter 4 and 5
- Emissions Inventory Chapter 8 and Appendix D

12.2 Summary of All Anthropogenic Sources of Visibility Impairment Considered in Developing the Long Term Strategy

Section 51.308(d)(3)(iv) of the Regional Haze Rule requires states to identify all anthropogenic sources of visibility impairment when developing the LTS. Chapter 8 of this plan identifies all the anthropogenic sources for 2002 and projections for 2018. In Chapter 8, section 8.1 identifies all the key pollutants and the emissions amounts by source category from Idaho and section 8.2 looks at emissions from surrounding states. Chapter 9 of this plan analyzed both natural and anthropogenic sources and used modeling to determine an apportionment of those emissions among those sources. Chapter 10 identified BART-eligible facilities and determined what control equipment met the BART requirements for subject-to-BART facilities. Chapter 11 identified major source categories of SO_x and NO_x and include a four factor analysis for each of those source categories. A summary of emissions source categories and pollutants can be found in table 11-1.

12.3 Summary of Interstate Transport and Contribution

12.3.1 Class I Areas in Other States Affected by Idaho Emissions

The Regional Haze Rule (40 CFR 51.308(d)(i) and (ii)) requires any state that is causing or contributing to visibility impairment in any mandatory Class I area to implement all measures necessary to achieve its share of the emission reductions needed to meet progress goals for that Class I area. When a state has emissions that are reasonably anticipated to cause or contribute to visibility impairment in other states' Class I areas, the state must consult with the other states and participate in the development of coordinated emissions management strategies.

Section 8.2 of this plan compares Idaho's visibility-impairing pollutants with those of the surrounding states. Chapter 9 looks at source apportionment for each visibility- impairing pollutant and the sources and origins of the pollutants. Section 9.7 specifically looks at Class I areas in surrounding states that do not share a common border with Idaho, which are: Cabinet Mountain Wilderness, Eagle Cap Wilderness, and Jarbidge Wilderness. Section 9.7 also explains how these Class I areas mentioned above were selected to represent other near by Class I areas based on Clustered Source Region Attribution (see figure 9-67).

Although it is important to review all visibility-impairing pollutants to determine whether reductions could be made, the focus is on those from anthropogenic sources because they can be controlled. Sections 11.2 and 11.3 explain why SO_x and NOx are the primary focus of that investigation in this SIP. Specifically, Table 11.1 shows that SO_x and NO_x emissions are primarily from anthropogenic combustion type source categories while the emissions of other pollutants are heavily influenced by natural fire and fugitive dust24.

While the Regional Haze Rule requires states to improve visibility on the 20% worst visibility days and also not allow additional visibility degradation during the 20% best days, the LTS will focus on improvements to the 20% worst days because it is believed that emissions reductions from anthropogenic sources that improve visibility during the 20% worst days will also have a positive effect on the visibility during the 20% best days. Based on modeling of baseline emissions and emissions projected for the future, the reasonable progress goals as shown in table 11-11 indicate the projected emissions reductions are having a positive effect on the 20% best days.

Table 12-1 summarizes Idaho's contributions to the total amounts of SO_x and NO_x at Class I areas in surrounding states. Idaho's sulfate contributions range from 1.93% at Eagle Cap Glacier National Park to 9.20% at Bridger Wilderness. Over the first planning period,

---

24 For this document the definition of fugitive dust is described as: Fugitive dust sources may be separated into two broad categories: process sources and open dust sources. Process sources of fugitive emissions are those associated with industrial operations such as rock crushing that alter the characteristics of a feed material. Open dust sources are those that generate non-ducted emissions of solid particles by the forces of wind or machinery acting on exposed material. Open dust sources include industrial sources of particulate emissions associated with the open transport, storage, and transfer of raw, intermediate, and waste aggregate materials, and nonindustrial sources such as unpaved roads and parking lots, paved streets and highways, heavy construction activities, and agricultural tilling. For a full description of fugitive dust sources and controls see the Fugitive Dust Hand Book at: http://www.wrapair.org/forums/dejf/fdh/index.html

Idaho's sulfate contributions are All over the board ranging from a 7.81% decrease at Cabinet Mountain Wilderness, 24.44% increase at Eagle Cap Wilderness. Jarbidge, Yellowstone, and Bridger are all down wind of emissions that were once anticipated from an electrical generating unit (EGU) that was included in the PSAT modeling; however, it is unlikely the unit will ever be built. For a complete discussion of the modeled emissions from the EGU project, see section 9.2 of this plan. Most of the expected sulfate emissions reductions are associated with BART controls and changes to the sulfur content of fuels used by on-road diesel sources.

