

# Preliminary Evaluation of Data for Reasonable Progress

**Montana RH FIP**

**Laurel Dygowski, EPA Region 8**

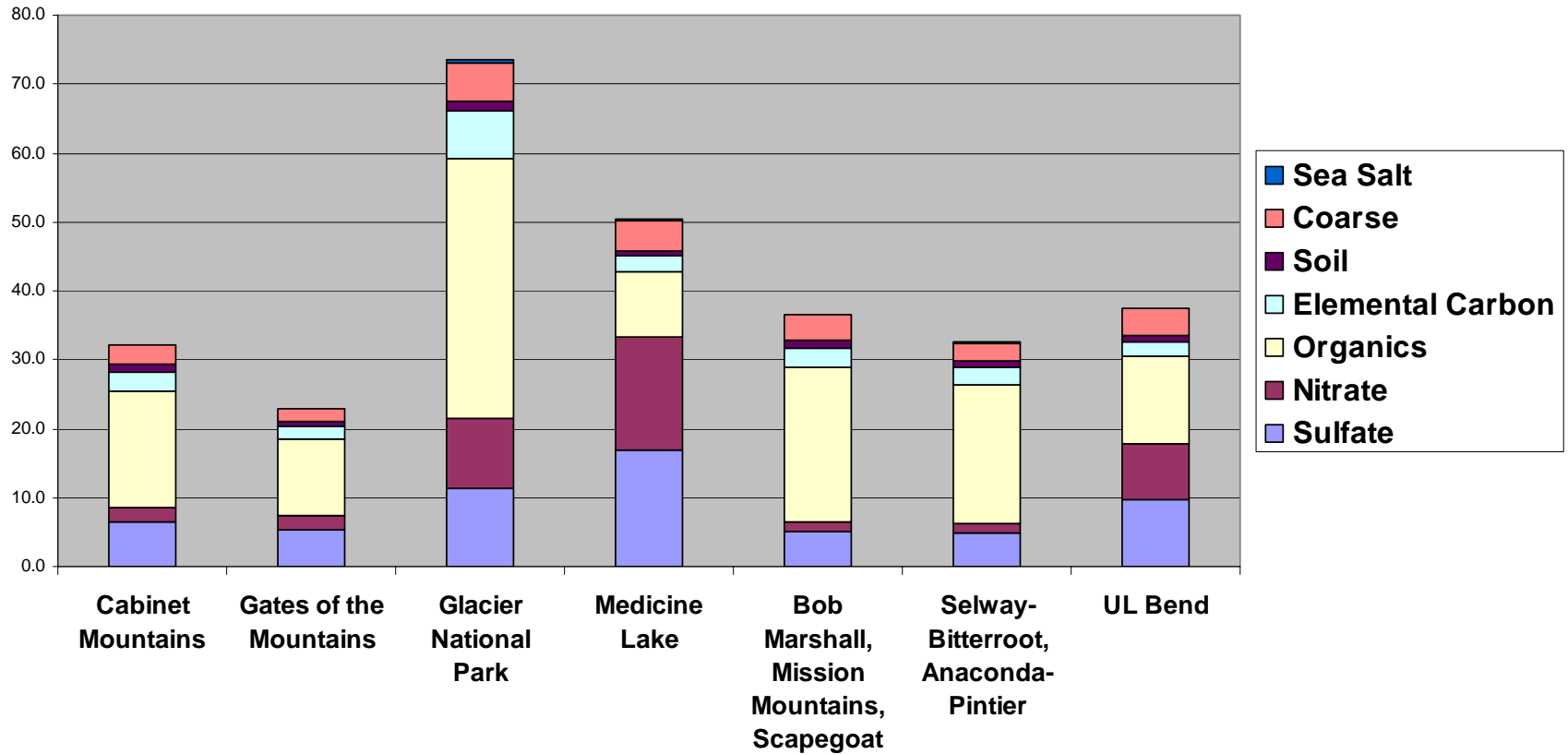
**IWG Meeting – April 2007**



# Mandatory Class I Areas

<b>Anaconda-Pintlar Wilderness Area</b>	157,803	USDA-FS
<b>Bob Marshall Wilderness Area</b>	950,000	USDA-FS
<b>Cabinet Mountains Wilderness Area</b>	94,272	USDA-FS
<b>Gates of the Mtn Wilderness Area</b>	28,562	USDA-FS
<b>Glacier NP</b>	1,012,599	USDI-NPS
<b>Medicine Lake Wilderness Area</b>	11,366	USDI-FWS
<b>Mission Mountain Wilderness Area</b>	73,877	USDA-FS
<b>Red Rock Lakes Wilderness Area.</b>	32,350	USDI-FWS
<b>Scapegoat Wilderness Area.</b>	239,295	USDA-FS
<b>Selway-Bitterroot Wilderness Area{1}</b>	251,930	USDA-FS
<b>U. L. Bend Wilderness Area</b>	20,890	USDI-FWS
<b>Yellowstone NP{2}</b>	167,624	USDI-NPS

# Distribution of Aerosol Light Extinction for 20% Worst Days for Federal Class I Areas in Montana



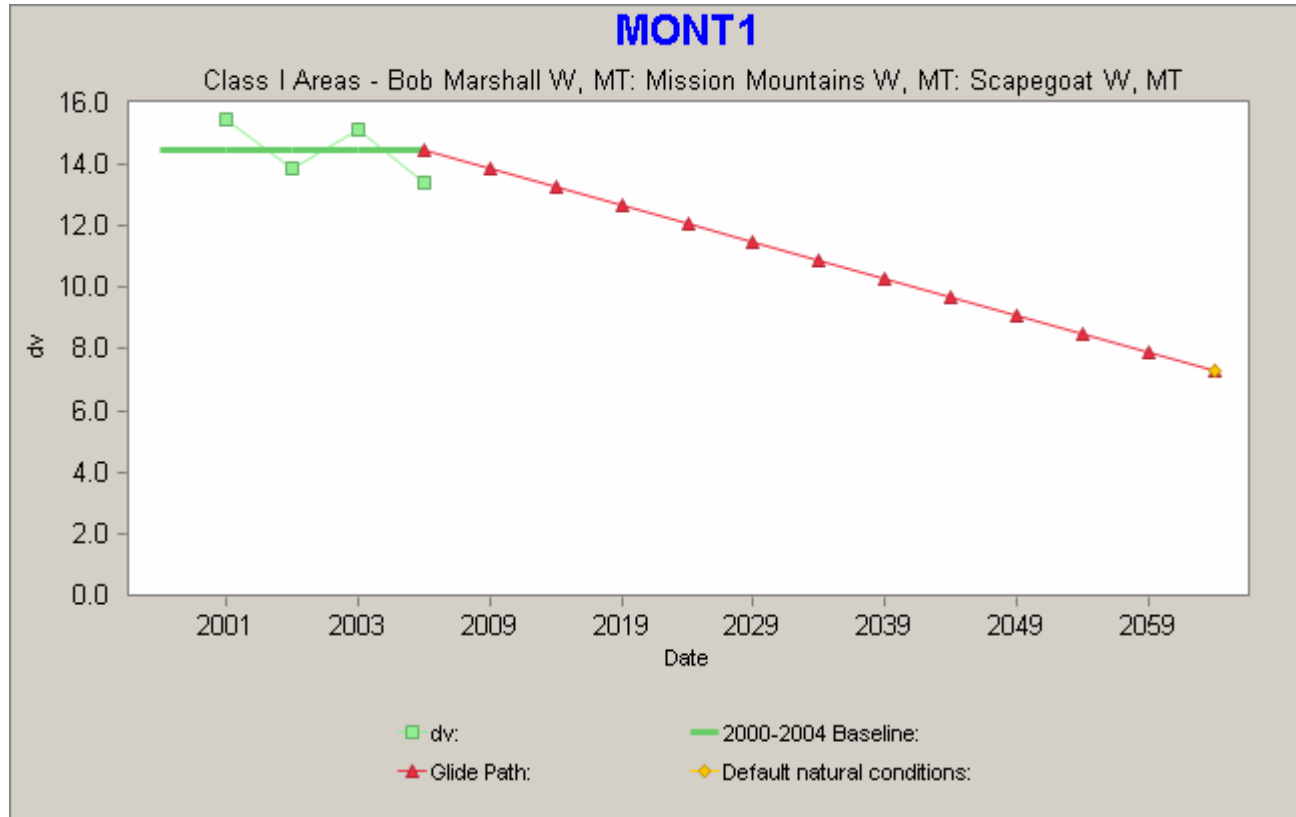
- Class I Areas in the west are dominated by organics.

- Class I Areas in the northeast have a relative higher contribution from sulfates and nitrates

# Monture (MONT1) - IMPROVE Monitor for – Bob Marshall, Mission Mountains, and Scapegoat – USFS Wilderness Areas



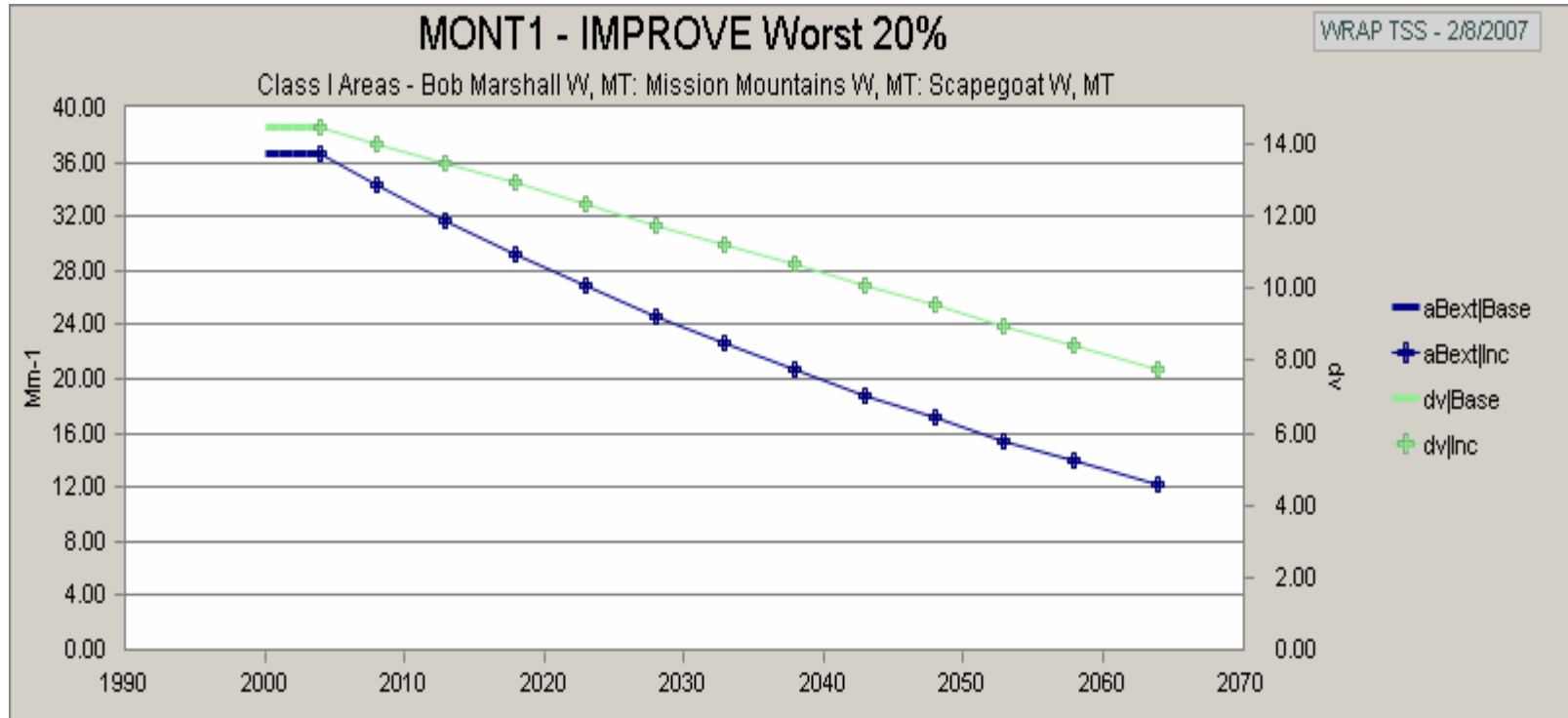
# Improve Data – Baseline and Natural Conditions – Default Natural Conditions



