

## APPENDIX M:

### Utah Class I Area Monitoring Data Summary Tables and Charts

Includes the following subsections:

Subsection	IMPROVE Monitor	Class I Area(s) Represented
M.1	BRCA1	Bryce Canyon NP
M.2	CANY1	Canyonlands NP and Arches NP
M.3	CAP11	Capitol Reef NP
M.4	ZICA1	Zion NP

## M.1. BRYCE CANYON NP (BRCA1)

The following tables and figures are presented in this section for the Bryce Canyon NP represented by the BRCA1 IMPROVE Monitor:

- **Table M.1-1: Annual Averages, 5-Year Period Averages, and Trends:** Table of averages and other metrics for the 20% least impaired days, the 20% most impaired days, and all sampled days is presented.
- **Figure M.1-1: Annual and 5-Year Period Averages for the 20% Most Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.1-2: Annual and 5-Year Period Averages for the 20% Least Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.1-3: 20% Most Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component for the 20% most impaired days are presented.
- **Figure M.1-4: 20% Least Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component are presented.
- **Figure M.1-5: 2000-2004 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the baseline period are presented.
- **Figure M.1-6: 2005-2009 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the progress period are presented.
- **Figure M.1-7: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the baseline period are presented.
- **Figure M.1-8: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the progress period are presented.