Table 12-1 Idaho's Contribution of SO_x and NO_x in Surrounding Class I Areas

2018 Idaho Percent Contribution and Change 2002/2018										
State	**Class I Area**	**Pollutant**	**Nat. Fires & Bio.**	**Anthro. Fires**	**Mobile**	**Area**	**Point**	**Outside Domain**	**Idaho Total**	**Percent Change 02/018**
Oregon	**Hells Canyon**	SO_x	0.38%	0.00%	0.38%	2.44%	5.25%	0.00%	8.44%	-6.25%
		NO_x	2.63%	0.11%	9.13%	19.75%	4.00%	0.00%	35.62%	-20.00%
	Eagle Cap	SO_x	1.64%	0.00%	0.16%	0.33%	7.06%	0.00%	9.20%	24.44%
		NO_x	1.48%	0.23%	5.25%	11.07%	2.28%	0.00%	20.32%	-21.59%
Nevada	**Jarbidge**	SO_x	5.36%	0.00%	0.20%	0.99%	3.57%	0.00%	10.12%	2.00%
		NO_x	4.64%	0.00%	7.59%	13.92%	4.64%	0.00%	30.80%	-24.74%
Wyoming	**Yellowstone**	SO_x	2.86%	0.00%	0.20%	0.61%	5.11%	0.00%	8.79%	7.50%
		NO_x	6.88%	0.00%	6.42%	7.80%	3.21%	0.00%	24.31%	-26.39%
	Bridger	SO_x	1.64%	0.00%	0.16%	0.33%	7.06%	0.00%	9.20%	24.44%
		NO_x	2.86%	0.00%	1.43%	2.14%	1.43%	0.00%	7.86%	-35.29%
	North Absaroka	SO_x	2.28%	0.19%	0.19%	0.38%	2.85%	0.00%	5.89%	3.33%
		NO_x	3.38%	0.34%	3.38%	4.39%	1.69%	0.00%	13.18%	-29.09%
Montana	**Cabinet**	SO_x	5.58%	0.13%	0.38%	1.02%	0.38%	0.00%	7.49%	-7.81%
		NO_x	1.21%	0.17%	4.48%	6.55%	1.55%	0.00%	13.97%	-26.36%
	Glacier	SO_x	0.12%	0.12%	0.12%	0.72%	0.84%	0.00%	1.93%	-15.79%
		NO_x	3.42%	0.00%	0.16%	0.31%	0.78%	0.00%	4.67%	-3.23%
	Bob Marshall	SO_x	3.42%	0.00%	0.16%	0.31%	0.78%	0.00%	4.67%	-3.23%
		NO_x	1.53%	0.22%	1.97%	2.41%	0.88%	0.00%	7.00%	-27.27%
	Gates	SO_x	2.98%	0.00%	0.14%	0.28%	0.71%	0.00%	4.12%	-6.45%
		NO_x	1.80%	0.00%	1.55%	1.80%	0.77%	0.00%	5.93%	-25.81%

Idaho's contributions to nitrate totals range from 4.67% at Glacier National Park to 35% at Hells Canyon Wilderness. Most of the Class I areas are expected to see a 20% or greater decrease in NO_x emissions from Idaho. Most of the expected decrease in NO_x emissions from Idaho is associated with reductions from mobile sources and BART. Jarbidge Wilderness and Glacier Wilderness are exceptions; for these two Class I areas major reductions in NOx from Idaho are not expected, but that is based on modeled emissions that included those anticipated from a projected EGU that is now unlikely to be built, as mentioned above.

12.3.2 Idaho Class I Areas Affected by Emissions from Other States

Section 8.2 of this plan reveals that all the WRAP states surrounding Idaho are expecting decreases in their SO_x and NO_x emissions. Tables 8-9 and 8-10 depict these expected reductions.

Table 12-2 shows the percentages of 2018 projected amounts of total SOx and NO_x in Idaho's Class I areas that are expected to come from the WRAP states impacting Idaho. The concentrations shown are based on the PSAT modeling discussed in Chapter 9. It should be noted that change shown from 2002 to 2018 may not include reductions expected from all the BART sources or changes in later versions of the 2018 emissions inventory. This may in part explain the SO_x and NO_x contributions from Wyoming. Wyoming overall NO_x and SO_x emissions are expected to decline by 14 to 15%. Wyoming is expecting some increases from oil and gas productions but through WRAP consultation process Idaho believes Wyoming as well as other surrounding states are diligently working to reduce sulfate and nitrate visibility impacts.