2000-2004 baseline for worst days – 14.48dv


Default Natural Conditions – 7.33dv

# Improve Data – Baseline and Natural Conditions – New Equation



- Natural Conditions with new equation – 7.74
- 6.74 deciview change to needed to reach natural conditions

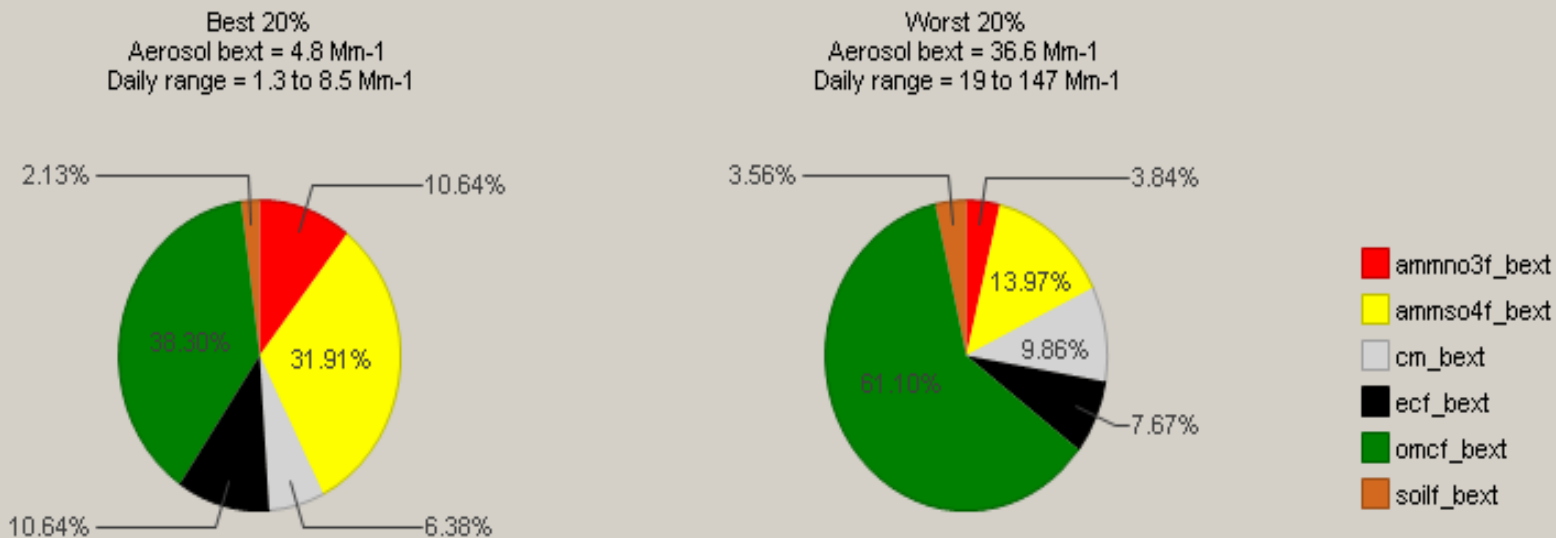
# Uniform Rate of Progress

- ◆ EPA Region 8 plans on using new calculation of natural conditions (7.74dv)
  - ◆ 1.2dv reduction to be on glideslope for first five planning periods
  - ◆ .74 reduction in 6<sup>th</sup> planning period
- 



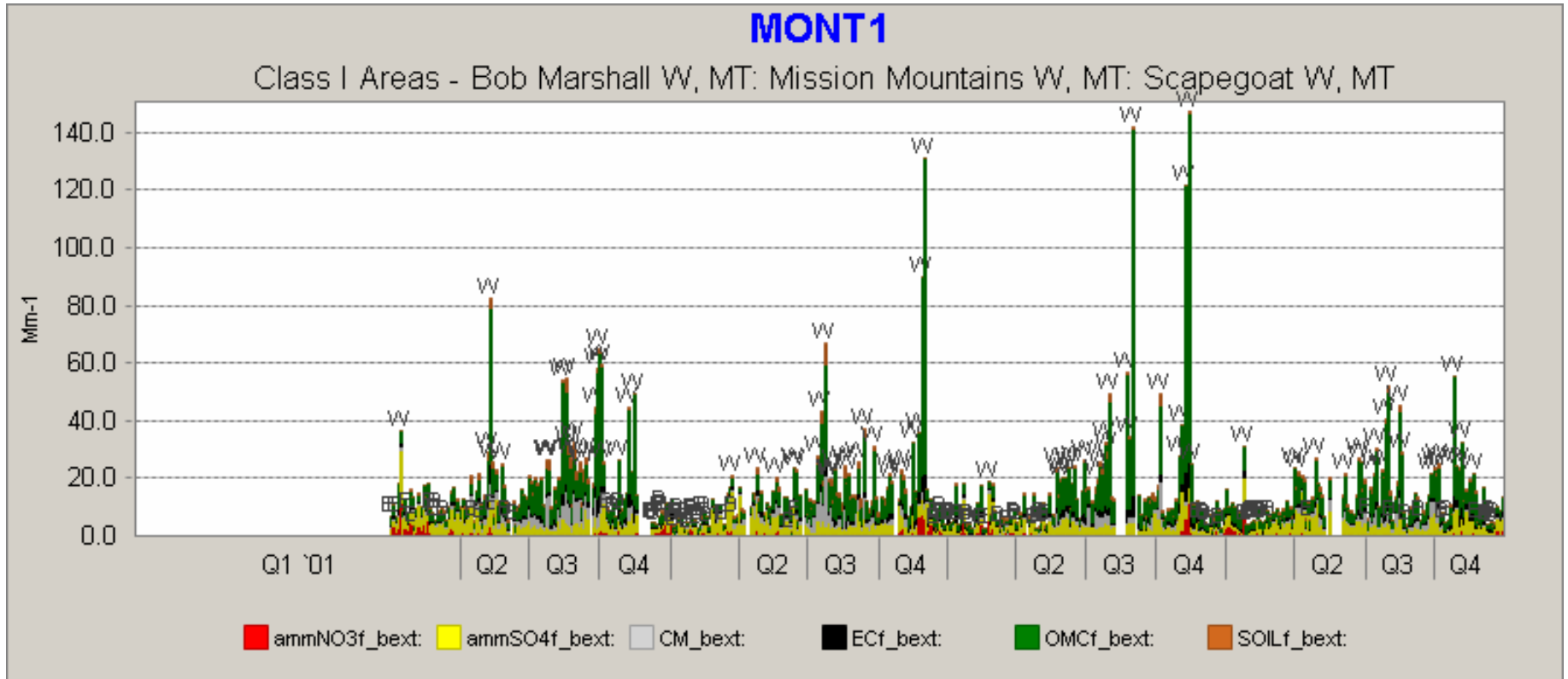
# Species Contribution Average over Baseline

## MONT1 2001-2004

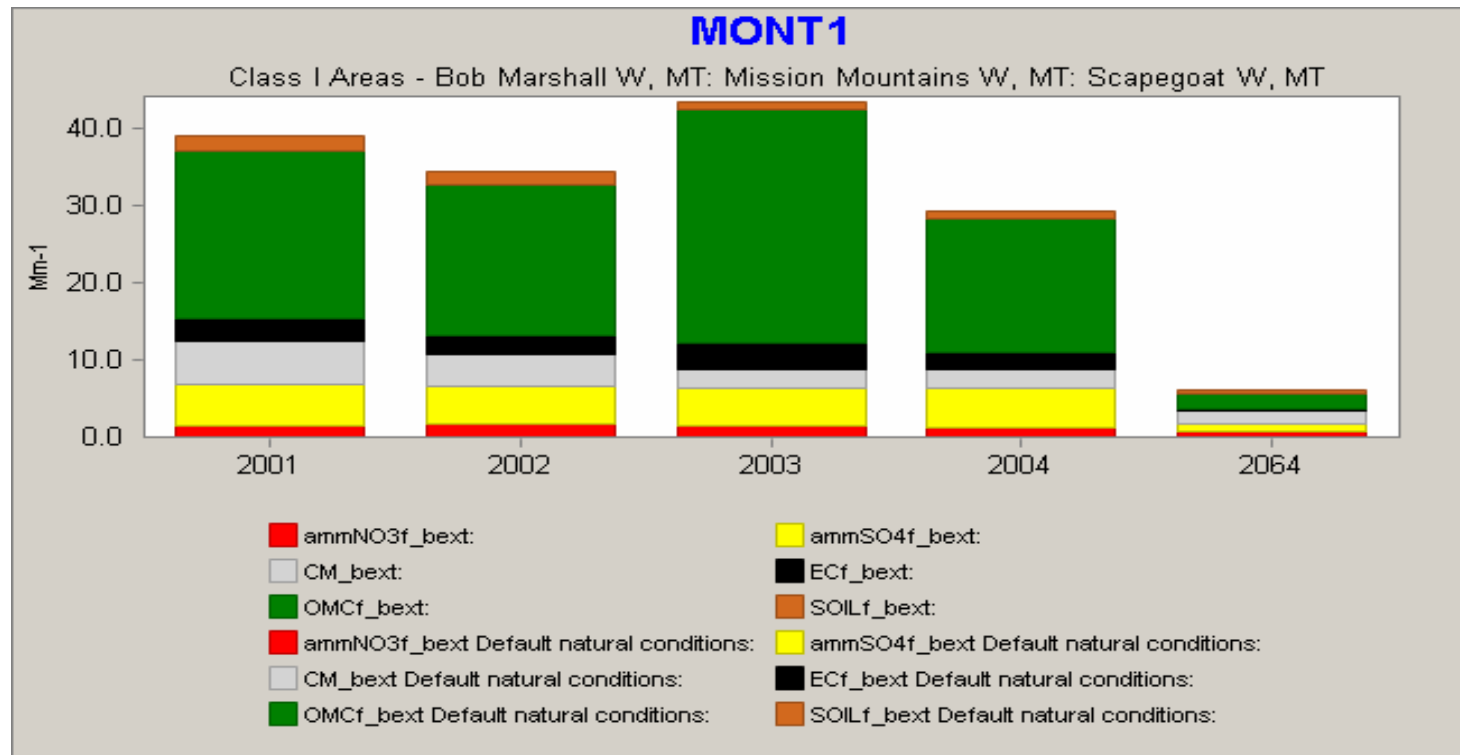


- **Best Days** – Organics and sulfates are highest contributors
- **Worst Days** – Organics heavily dominate species contribution