**Table M.1-1  
Bryce Canyon NP, UT (BRCA1 Site)  
Annual Averages, 5-Year Period Averages and Trends**

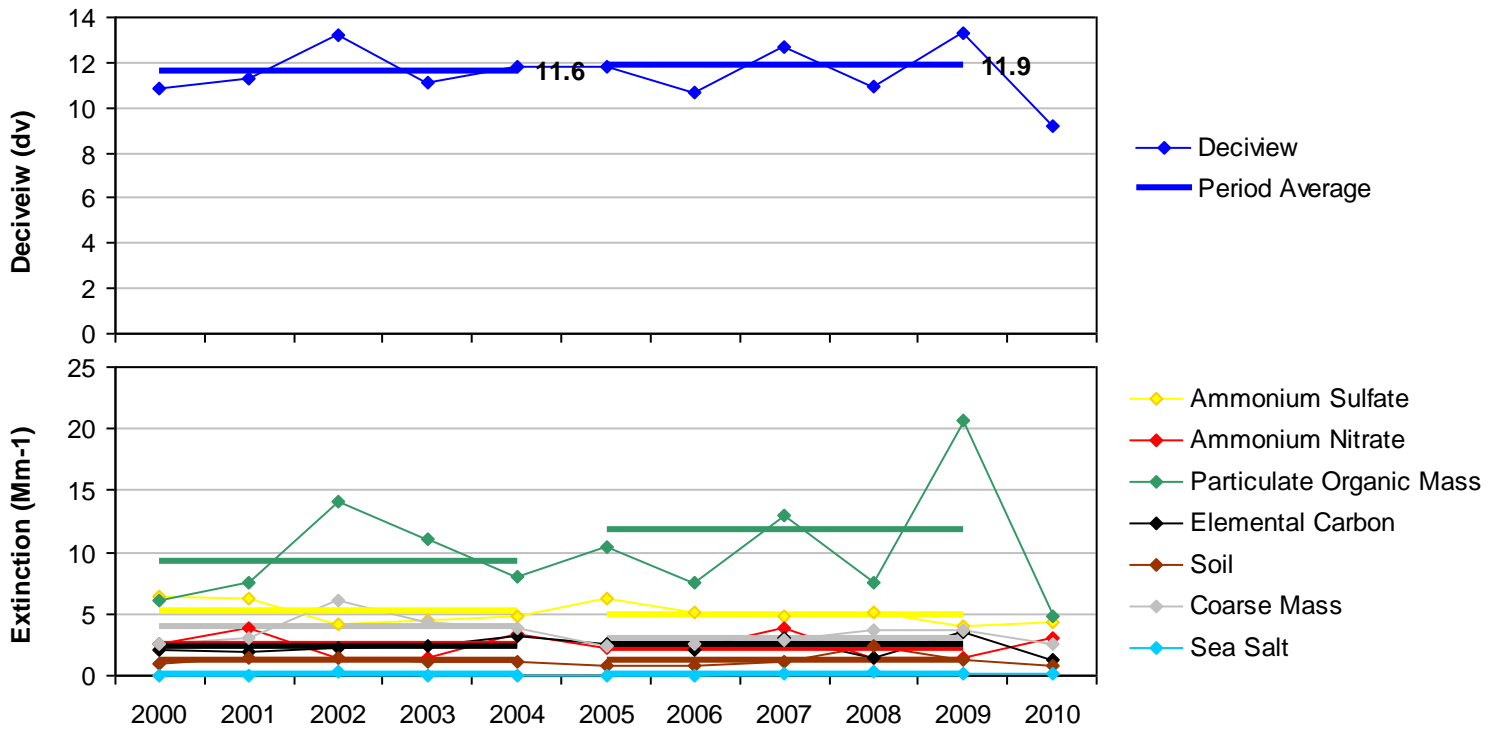
Group	Baseline Period					Progress Period					2010	2000-2009 Trend Statistics*		Period Averages**			
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		Slope (change/yr.)	p-value	Baseline (B)	Progress (P)	Difference (P-B)	Percent Change
<b>Deciview (dv)</b>																	
Best 20% Days	3.0	3.1	2.6	2.4	2.8	1.9	2.4	2.4	1.7	2.1	1.5	-0.1	0.0	2.8	2.1	-0.7	-25%
Worst 20% Days	10.8	11.3	13.2	11.1	11.8	11.8	10.7	12.7	11.0	13.3	9.2	0.1	0.2	11.6	11.9	0.3	3%
All Days	6.8	7.0	7.3	6.3	7.0	6.5	6.3	7.1	6.1	6.6	5.4	-0.1	0.2	6.9	6.5	-0.4	-6%
<b>Total Extinction (Mm-1)</b>																	
Best 20% Days	13.5	13.6	13.0	12.7	13.3	12.1	12.7	12.8	11.8	12.4	11.6	-0.1	0.0	13.2	12.4	-0.8	-6%
Worst 20% Days	30.0	33.0	38.8	33.8	33.4	33.8	29.4	37.9	30.9	43.7	25.9	0.4	0.2	33.8	35.1	1.3	4%
All Days	20.5	21.5	22.5	20.4	21.4	20.5	19.7	22.3	19.6	22.3	17.9	0.0	0.3	21.2	20.9	-0.3	-1%
<b>Ammonium Sulfate Extinction (Mm-1)</b>																	
Best 20% Days	1.6	1.8	1.4	1.1	1.5	1.2	1.7	1.3	1.1	1.4	1.0	0.0	0.2	1.5	1.4	-0.1	-7%
Worst 20% Days	6.5	6.3	4.2	4.4	4.8	6.2	5.1	4.9	5.0	4.0	4.3	-0.2	0.2	5.2	5.0	-0.2	-4%
All Days	3.8	4.1	3.0	2.7	3.3	3.8	3.6	3.4	3.1	2.8	2.7	-0.1	0.2	3.4	3.3	-0.1	-3%
<b>Ammonium Nitrate Extinction (Mm-1)</b>																	
Best 20% Days	0.7	0.8	0.8	0.5	0.7	0.4	0.4	0.7	0.4	0.6	0.4	0.0	0.0	0.7	0.5	-0.2	-29%
Worst 20% Days	2.6	3.8	1.4	1.4	3.4	2.3	2.3	3.8	1.5	1.4	3.1	-0.1	0.4	2.5	2.2	-0.3	-12%