Table 12-2 Other States' 2018 Contributions to Totals at Idaho Class I Areas and Change from 2002

	Craters of the Moon NM			
	SO_x		NO_x	
Source Region	Percent Contribution	Change from 2002 - 2018	Percent Contribution	Change from 2002 - 2018
CA	0.91%	-16.67%	1.12%	-40.00%
MT	0.91%	0.00%	2.61%	-25.00%
NV	1.82%	11.11%	2.61%	-8.70%
OR	5.11%	-6.67%	3.47%	-34.88%
Pacific Offshore marine diesel	2.37%	0.00%	0.99%	0.00%
UT	3.10%	-5.56%	14.52%	-33.90%
WA	3.10%	-22.73%	2.98%	-52.94%
WY	3.47%	35.71%	4.34%	9.38%
Outside of Domain	51.46%	0.00%	25.19%	2.01%
	Sawtooth Wilderness			
	SO_x		NO_x	
Source Region	Percent Contribution	Change from 2002 - 2018	Percent Contribution	Change from 2002 - 2018
CA	2.57%	0.00%	2.68%	-33.33%
MT	0.77%	0.00%	2.01%	-25.00%
NV	2.57%	0.00%	4.03%	0.00%
OR	9.51%	-9.76%	8.72%	-31.58%
Pacific Offshore marine diesel	4.37%	0.00%	0.67%	0.00%
UT	0.51%	-33.33%	1.34%	-50.00%
WA	6.94%	-27.03%	8.05%	-42.86%
WY	2.06%	33.33%	0.00%	0.00%

Source Region	Selway-Bitterroot Wilderness			
	SO_x		NO_x	
	Percent Contribution	Change from 2002 - 2018	Percent Contribution	Change from 2002 - 2018
Outside of Domain	50.64%	-1.01%	36.91%	7.84%
CA	1.82%	0.00%	0.70%	-60.00%
MT	4.13%	0.00%	16.90%	-35.14%
NV	0.83%	0.00%	0.70%	0.00%
OR	6.12%	-5.13%	4.58%	-40.91%
Pacific Offshore marine diesel	3.64%	-4.35%	1.41%	0.00%
UT	0.50%	0.00%	1.06%	-50.00%
WA	7.27%	-26.67%	10.56%	-50.00%
WY	1.98%	33.33%	3.52%	0.00%
Outside of Domain	44.63%	0.00%	33.45%	3.26%

12.3.3 Estimated International Contribution to Idaho Class I Areas

Table 12-3 shows the 2018 projected contributions from outside the United States to concentrations of SO_x and NO_x at Idaho's Class I areas. These projections are based on the PSAT modeling discussed in Chapter 9. In many cases, the contribution from international emissions is more than the total contributions from the surrounding states and Idaho's point sources.

Table12-12-3 International 2018 Contributions to Emissions at Idaho's Class I Areas

	Craters of the Moon NM		Sawtooth Wilderness		Selway-Bitterroot Wilderness	
	SO_x	NO_x	SO_x	NO_x	SO_x	NO_x
Source Region	Percent Contribution	Percent Contribution	Percent Contribution	Percent Contribution	Percent Contribution	Percent Contribution
CAN	7.30%	4.22%	6.68%	6.04%	13.39%	11.62%
MEX	0.18%	0.00%	1.29%	0.00%	1.16%	0.00%
Pacific Offshore marine diesel	2.37%	0.99%	4.37%	0.67%	3.64%	1.41%
Outside of Domain	51.46%	25.19%	50.64%	36.91%	44.63%	33.45%

The PSAT and WEP results in Chapter 9 describe the amount of contribution from Canada, Mexico Pacific Offshore, marine shipping emissions, and global emissions identified as "outside domain" of the modeling boundaries. Since Idaho does not have regulatory authority over any of these emissions, the strategies for reductions from those sources will need to come from organizations like EPA.

This topic was brought up at a WRAP Implementation Work Group in March of 2007. Below is a brief summary of the EPA response regarding their work on international emissions.

The U.S. and Canada have been working on addressing transboundary emissions issues through the bilateral 191 Canada-United States Air Quality Agreement. Information regarding these agreements and reports can be found at: http://www.epa.gov/airmarkets/resurce/usaqa-resources.html. EPA Region 10 has been meeting with their counterparts in the British Columbia Ministry of Environment for the past five years to identify air quality issues in the Georgia Basin-Puget Sound airshed and to develop an International Airshed Strategy to address these issues.

The United States and Mexico, in partnership with border tribal, state, and local governments, have worked to increase the knowledge about air pollutions sources and their impacts on both sides of the border, establish monitoring networks in several key areas, conduct emissions inventories, and build local capacity.

In February 1992, the environmental authorities of both Federal governments released the Integrated Border Environmental Plan for the U.S.-Mexico Area (IBEP). The IBEP, a two-year plan, was the first bi-national Federal initiative created under the assumption that increased liberalization of trade would place additional stress on the environment and human health along the border.