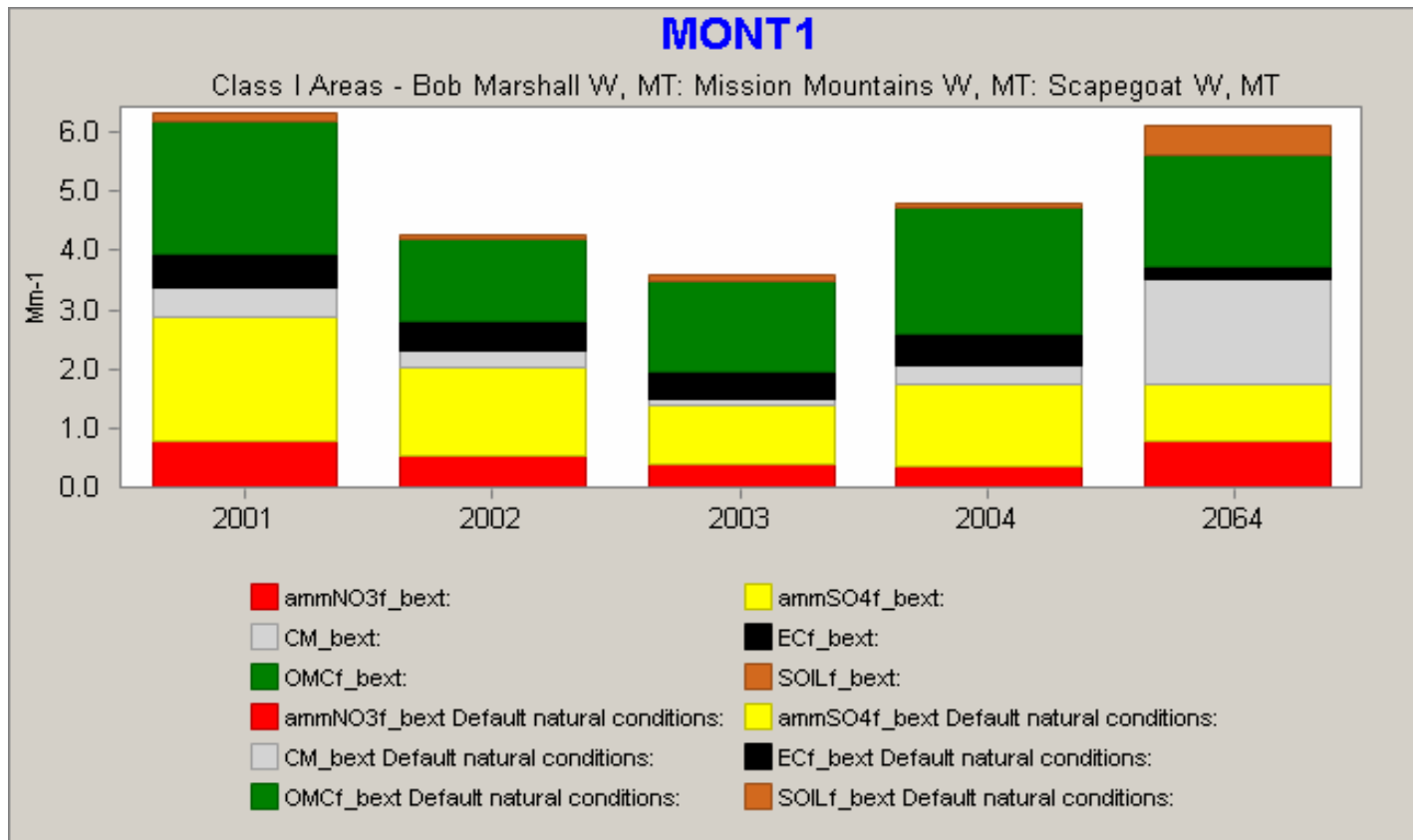
# Species Contribution By Year



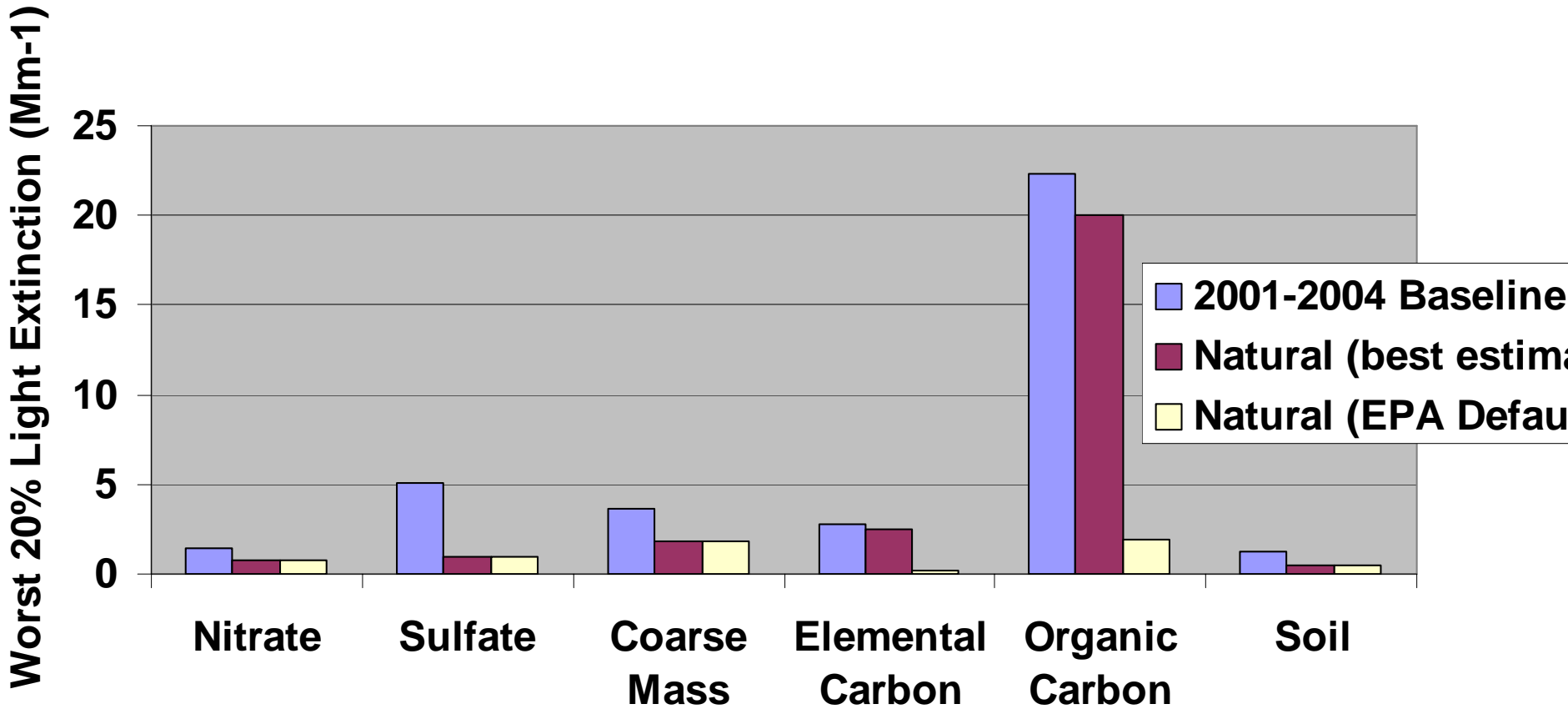
# Baseline & natural conditions worst 20% species



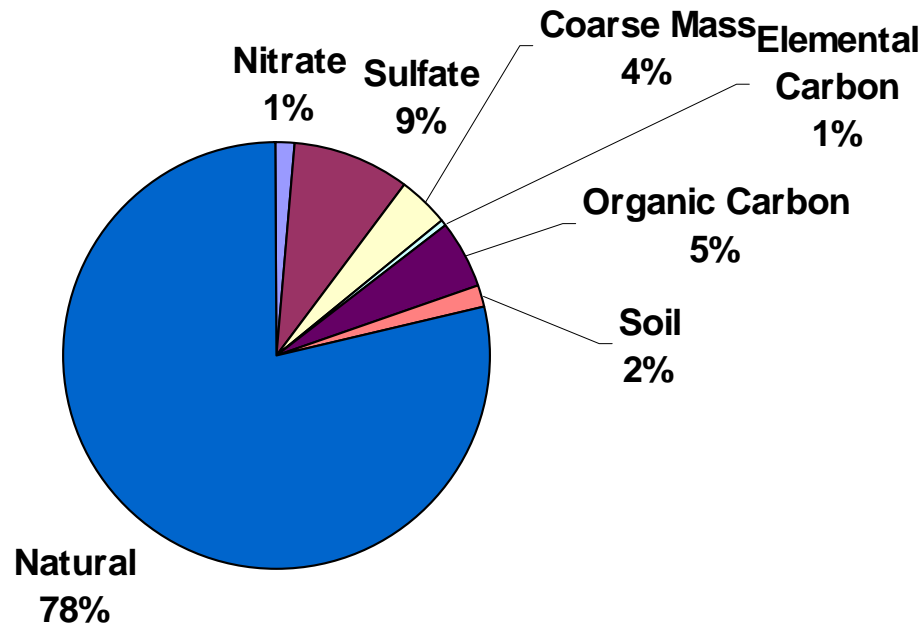
# Baseline & natural conditions best 20% species