All Days	1.4	1.6	1.5	1.2	1.7	1.1	1.3	1.8	1.0	1.0	1.2	0.0	0.2	1.5	1.2	-0.3	-20%
<b>Particulate Organic Mass Extinction (Mm-1)</b>																	
Best 20% Days	1.2	0.8	1.0	1.1	1.1	0.8	0.7	0.9	0.6	0.6	0.7	-0.1	0.0	1.0	0.7	-0.3	-30%
Worst 20% Days	6.1	7.5	14.1	11.1	8.0	10.5	7.5	13.0	7.5	20.7	4.8	0.5	0.2	9.4	11.8	2.4	26%
All Days	3.1	3.2	4.6	4.0	3.6	3.8	2.9	4.4	3.0	5.7	2.3	0.1	0.3	3.7	4.0	0.3	8%
<b>Elemental Carbon Extinction (Mm-1)</b>																	
Best 20% Days	0.4	0.4	0.4	0.3	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.0	0.0	0.4	0.2	-0.2	-50%
Worst 20% Days	2.1	1.9	2.3	2.4	3.2	2.6	2.1	3.0	1.5	3.5	1.3	0.1	0.2	2.4	2.5	0.1	4%
All Days	1.2	1.1	1.0	1.1	1.4	1.1	1.0	1.2	0.7	1.2	0.7	0.0	0.4	1.2	1.0	-0.2	-17%
<b>Soil Extinction (Mm-1)</b>																	
Best 20% Days	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.0	0.4	0.1	0.1	0.0	0%
Worst 20% Days	1.0	1.4	1.5	1.1	1.2	0.8	0.8	1.2	2.4	1.3	0.8	0.0	0.3	1.2	1.3	0.1	8%
All Days	0.5	0.7	0.7	0.5	0.6	0.4	0.5	0.7	0.9	0.7	0.5	0.0	0.2	0.6	0.6	0.0	0%
<b>Coarse Mass Extinction (Mm-1)</b>																	
Best 20% Days	0.5	0.7	0.4	0.5	0.3	0.3	0.4	0.4	0.4	0.4	0.2	0.0	0.1	0.5	0.4	-0.1	-20%
Worst 20% Days	2.6	3.1	6.1	4.3	3.9	2.5	2.6	2.9	3.7	3.7	2.5	0.0	0.4	4.0	3.1	-0.9	-23%
All Days	1.5	1.7	2.5	1.8	1.7	1.2	1.4	1.7	1.7	1.8	1.4	0.0	0.4	1.9	1.6	-0.3	-16%
<b>Sea Salt Extinction (Mm-1)</b>																	
Best 20% Days	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Worst 20% Days	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0%
All Days	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0%