Additionally, the United States and Mexico in partnership with border tribal, state and local governments are working together on projects such as retrofitting diesel trucks and school buses with either diesel oxidation catalysts or diesel particulate filters to operate on ultra-low-sulfur diesel fuel, constructing “lower polluting” or “environmentally friendly” brick kilns, and paving roads to reduce the levels of particulate matter in the border regions.

12.4 Summary of Interstate Consultation

Section 51.308(d)(3)(i) of the Regional Haze Rule requires the state to consult with the other states in order to develop coordinated emissions management strategies. A discussion of the WRAP consultation process is included in Chapter 2. This included consultation with the federal land managers, and the state-to-state consultation through the WRAP committees and work groups.

12.5 Technical Documentation

Section 51.308(d)(3)(iii) of the Regional Haze Rule requires the state to document the technical bases, including modeling, monitoring, and emissions information on which the state has relied to determine its apportionment of emissions reduction obligations necessary to achieve the RPGs. Idaho has relied upon technical information developed by WRAP with input from its member states through the various committees and work groups. Idaho has relied upon the emissions inventory and modeling results available on the WRAP technical support system. A discussion of the emissions inventory is in Chapter 8 and the modeling for source apportionment is in Chapter 9. The monitoring data for this plan came from the IMPROVE monitoring network. Chapter 4 provides an explanation of the IMPROVE monitoring system and the monitoring sites for Class I areas residing in Idaho.

12.6 Required Factors for the Long Term Strategy

Section 58.308(d)(3)(v) of the Regional Haze Rule requires each state to look at the following factors, at a minimum, in developing its LTS:

- Emissions reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;
- Measures to mitigate the visibility impacts of construction activities;
- Emissions limitations and schedules for compliance to achieve the reasonable progress goals;
- Emissions source retirement and replacement schedules;
- Smoke management techniques for agricultural and forestry management purposes including plans that currently exist with the state for these purposes;
- Enforceability of emissions limitations and control measures; and
- The anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions over the period addressed by the long-term strategies.

The remainder of this section will discuss these required factors for the LTS.

12.6.1 Emissions Reductions Due to Ongoing Air Pollution Programs

The following summary describes ongoing programs and regulations in Idaho that directly protect visibility, or can be expected to improve visibility in Idaho's Class I areas, 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.

Prevention of Significant Deterioration/New Source Review (NSR) Rules

Idaho's Prevention of Significant Deterioration (PSD) and NSR Program are the primary tools for future protection of visibility at Idaho's Class I areas. These programs require new major sources and major modifications at existing sources with significant impacts to visibility at Class I areas to install Best Available Control Technology (BACT). Much like BART, PSD requires new or major modifications to model the emissions impacts on Class I areas within 300km to determine if the change in visibility above natural levels is significant. As new National Ambient Air Quality Standards are promulgated these significant levels can change. The PSD NSR permitting program is located at IDAPA 58.01.01.200 through 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.

State and Federal Mobile Source Regulations

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

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

Programs to Meet PM_{10} NAAQS

12.6.1..1 Northern Ada County Carbon Monoxide (CO) Limited Maintenance Plan

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

- Local ordinances that ban residential wood stoves and open burning during inversion conditions;
- Voluntary transit control measures to increase ridership of alternative forms of 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;
- The City of Boise replaced its diesel commuter buses with compressed natural gas buses.

12.6.1..2 Northern Ada County PM_{10} Maintenance Plan

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 Northern Ada County/Boise, Idaho which reverted the area to moderate non-attainment. Simultaneously, EPA took final action to approve the PM_{10} maintenance plan for the Ada County/ Boise, Idaho 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 carbon monoxide maintenance plan. Because of the woodstove ordinances, vehicle inspection and maintenance program, along with 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 Class I areas. The closest Class I areas are Sawtooth Wilderness, Craters of the Moon National Monument, Eagle Cap Wilderness, and Hells Canyon Wilderness.

12.6.1..3 Portneuf Valley (Pocatello) PM10 Maintenance Plan

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

- A residential wood stove education program and local ordinances that require all new stoves to be certified;
- A voluntary wood stove 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 required RACT controls on the only major industrial source;
- The Sip requires transportation is to adhere 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 Class I areas.

Sandpoint PM_{10} Non-attainment

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:

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

12.6.2 Measures to Mitigate the Impacts of Construction Activities

40 CFR 51.308(d)(3)(v)(B) requires states to consider measures to mitigate the impacts of construction activities. Fugitive and windblown dust are the major source of particulate matter associated with construction activities. Idaho’s rule’s IDAPA 58.01.01.651 and 652 addresses control of fugitive dust from activities like 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:

- use of water or chemicals,

- application of dust suppressants,
- use of control equipment,
- covering of truck loads,
- paving of roads,
- prompt removal of materials.