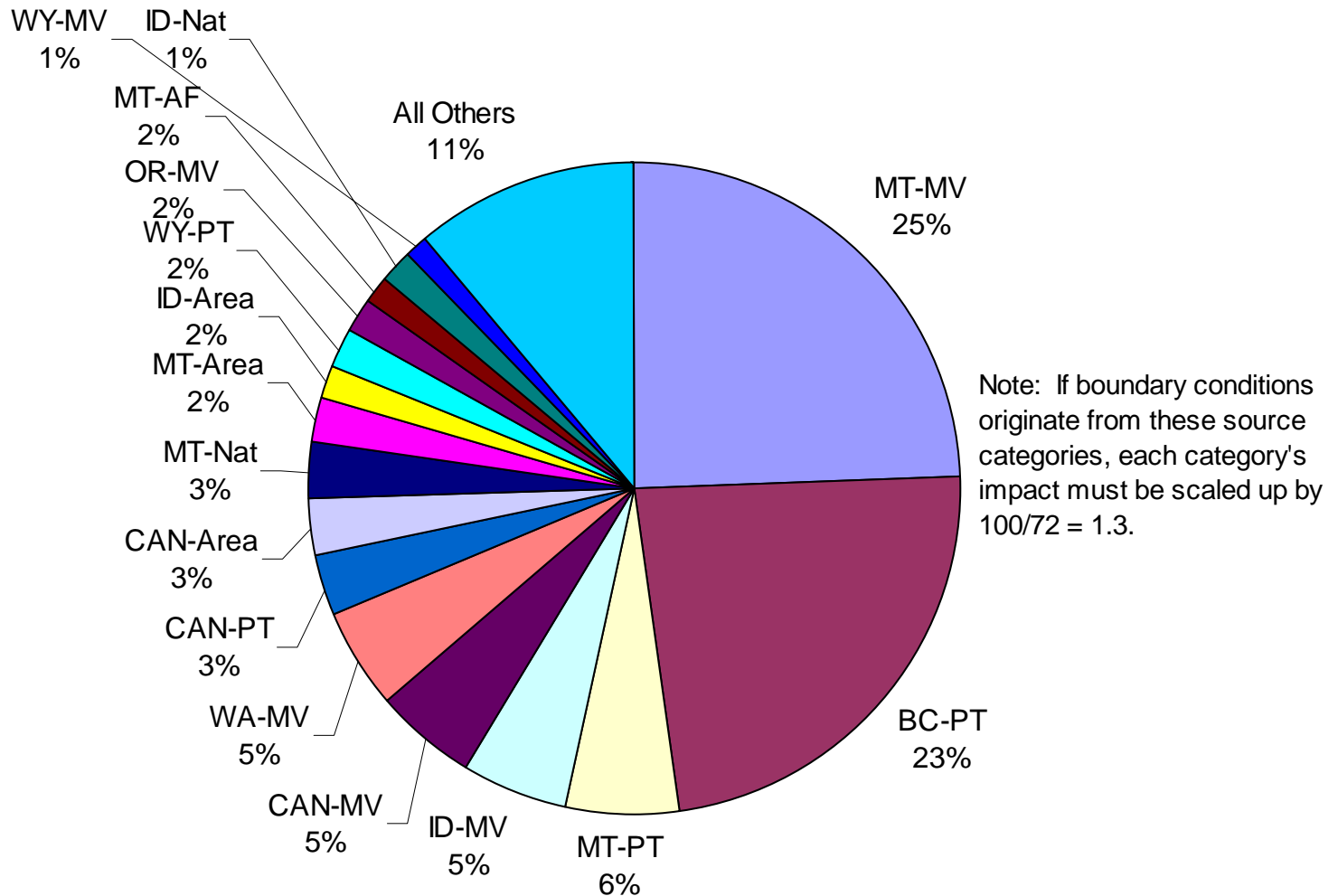
# Monture Light Extinction, Baseline and Estimated and Default Natural



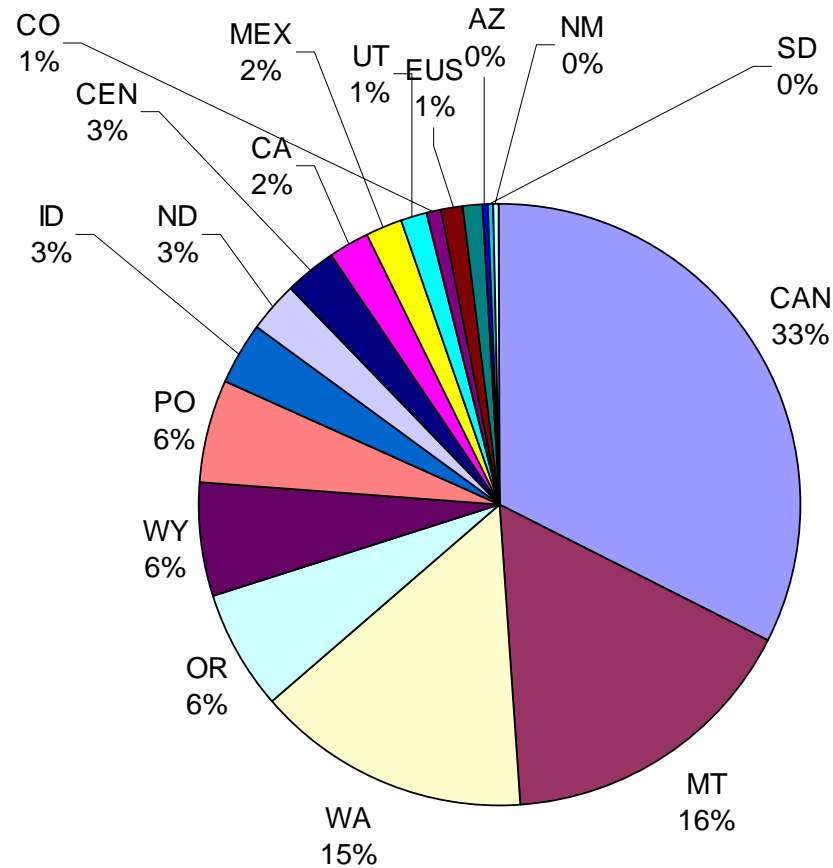
# Monture Controllable Light Extinction on 20% Worst Days for Base Period



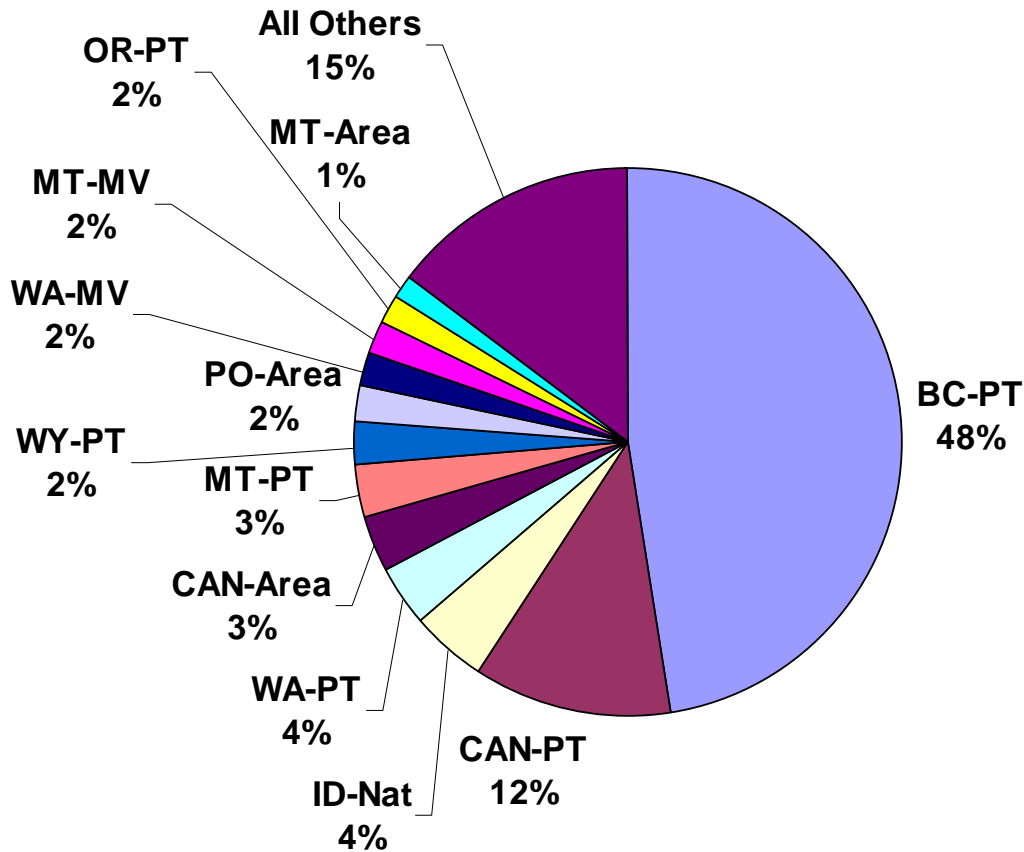
# CAMx PSAT Attribution of Nitrate at Monture for 20% Worst Days for Base Period



# CAMx PSAT Sulfate Attribution at Monture for 20% Worst Days for Base Period (Excluding Boundary Conditions)

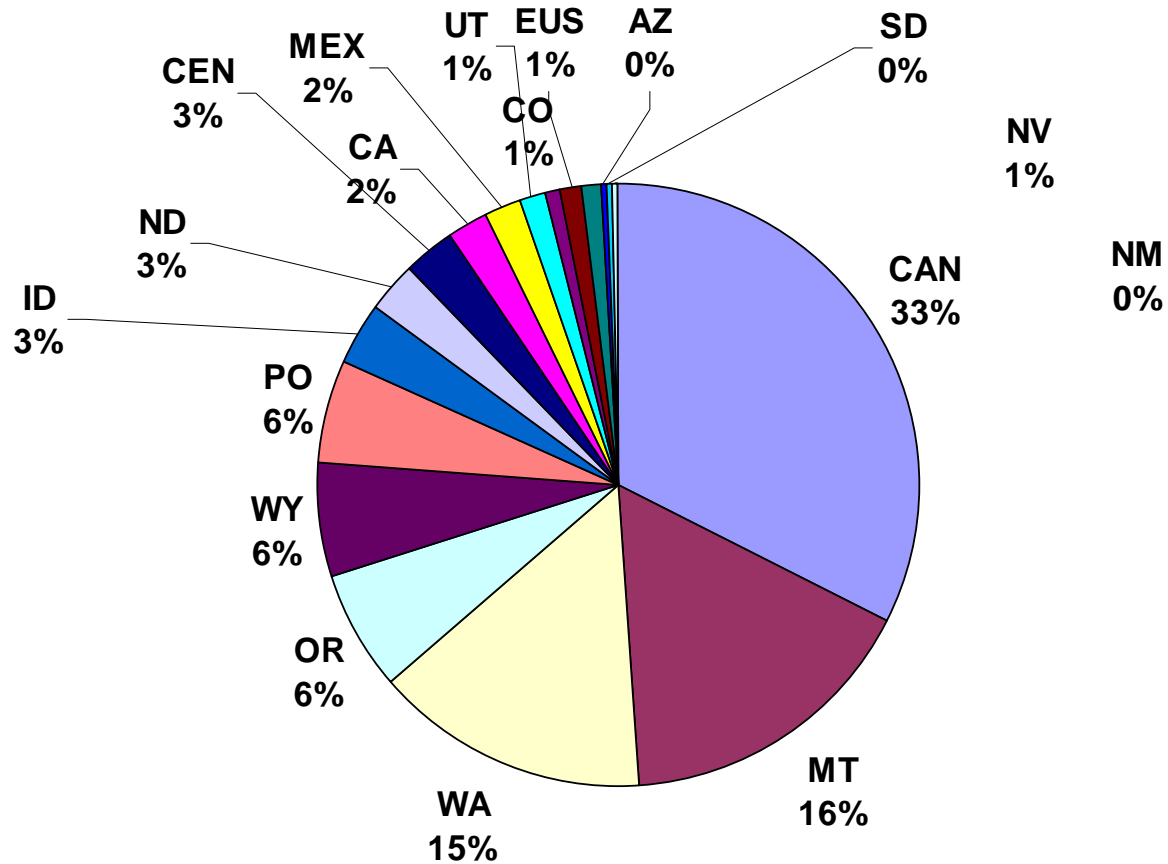


# CAMx PSAT Attribution of Sulfate at Monture for 20% Worst Days for Base Period



Note: If boundary condition sulfate comes from these categories, double the contribution of these categories. For example, Montana contributions would double from 6% to 12%. If, however, boundary conditions are indicative of natural and international impacts, the contributions shown may be indicative of the true impact.