\*Values highlighted in blue (red) indicate statistically significant decreasing (increasing) annual trend. Significance is measured at the 85% confidence level (p-value ≤0.15).

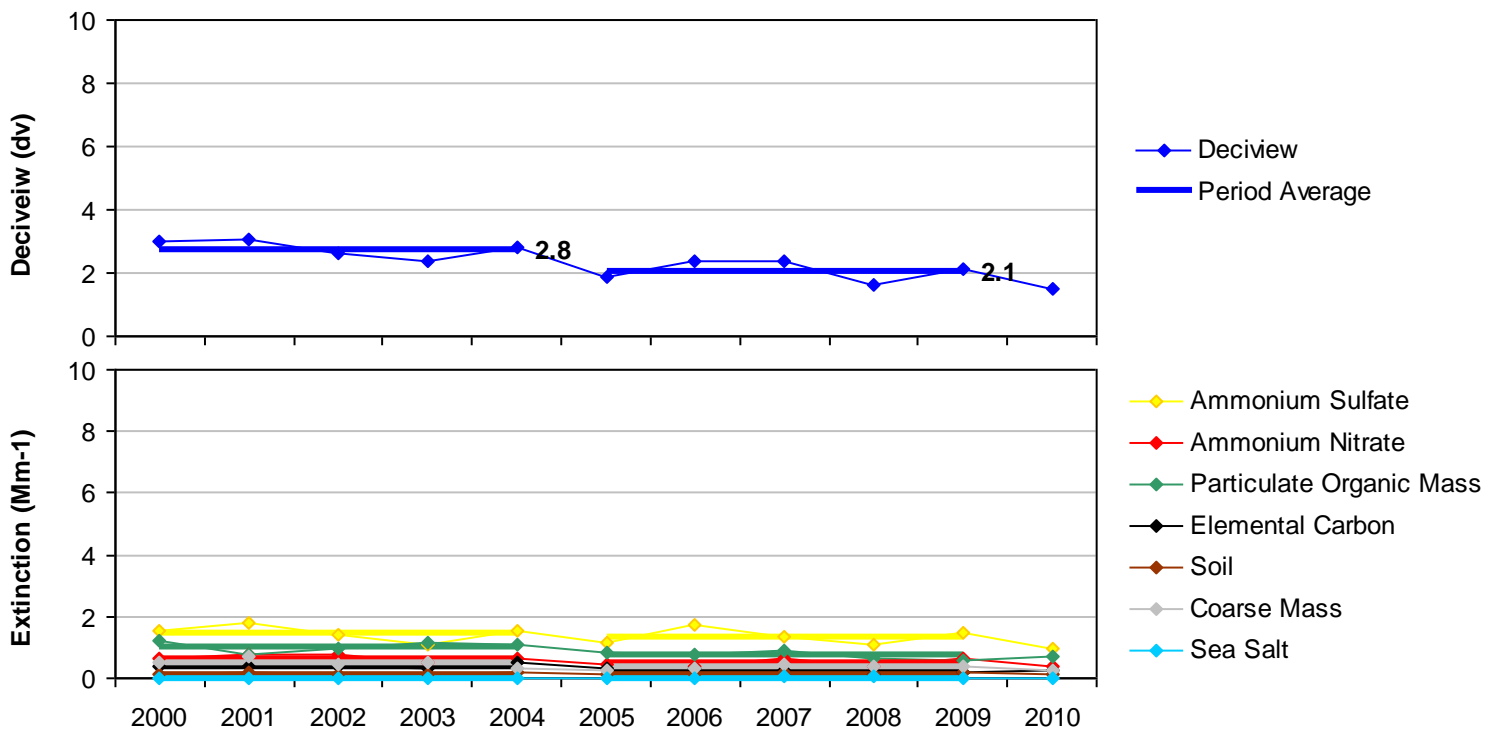
\*\*Values highlighted in blue indicate a decrease in the 5-year average, values highlighted in red indicate an increase.

"---" Indicates a missing year that did not meet RHR data completeness criteria.