12.6.3 Emissions Limitations and Schedules of Compliance

40 CFR 51.308(d)(3)(v)(C) of the Regional Haze Rule requires states to consider emissions limitations and schedules for compliance to achieve the reasonable progress goals. The only emissions limitations and compliance schedules associated with this plan are the BART controls identified in Chapter 10. The control technologies for P4 Production (formerly Monsanto) are already in place and operating. The NO_x and SO_x controls for TASCO Nampa (Amalgamated Sugar) will be installed and operational no later than five-years after EPA approval of this plan.

In Chapter 11 (Reasonable Progress Goals) several source categories were identified as having the potential to cause or contribute to visibility impairment in Class I areas. It was determined it would take 4 to 5 years to determine if these source categories are in fact causing or contribution and develop rules for compliance. In most instances, it would take 1 to 2 years to model the emissions from individual facilities within the source category to determine if they are impacting visibility in Class I areas and another 2 to 3 years to develop rules for implementation, and time for the facilities to secure the necessary capital and install emission controls.

Idaho DEQ is required by the Clean Air Act section 110(a)(2)(A-D) to have a plan to assure compliance with the revised NAAQS for $PM_{2.5}$ and ozone. Since the state will need to implement the New Source Review Program and PSD program for the new $PM_{2.5}$ standard and must assure compliance with the revised standard, it makes sense to simultaneously analyze the source categories identified in the four factor analysis as needing further investigation on visibility impacts.

Idaho is investigating whether to deploy a strategy that would include a sensitivity study using AERMOD (a regulatory dispersion model) with local meteorology to determine the level of $PM_{2.5}$ emissions that may cause a significant concentration at any combination of a range of typical fenceline conditions and a range of typical stack parameters. Based on such an AERMOD sensitivity study, threshold emissions rates (solid and condensable) would be determined for various plume heights.

Secondary pollutants (such as ammonium nitrate and ammonium sulfate) do not contribute near a source (i.e. fenceline); however a large source of secondary pollutants may contribute to an airshed-wide non-attainment problem or impact visibility at Class I areas. A sensitivity study could also be conducted using an airshed photochemical grid model to determine what levels of SO_2 and NO_x emissions may cause a significant impact at any point in the airshed. Since the photochemical precursor environment varies throughout the airshed, the sensitivity study should explore a number of source locations to assure that conservative conditions are captured.

The results of the primary and secondary $PM_{2.5}$ sensitivity study would be a set of emissions thresholds for a specific non-attainment airshed above which a significant contribution may result. The point source emissions inventory containing $PM_{2.5}$, $SO_{2,}$ and NO_x could then be sorted and compared to determine if facilities' emissions are above these thresholds. Those facilities with emissions above these thresholds could have the potential to cause or contribute to visibility impairment and may require further modeling to see if controls are warranted.

12.6.4 Emissions Source Retirement and Replacement Schedules

Section 51.308(d)(3)(v)(D) of the Regional Haze Rule requires States to consider emissions source retirement and replacement schedules. At this time, DEQ is not aware of any sources expecting to shut down or any scheduled replacements. If shutdowns or replacements do occur, they will be included as part of future projections.

12.6.5 Agricultural and Forestry Smoke Management Techniques

Section 51.308(d)(3)(v)(E) requires States to consider smoke management techniques for the purposes of agricultural and forestry management in developing reasonable progress goals. Idaho's open burning rules (IDAPA 58.01.01.600-623) regulate all open burning in Idaho on lands other than the five Indian reservations. Visibility concerns are addressed in Idaho's open burning rules; "The purpose of Sections 600-623 is to reduce the amount of emissions and minimize the impact of open burning to protect human health and environment from air pollutants resulting from open burning as well as to reduce the visibility impairment in mandatory Class I Federal Areas in accordance with the regional haze long-term strategy referenced at Section 667." (IDAPA 58.01.01.600)

Crop Residue Burning Program

Idaho specifically regulates crop residue burning with a permit by rule process. Crop residue is defined as "any vegetative material remaining in the field after harvest or vegetative material produced on designated conservation reserve program (CRP) lands." This includes entire fields, spots and broken bales within a field, pasture, and food plots. EPA approved Idaho's SIP for the crop residue burning program in August 2008. This SIP demonstrated that the new crop residue burning program meets all the requirements of an enhanced smoke management program, under 40 CFR 309 (d)(6)(i).

Prescribed Burning

Idaho also specifically regulates forestry (prescribed) burning under 58.01.01.614. Idaho regulates prescribed burning in the following two ways.

- When burn permits or prescribed fire plans are required:

DEQ will seek interagency agreements to assure permits or plans issued by agencies provide adequate consideration for controlling smoke from prescribed burning.

- When burn permits or prescribed fire plans are **not** required:

DEQ will develop and put into effect a smoke management plan for prescribed burning that must be followed by all burners.