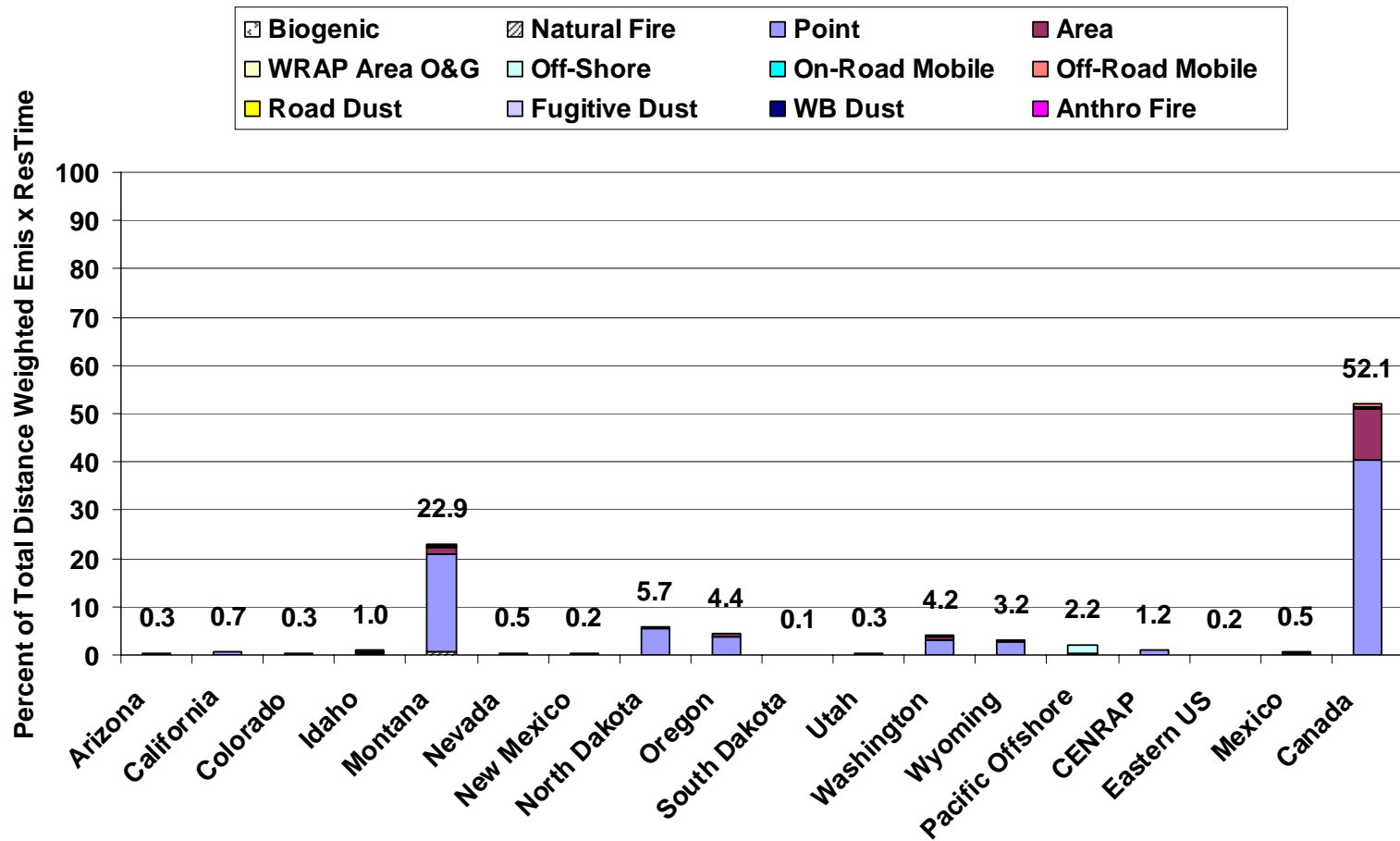
# CAMx PSAT Sulfate Attribution at Monture for 20% Worst Days for Base Period (Excluding Boundary Conditions)