Most of the major prescribed burners in Idaho voluntarily participate in the Montana/Idaho Airshed Group (Airshed Group). The Airshed group is composed of state, federal, tribal, and private member organizations who are dedicated to the preservation of air quality in Montana and Idaho. Its members are prescribed burners and the public health and regulatory agencies that regulate this burning work cooperatively to prevent smoke impacts while using fire to accomplish land management objectives.

The Airshed Group is composed of three units: Montana, North Idaho, and South Idaho. The Montana Unit (formerly called the Montana State Airshed Group) was formed in 1978. The North Idaho Unit (formerly called the North Idaho State Airshed Group) was formed in 1990. The South Idaho Unit was formed in September 1998 and formally joined the operations of Montana and North Idaho in the fall of 1999.

Since 1999, Idaho has used the Airshed Group's operating guide as the state smoke management plan for prescribed burning. In 2003, DEQ sent a letter to EPA Region 10 certifying the Montana/Idaho Airshed Group's operating guide as DEQ's smoke management program for prescribed burning.

Idaho is currently in the process of developing a stand-alone smoke management plan that incorporates the MT/ID Airshed Group's operating guide. The smoke management plan will follow the EPA's *Interim Air Quality Policy on Wildland and Prescribed Fires* (1998). This smoke management plan will apply to all prescribed burning in Idaho on lands other than the five Indian reservations. The smoke management plan will address what is needed to protect air quality when a burn permit or prescribed fire burn plan is and is not required. The smoke management plan will be implemented in 3 phases:

1. Address burning by the members of the Airshed Group. Documenting the smoke management techniques used by the Airshed Group.
2. Evaluate and address burning by large prescribed burners that are not currently members of the Airshed Group.
3. Evaluate and address burning by smaller prescribed burners.

12.7 Additional Factors Considered in Developing the Long Term Strategy

Under Idaho's general rules there are several rules that reduce emissions of visibility-impairing pollutants. While these rules are presented here, they are state-only rules and only included here as examples of additional factors Idaho is implementing that have a positive effect on visibility. These rules may change in the future as needed to reduce emissions under the intent of the rule.

Idaho's dairy rule provides for a program that reduces ammonia emissions through best management practices (BMPs). Under this program, feedlot and dairy operations are given a variety of BMPs to choose. Each BMP has a point score based on the effectiveness of that BMP to reduce ammonia.

Idaho's sulfur content rule sets a threshold for sulfur content in distillate fuel and coal. The burning of lower sulfur content fuels contributes less sulfur to the atmosphere which reduces the formation of sulfates.

12.8 Enforceability of Idaho's Measures

Section 51.308(d)(3)(v)(F) of the Regional Haze Rule requires states to assure that emissions limitations relied upon to meet reasonable progress goals are enforceable.

Idaho has assured that all emissions limitations relied upon to meet the RPGs identified in this plan are enforceable. Both subject–to-BART facilities have permit limits based upon the emissions reductions expected from BART controls. The state has also developed and adopted rules to implement BART, set RPGs, and establish LTS. These rules can be found at IDAPA 58.01.01.665-668

12.9 Net Effect on Visibility from the Long Term Strategy

Section 51.308(d)(3)(v)(G) requires states to address the net effect on visibility resulting from projected changes in point, area, and mobile source emissions by 2018. Idaho projects emissions inventory changes to point, area, and mobile source inventories by the end of the first implementation period. These changes are summarized in the tables found in Chapter 8. These changes in the emissions inventory are from the most recent emissions inventory produced by WRAP and include all the BART and LTS known at the time of the inventory development.

12.9.1 Emissions Reductions from Point, Area, and Mobile Sources

A full description of the projected emissions reductions can be found in Chapter 8. Chapter 8 includes a separate analysis for each of the visibility-impairing pollutants and the source categories. The tables in Chapter 8 summarize the data and show the net change in emissions from 2002 to 2018. In Chapter 11, Table 11-11 shows all of the visibility-impairing pollutants and the percentage contribution from each source category.

12.9.2 Projection of 2018 Visibility Conditions from 2002 Base Case (results from WRAP regional modeling work)

Using WRAP's 2002 and 2018 emissions inventories, Chapter 11 shows the modeling results and the Idaho's RPGs. Section 11.5 discusses RPGs for both the 20% best and 20% worst days and also looks at the estimated future concentrations in comparison with the URP and discusses impacts from anthropogenic and natural sources.