# Sources and Areas of Potential Sulfur Oxide Emissions Influence

## 2018 Projections for UL Bend, MT

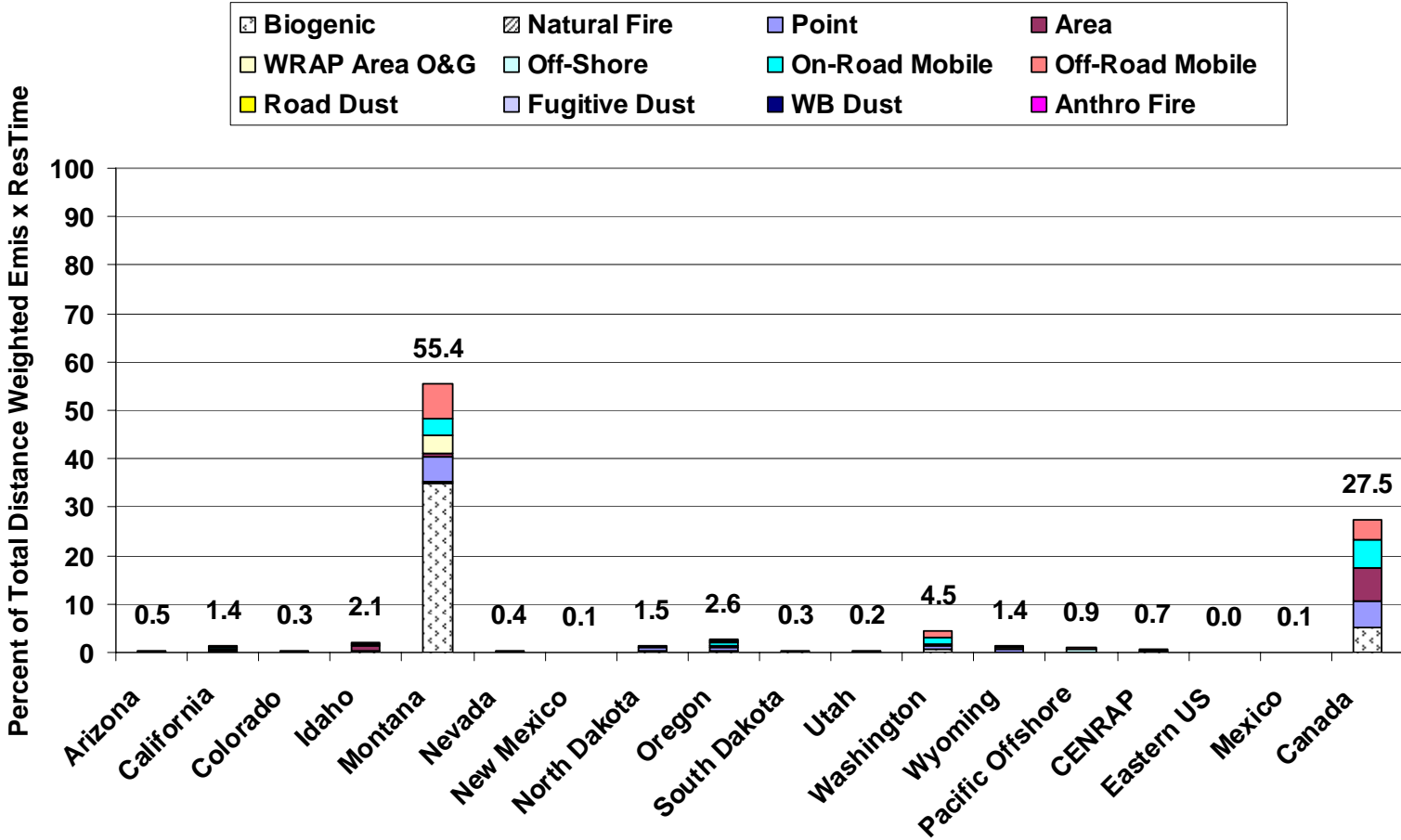
### 20% Worst Visibility Days



# Sources and Areas of Potential Nitrogen Oxide Emissions Influence

## 2018 Projections for UL Bend, MT

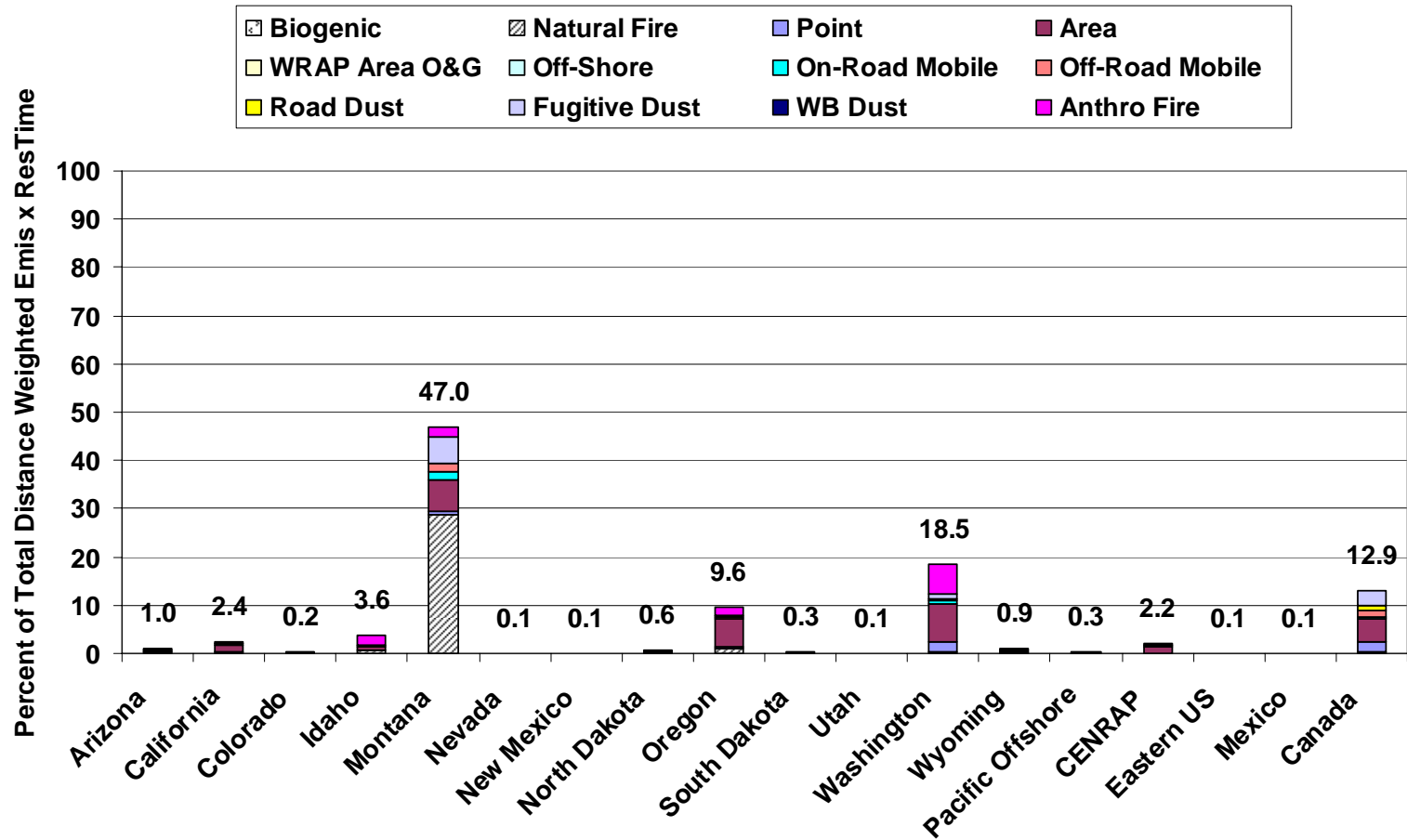
### 20% Worst Visibility Days



# Sources and Areas of Potential Organic Carbon Emissions Influence

## 2018 Projections for UL Bend, MT

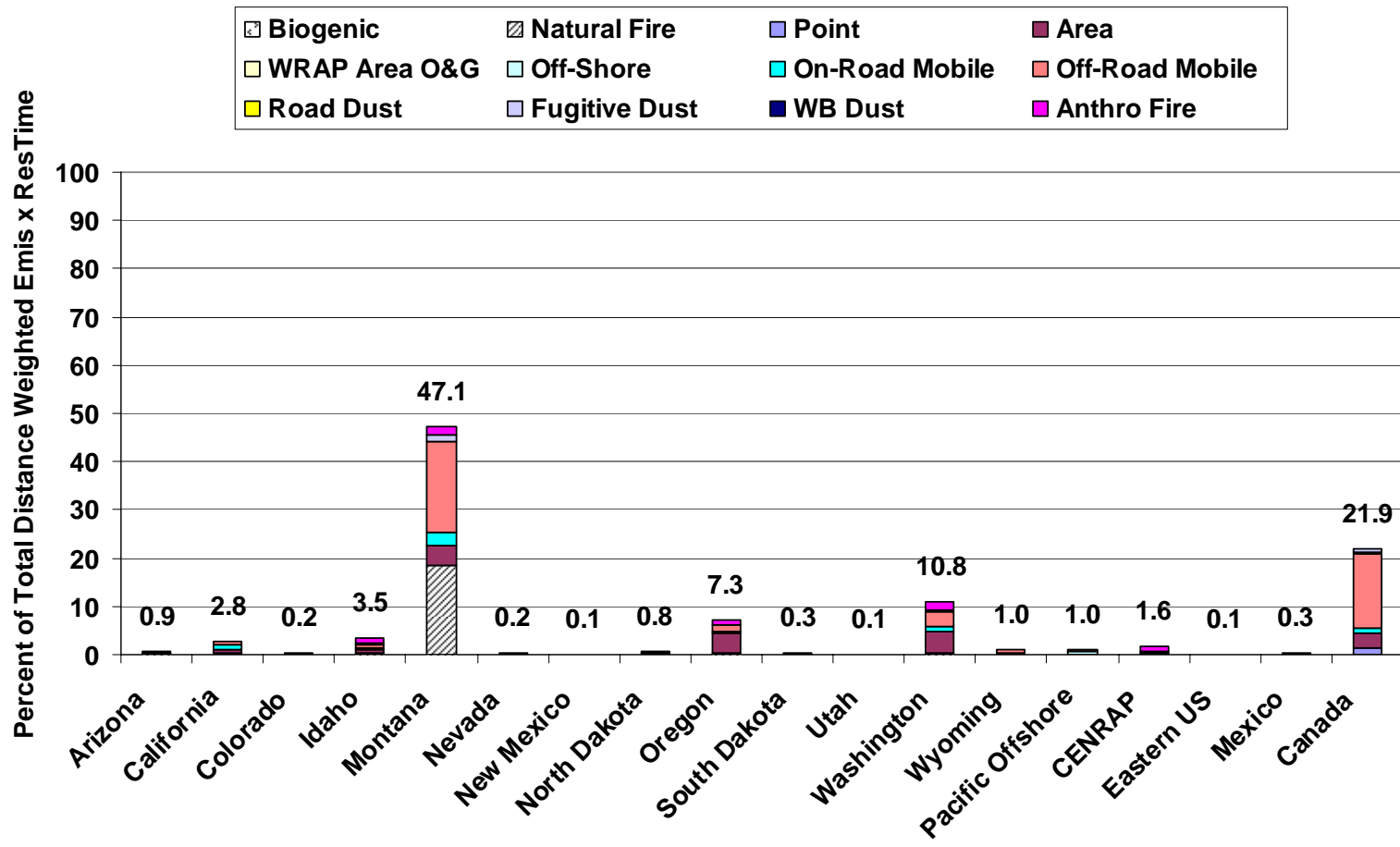
### 20% Worst Visibility Days



# Sources and Areas of Potential Elemental Carbon Emissions Influence

## 2018 Projections for UL Bend, MT

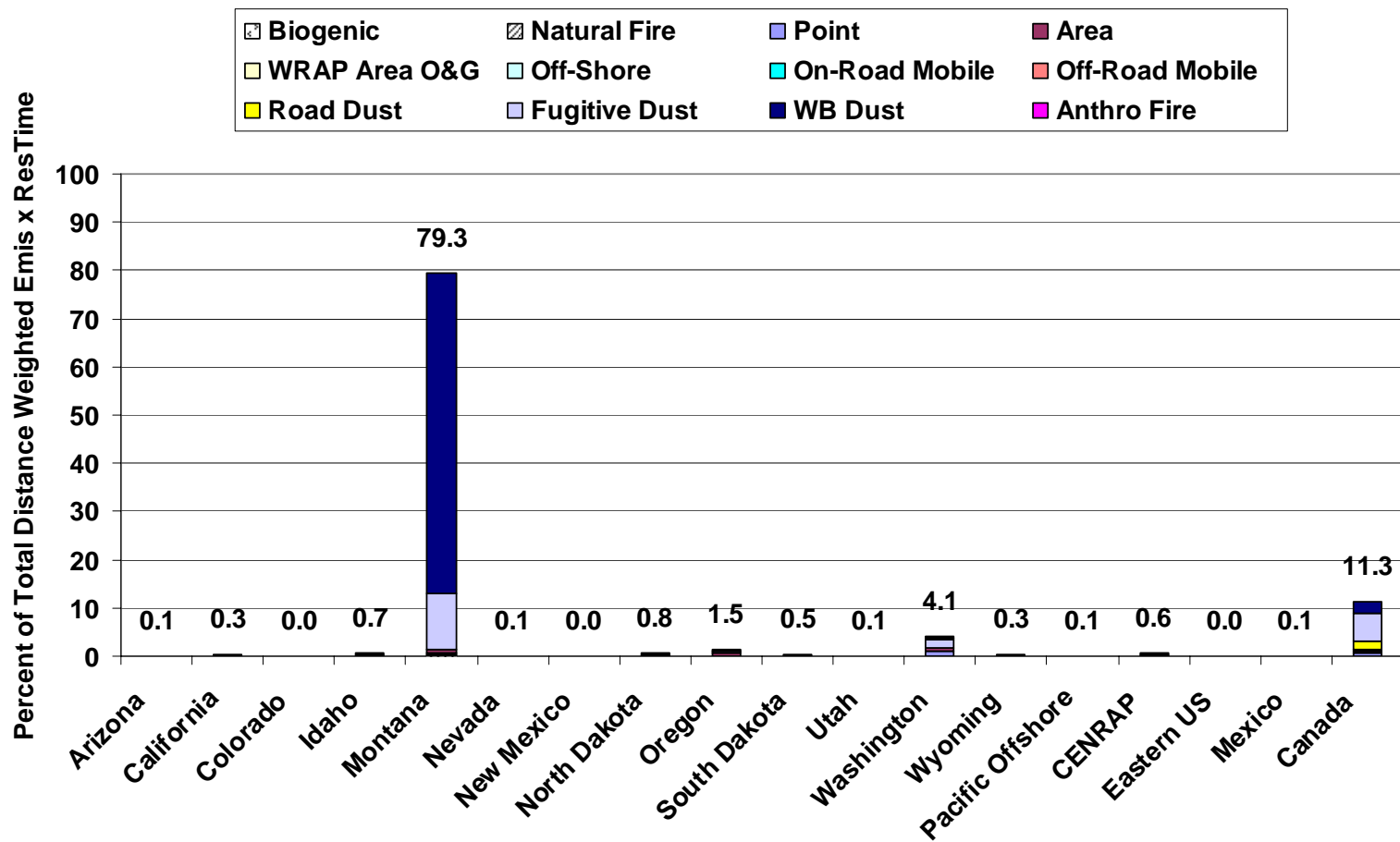
### 20% Worst Visibility Days



# Sources and Areas of Potential Fine PM Emissions Influence

## 2018 Projections for UL Bend, MT

### 20% Worst Visibility Days

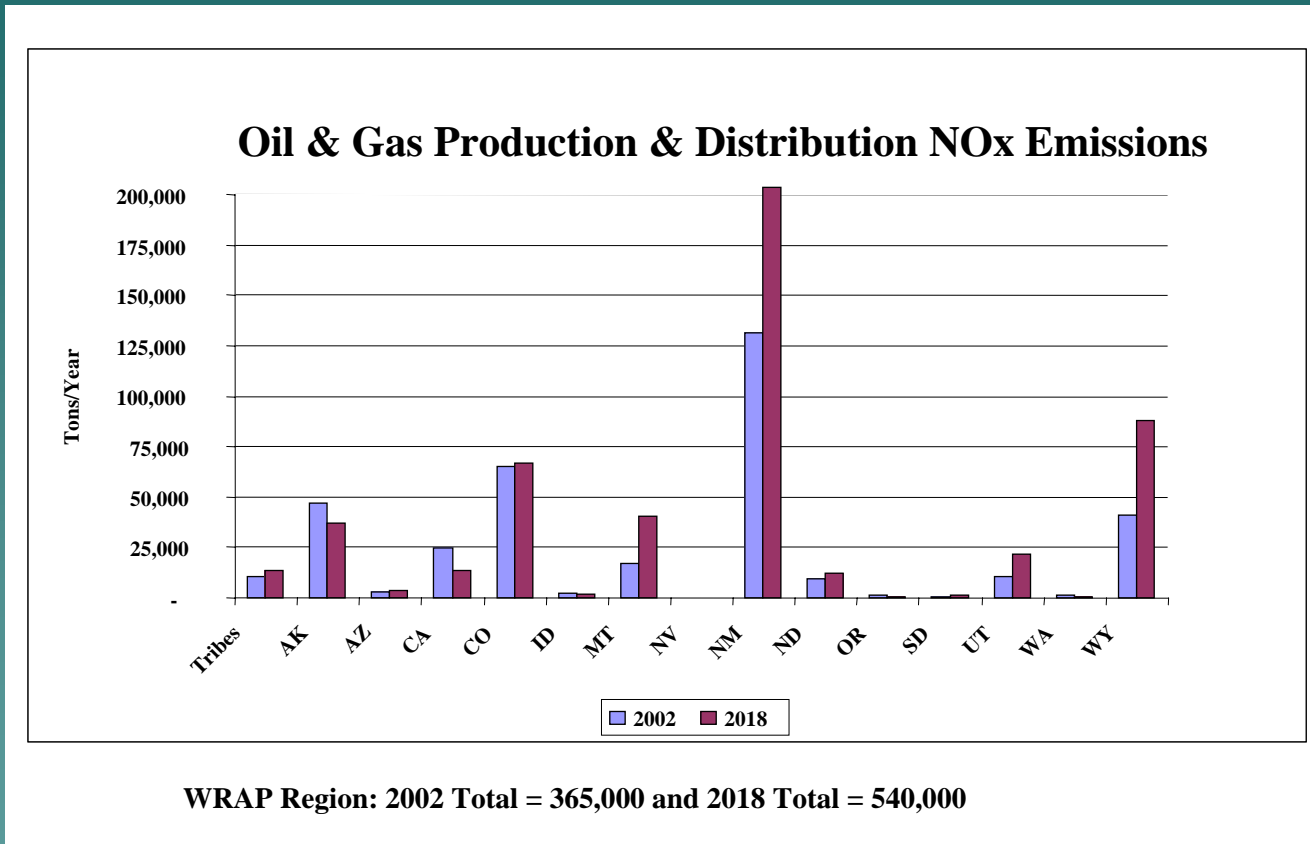


# EMISSION INVENTORY

## MT – Area Sources 2002 and 2018

Source Category	2002	2018
Misc. Area Sources	219,987	227,975
Industrial Processes (includes O&G)	147,734	213,619
Stationary Source Fuel Combustion	56,865	61,537
Solvent Utilization	25,043	36,176
Waste Disposal	25,043	29,172
Storage and Transport	8,051	8927
Total	486,115	577,406

# Area Sources – Oil and Gas



Taken from *WRAP POINT AND AREA SOURCE EMISSIONS PROJECTIONS FOR THE 2018 BASE CASE INVENTORY, VERSION 1*

## MT – NOx Emissions Point Sources 2002 and 2018

Source Category	2002	2018
External Combustion Engine	39,480	48,304
Industrial Processes	6,805	8,446
Internal Combustion Engines	6,656	5,346
Waste Disposal	29	36
Petroleum and Solvent Evap.	22	30
Total	53,415	62,583

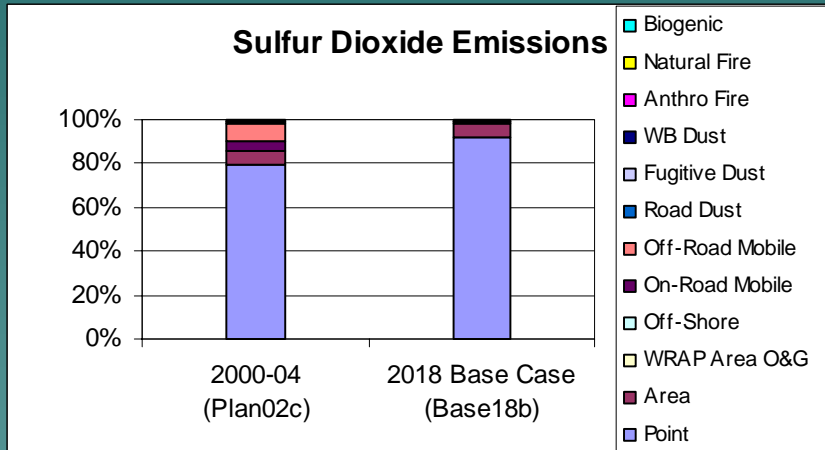
## MT – SOx Emissions Point Sources 2002 and 2018

Source Category	2002	2018
External Combustion Engine	24,867	29,852
Industrial Processes	11,528	12,675
Internal Combustion Engines	243	277
Waste Disposal	18	25
Petroleum and Solvent Evap.	14	18
Total	36,879	43,055

# Emissions by Pollutant

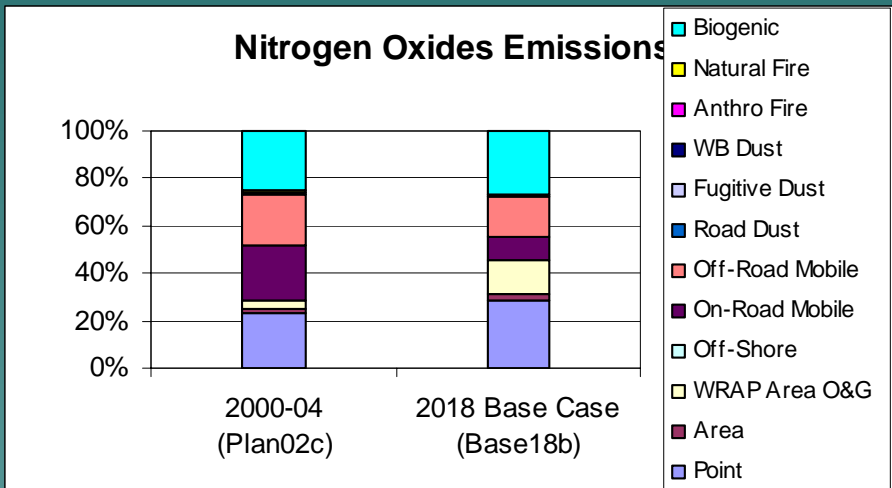
Pollutant	Total 2002 tpy	Total 2018 tpy	Delta	% Delta
<b>Sulphur Dioxide</b>	46,536	49,302	2,766	5.9%
<b>NOx</b>	229,442	216,434	-13,009	-5.7%
<b>Fine PM</b>	74,086	56,930	-17,156	-23.2%
<b>Organic Carbon</b>	13,081	9,851	-3,231	-24.7
<b>Elemental Carbon</b>	4,919	2,695	-2,224	-45.2%
<b>Ammonia</b>	64,949	65,737	788	1.2%
<b>Fine PM</b>	74,086	56,930	-17,156%	-23.2%

# SOx Emissions



Source Category	Sulfur Dioxide	
	2002 (tpy)	2018 (tpy)
<b>Point</b>	<b>36,819</b>	<b>45,271</b>
Area	2,965	3,302
WRAP Area O&G	281	7
Off-Shore	0	0
On-Road Mobile	1,757	206
Off-Road Mobile	4,091	60
Road Dust	0	0
Fugitive Dust	0	0
WB Dust	0	0
Anthro Fire	378	210
Natural Fire	246	246
Biogenic	0	0
<b>Total</b>	<b>46,536</b>	<b>49,302</b>
Delta (2018-2002)	2,766	
% Delta	5.9%	

# NOx Emissions

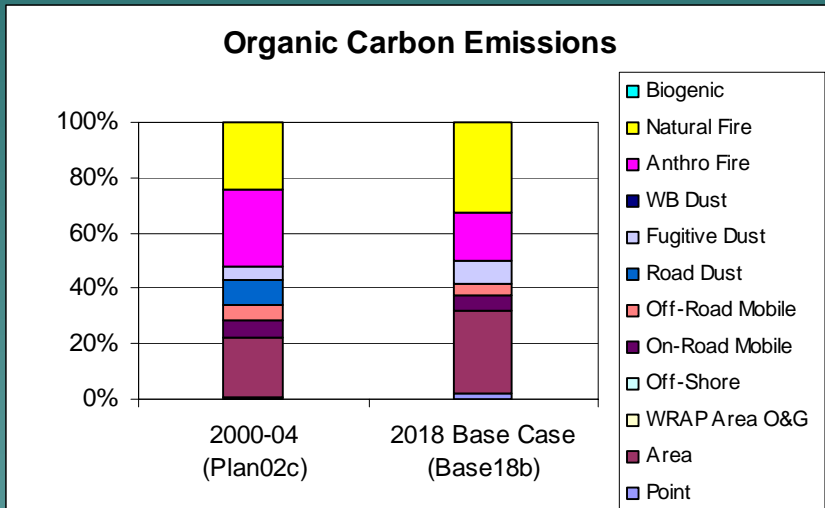


Source Category	Nitrogen Oxides	
	2002 (tpy)	2018 (tpy)
<b>Point</b>	<b>53,570</b>	<b>62,525</b>
Area	4,365	5,602
WRAP Area O&G	7,859	30,166
Off-Shore	0	0
<b>On-Road Mobile</b>	<b>53,433</b>	<b>22,345</b>
<b>Off-Road Mobile</b>	<b>49,388</b>	<b>35,598</b>
Road Dust	0	0
Fugitive Dust	0	0
WB Dust	0	0
Anthro Fire	1,409	781
Natural Fire	1,228	1,228
<b>Biogenic</b>	<b>58,190</b>	<b>58,190</b>
<b>Total</b>	<b>229,442</b>	<b>216,434</b>