Chapter 13. Consultation and Future Commitments

13.1 Federal Land Manager Consultation

Section 51.308(i) of the Regional Haze Rule requires consultation between the state and federal land managers (FLMs) related to development and implementation of regional haze plans. States need to provide FLMs an opportunity to comment at least 60 days prior to holding a public hearing on any proposed plan or plan revisions. This includes the opportunity to comment on the state's assessment of visibility impairment in each Class I area, and providing recommendations on the reasonable progress goals and visibility control strategies the state has proposed. States also need to provide the FLMs an opportunity to comment on the five-year progress reports and other developing programs that may contribute to Class I visibility impairment.

Idaho has provided agency contacts to the FLMs as required. In the development of this plan, the FLMs were consulted in accordance with provisions of 51.308(i)(2). Idaho has provided the FLMs an opportunity for consultation at least 60 days prior to holding any public hearing on the plan. The FLM comment period started on June 3, 2010 and closed on August 5, 2010. The first public hearing on the plan is August 31, 2010. The Idaho Regional Haze State Implementation Plan was made available to the FLMs for review and comment via DEQ's regional haze Web site on June 3, 2010. The FLMs were notified by e-mail and a letter on that date. A copy of the letter can be found in Appendix I.

In accordance with 40 CFR 51.308(i)(3), Idaho has received comments regarding the plan from the FLMs. These comments on the plan were addressed by DEQ and can be found in Appendix I.

Section 51.308(i)(4) requires procedures for continuing consultation between the state and FLMs on the implementation of the visibility protection program. Idaho will consult with the FLMs on the status of the following implementation items:

- Implementation of emissions strategies identified in the plan as contributing to expected improvements in visibility on the 20%worst days visibility.
- Summary of new permits issued for major sources.
- Status of state actions to meet commitments for completing any future assessments or rulemaking on sources identified as likely contributors to visibility impairment.
- Any changes to the monitoring strategy or monitoring station locations that affect tracking of reasonable progress.
- Work underway for preparing the five-year reviews and 10-year revisions.
- Items for FLMs to consider or provide support for in preparation for any visibility plan revisions (based on any five-year review or 10-year revision).

Section 51.308(g) requires States to submit a progress report to EPA every five years evaluating progress towards the reasonable progress goal established for each Class I area. The first progress report is due 5 years from submittal of this plan. In accordance with Section 51.308(h), Idaho will submit a determination of the adequacy of the existing regional haze SIP as part of the five-year progress report. Idaho will continue to consult with the FLMs during the development of future progress reports and revisions.

13.2 State Consultation and Coordination

Section 51.308(d)(3)(i) of the Regional Haze Rule requires states to consult with neighboring states to develop coordinated emissions strategies. This requirement applies both where emissions from a state are reasonably anticipated to contribute to visibility impairment in Class I areas outside the state, and where emissions from other states are reasonably anticipated to contribute to Class I visibility impairment inside the state.

As described in Chapter 12, Idaho reviewed interstate transport of haze (visibility-impairing) pollutants with neighboring states, focusing on source apportionment information to identify visibility impacts at Class I areas in Idaho and neighboring states. The states consulted by Idaho were Washington, Oregon, Nevada, Wyoming and Montana. This section reviews the consultation process with these states. Additional consultation with these states was part of Idaho's participation in WRAP forums and committees as described in Chapter 2.

As part of the WRAP process, the Implementation Work Group (IWG), composed of the 14 Western States, reviewed major strategies associated with state and tribal regional haze plans. These meetings addressed the issues associated with development of strategies for meeting reasonable progress goals and consultation with states and tribes to address impacts of intrastate emissions.

13.2.1 Summary of State Consultation Process

The WRAP IWG process was one of the primary mechanisms for state-to-state consultation. Idaho also consulted directly with IWG members from the following neighboring states:

1. Washington – Doug Schneider, Washington Department of Ecology
2. Oregon – Brian Finneran, Oregon Department of Environmental Quality
3. Nevada – Frank Forsgren, Nevada Division of Environmental Protection
4. Wyoming- Tina Anderson, Wyoming Department of Environmental Quality
5. Montana – Laurel Dygoski, EPA Region 8

Discussions with neighboring states included the review of major contributing sources of air pollution, as documented in numerous WRAP reports and projects, and as described in Chapters 7-12 of this plan. The focus of this review process was interstate transport of emissions, major emissions sources believed to be contributing to visibility impairment, and whether any mitigation measures were needed. All the states relied upon similar emission inventories, results from source apportionment studies and BART modeling, review of IMPROVE monitoring data, existing state smoke management programs, and other information in assessing the extent to which each state contributes to visibility impairment in other states' Class I areas.

Idaho will continue to coordinate and consult with other states as part of the implementation of the strategies in the Idaho regional haze plan and for future progress reports and revisions.

13.2.2 Consistency with Neighboring State SIPs

Idaho's Regional Haze Plan was developed with emphasis on consistency with other State plans, through consultation directly with neighboring states and in the WRAP, and the technical tools, policy documents, and other products that were used to develop all of the by western states' regional haze plans. The format, layout, and in some instances language from other WRAP states was used in the development of this regional haze SIP. In an effort to improve consistency among SIPs submitted to EPA Region X, this plan follows Oregon's Regional Haze SIP as a template.

13.2.3 Idaho and Other States' Emissions Reduction Obligations

Section 51.308(d)(3)(ii) requires each state to demonstrate that its regional haze plan includes all measures necessary to achieve its fair share of emissions reductions needed to meet reasonable progress goals. Based on the consultation described above, no major contributions were identified that supported developing new interstate strategies, mitigation measures, or emissions reduction obligations. Both Idaho and neighboring states agreed that the implementation of BART and other existing measures in state regional haze plans were sufficient, and that future consultation would address any new strategies or measures needed.

13.3 Public Comment

As required by 40 CFR 51.102 and adopted by reference in the Department of Environmental Quality rules, IDAPA 58-10-10-107.03.a, this Regional Haze Plan was provided to the public for comments. The public comment period started on August 31, 2010 and ended at close of business on September 30, 2010. A public hearing was held on September 15, 2010 at 3:00 pm. A copy of the "Certificate of Hearing" certifying no members of the public attended the hearing and that the notice was published in several news papers can be found in Appendix I.

DEQ received three written comments from Lesilie Weldon (USDA Forest Service), Charles Johnson (Nampa citizen) and Dean DeLorey (Amalgamated Sugar Company – TASCO). The actual comments and response to those comments can be found in Appendix I.

13.4 Tribal Consultation

Although not required by the EPA Regional Haze Rule, DEQ consulted with the tribes during the development of this plan. Like the state consultation process described above, consultation with the tribes involved reviewing major emissions sources and regional haze strategies, both through WRAP activities and direct outreach to tribes in Idaho. Idaho participated in two "Environmental Summits" put on by the tribes and presented Idaho's regional haze plans.

A letter was sent on March 13, 2008, to the WRAP Tribal Caucus Coordinator Ken Cronin with the National Tribal Environmental Council (NTEC), describing Idaho's interest in obtaining participation from the tribes in the development of Idaho's haze plan, and seeking assistance from NTEC in contacting Tribes on this matter. A copy of the letter can be found in appendix I.

13.5 Commitment to Future Regional Haze Plan Revisions

13.5.1 Comprehensive 10-Year Plan Revisions

Section 51.308(f) of the Regional Haze Rule requires states to revise their regional haze plans and submit a plan revision to EPA by July 31, 2018, and every 10 years thereafter. In accordance with the requirements listed in this section of the federal Regional Haze Rule, Idaho commits to revising and submitting a regional haze implementation plan by July 31, 2018.

These plan revisions must evaluate and reassess elements under 40 CFR 51.308(d), taking into account improvements in monitoring data collection and analysis, and control technologies. Elements of the future plan are summarized below.

1. **Current Visibility Conditions**- Determine current visibility (most recent five-year period preceding the required date of the plan submittal for which data is available) conditions for the most impaired and least impaired days and determine the actual progress made towards natural conditions.
2. **Long Term Strategies –** Determine the effectiveness of the long term strategy for achieving the presumptive goal for the prior SIP period. If the long term strategy or prior goal was insufficient to attain natural conditions by 2064, the State must look at additional or new controls measures that may be adopted considering the cost of compliance, the time necessary to implement, energy and non-air quality environmental impacts, and the affected source's remaining useful life.
3. **Reasonable Progress Goals –** Affirm or revise the current reasonable progress goal based on assessment of new or updated information, improved technologies, and ongoing programs.
4. **Monitoring Strategy –** Re-evaluate the adequacy of the existing monitoring strategy. Provide updated information and changes to the monitoring strategy, as well as an updated emissions inventory.

13.6 Adequacy Determination of the Plan

As required by Section 51.308(h) of the Regional Haze Rule, depending on the findings of the five-year progress report, Idaho commits to taking one of the following actions at the same time Idaho submits its five-year progress report:

1. If Idaho finds that no substantive SIP revisions are required to meet established visibility goals, Idaho shall provide EPA a negative declaration saying that no plan revision is needed;

2. If Idaho finds that the plan is or may be inadequate to ensure reasonable progress due to emissions from outside the state, Idaho shall notify EPA and the other contributing state(s), and initiate efforts through a regional planning process to develop additional strategies for addressing the SIP deficiency;
3. If Idaho finds that the plan is or may be inadequate to ensure reasonable progress due to emissions from another country, Idaho shall notify EPA and provide the available supporting information; or
4. If Idaho finds that the plan is or may be inadequate to ensure reasonable progress due to emissions from within the State, Idaho will develop additional control strategies to address the plan deficiencies and revise the plan.