Delta (2018-2002) -13,009

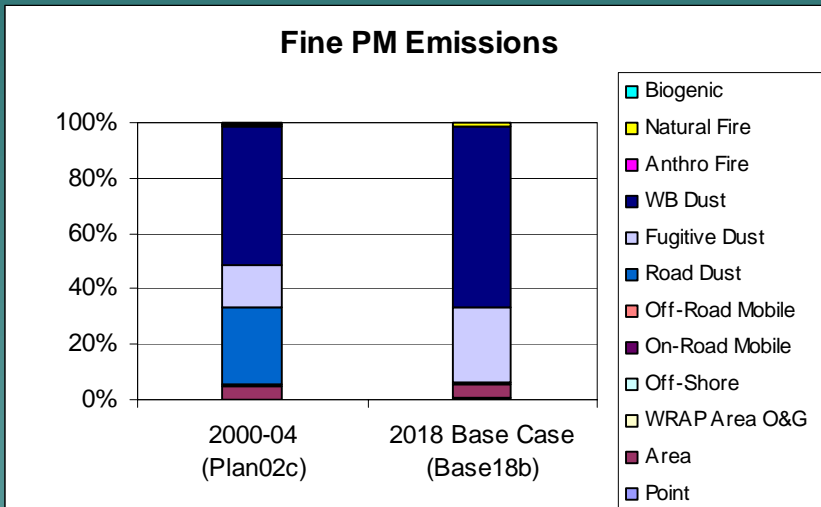
% Delta -5.7%

# Organic Carbon Emission



Source Category	Organic Carbon	
	2002 (tpy)	2018 (tpy)
Point	101	199
<b>Area</b>	<b>2,822</b>	<b>2,950</b>
WRAP Area O&G	0	0
Off-Shore	0	0
On-Road Mobile	788	563
Off-Road Mobile	706	411
Road Dust	1,228	7
Fugitive Dust	652	786
WB Dust	0	0
<b>Anthro Fire</b>	<b>3,580</b>	<b>1,728</b>
<b>Natural Fire</b>	<b>3,205</b>	<b>3,205</b>
Biogenic	0	0
<b>Total</b>	<b>13,081</b>	<b>9,851</b>
Delta (2018-2002)	-3,231	
% Delta	-24.7%	

# Fine PM




Source Category	Fine PM	
	2002 (tpy)	2018 (tpy)
Point	182	409
Area	3,405	2,690
WRAP Area O&G	0	0
Off-Shore	0	0
On-Road Mobile	276	458
Off-Road Mobile	2	2
<b>Road Dust</b>	<b>20,919</b>	<b>114</b>
<b>Fugitive Dust</b>	<b>11,227</b>	<b>15,321</b>
<b>WB Dust</b>	<b>37,096</b>	<b>37,096</b>
Anthro Fire	269	130
Natural Fire	710	710
Biogenic	0	0
<b>Total</b>	<b>74,086</b>	<b>56,930</b>
 Delta (2018-2002)	 -17,156	
 % Delta	 -23.2%	

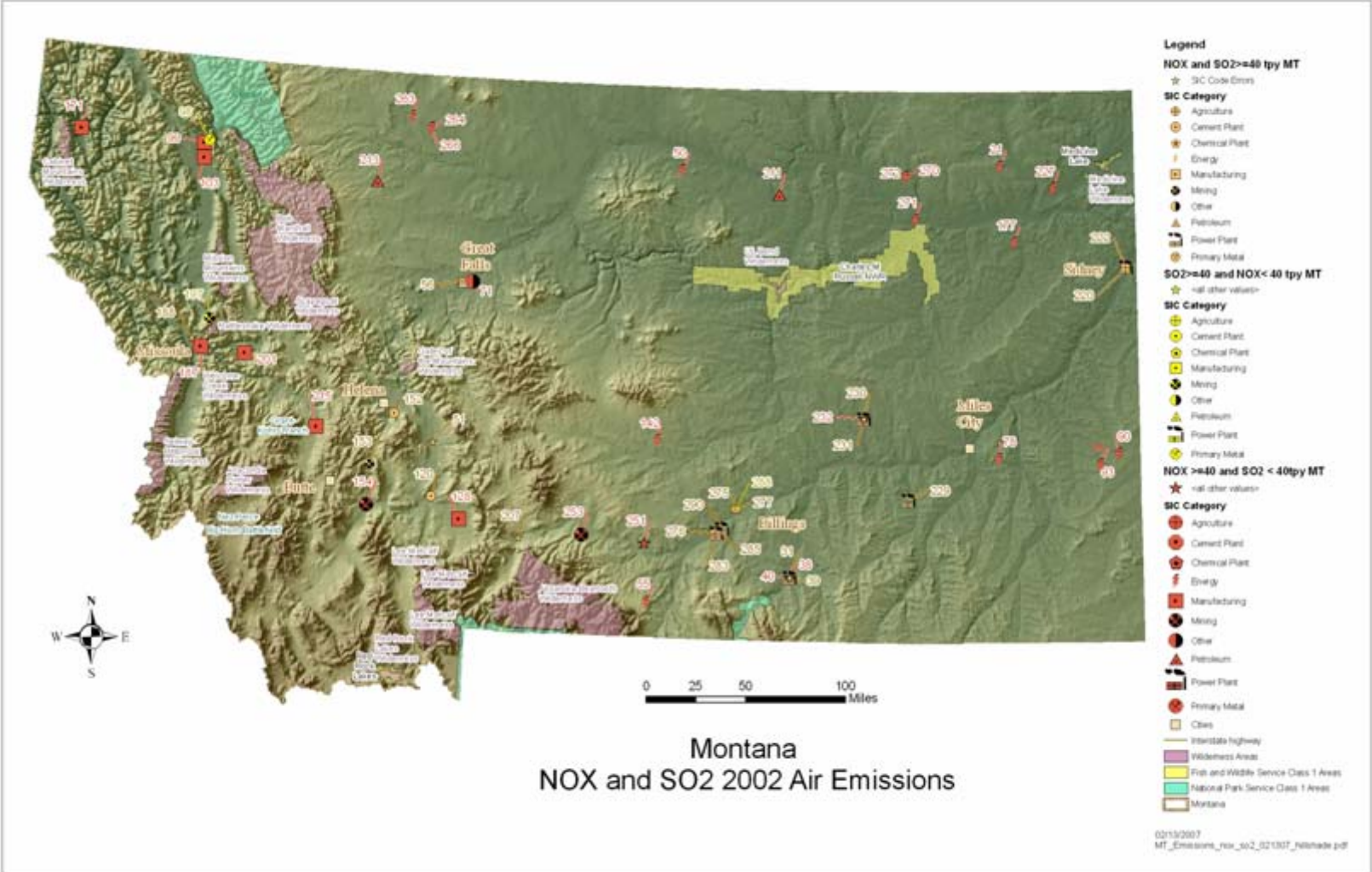
# On and Off Road Mobile Source Emissions

	2002 NO <sub>2</sub> and NO	2018 NO <sub>2</sub> and NO
On-Road Mobile	53,444	22,262
Off-Road Mobile	50,767	36,695
Total	104,211	58,957

## Emission Inventory and 2018 Projections

- ◆ Oil and Gas – Only area source predicted to grow
  - ◆ Area source emission inventory much larger than point source
  - ◆ Most pollutants predicted to decline or grow only slightly
  - ◆ Decline in mobile sources
- 
- A decorative graphic at the bottom right of the slide, consisting of a stylized mountain range silhouette in various shades of teal and blue.

# Map of Largest Non-Bart Sources of SOx and NOx



# Emissions Inventory – Highest NOx Emitters

Source	Type of Source		2002	2005
PPL MT - COLSTRIP Units 1, 2, 3 & 4	External Combustion Boilers	Electric Generation	<b>32089</b>	<b>36497</b>
ASH GROVE CEMENT	Industrial Processes	Mineral Products	1826	1837
PPL MT - JE CORETTE PLANT	External Combustion Boilers	Electric Generation	1703	1668
Devon Energy - Blaine County #1	Internal Combustion Engines	Industrial	1155	1156
HOLCIM US INC - TRIDENT PLANT	Industrial Processes	In-process Fuel Use	1105	1907
Plum Creek - Columbia Falls	External Combustion Boilers	Industrial	1043	786
Smurfit-Stone CONTAINER	Industrial Processes	Pulp and Paper and Wood Products	837	818
MDU - LEWIS & CLARK STATION	External Combustion Boilers	Electric Generation	795	767
Rocky Mountain Power - Hardin Power Plant	External Combustion Boilers	Electric Generation	514	0
WILLISTON BASIN - CABIN CREEK	Internal Combustion Engines	Industrial	490	91
ROSEBURG FOREST PRODUCTS	External Combustion Boilers	Industrial	487	474
MONTANA TUNNELS MINE	Internal Combustion Engines	Engine Testing	445	439
Decker Coal - mine	Internal Combustion Engines	Industrial	412	290
EXXONMOBIL BILLINGS REFINERY	Industrial Processes	Petroleum Industry	405	1230

The EI numbers are approximate and have not been verified by EPA

# Emission Inventory – Highest SOx Emitters

Source	Type of Source		2002	2005
PPL MT - COLSTRIP Units 1, 2, 3 & 4	External Combustion Boilers	Electric Generation	14087	15467
EXXONMOBIL BILLINGS REFINERY	Industrial Processes	Petroleum Industry	1	5096
PPL MT - JE CORETTE PLANT	External Combustion Boilers	Electric Generation	3135	2894
MONTANA SULPHUR & CHEMICAL	Industrial Processes	Chemical Manufacturing	2396	1992
YELLOWSTONE ENERGY LIMITED PARTNERSHIP	External Combustion Boilers	Electric Generation	1546	1832
Montana Refining - Great Falls	Industrial Processes	Petroleum Industry	610	917
MDU - LEWIS & CLARK STATION	External Combustion Boilers	Electric Generation	780	839
CHS - Laurel refinery	Industrial Processes	Petroleum Industry	14	646
ConocoPhillips - Billings refinery	Industrial Processes	Petroleum Industry	3	269
ASH GROVE CEMENT	Industrial Processes	Mineral Products	234	245
WESTERN SUGAR COOP-Billings	External Combustion Boilers	Industrial	75	127
Graymont Western - Indian Creek	Industrial Processes	Mineral Products	80	111
HOLCIM US INC - TRIDENT PLANT	Industrial Processes	In-process Fuel Use	167	87
Smurfit-Stone CONTAINER	Industrial Processes	Pulp and Paper and Wood Products	133	84

The EI numbers are approximate and have not been verified by EPA

# Emission Inventory Non-BART Sources

- ◆ NOx Stationary Sources
  - ◆ 2002 NOx – Approx 53,000 tons
  - ◆ 15 Sources – 81% of emission
  - ◆ 2005 – Approx 56,000 tones
  - ◆ **14 Sources – Approximately 85% of emissions**
- ◆ SOx Stationary Sources
  - ◆ 2002 Sox – approx. 37,000 tons
  - ◆ 14 Sources – 64% of SOx Emission
  - ◆ 2005 – Approx 24,357 tons
  - ◆ **14 Sources – Approximately 75% of SOx Emissions**

# Non-BART Stationary Sources

## ◆ Possible Approach

Use Q/D for screening

– Sources with  $Q/D > 10$

–  $Q = \text{NO}_x + \text{SO}_x + \text{PM}$  (tons/year - PTE)

–  $D =$  distance to nearest Class I area in km

◆ Possibility of WRAP providing additional information on current and possible control measures for these sources

◆ Use of other sources (i.e., permits) to determine current controls

# Summary of Analysis for Reasonable Progress at Monture

- ◆ Are there uncontrolled sources that are controllable?

Non-BART Stationary Sources			

# Next Steps

- ◆ Analyze data for other MT Class I areas
- ◆ Evaluate contributing sources and source categories for possible controls
- ◆ Do four factor analysis for identified sources and determine LTS
- ◆ Consult with states Montana is affecting and that are being affected by Montana