**Figure M.1-1**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Most Impaired Visibility Days**

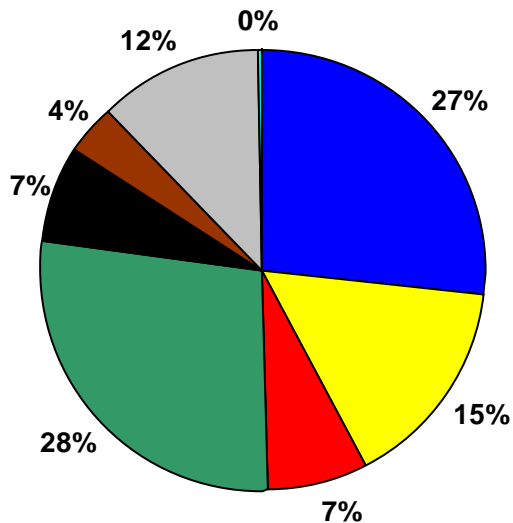


**Figure M.1-2**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Least Impaired Visibility Days**

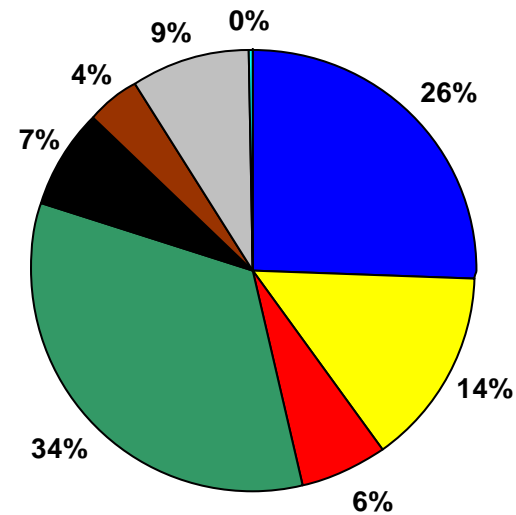


**Figure M.1-3**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**20% Most Impaired Visibility Days**

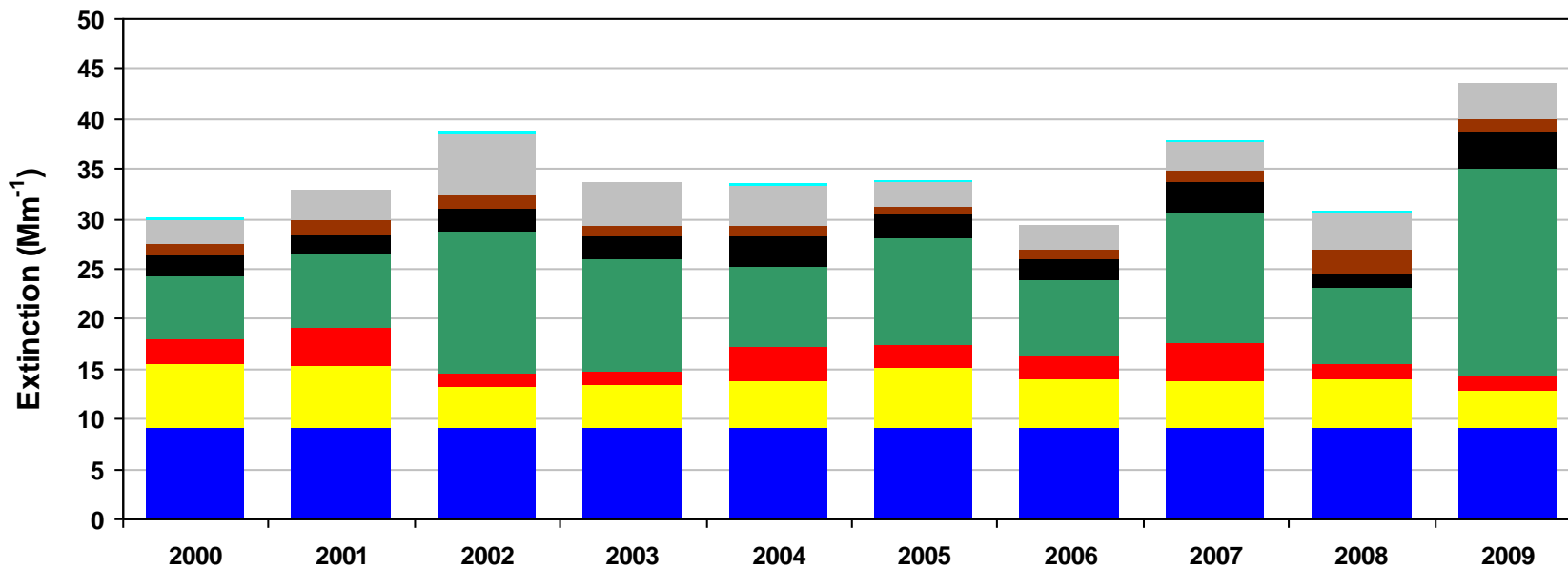
**2000-2004 Baseline Average**  
 11.6 dv (10.8 - 13.2 dv)



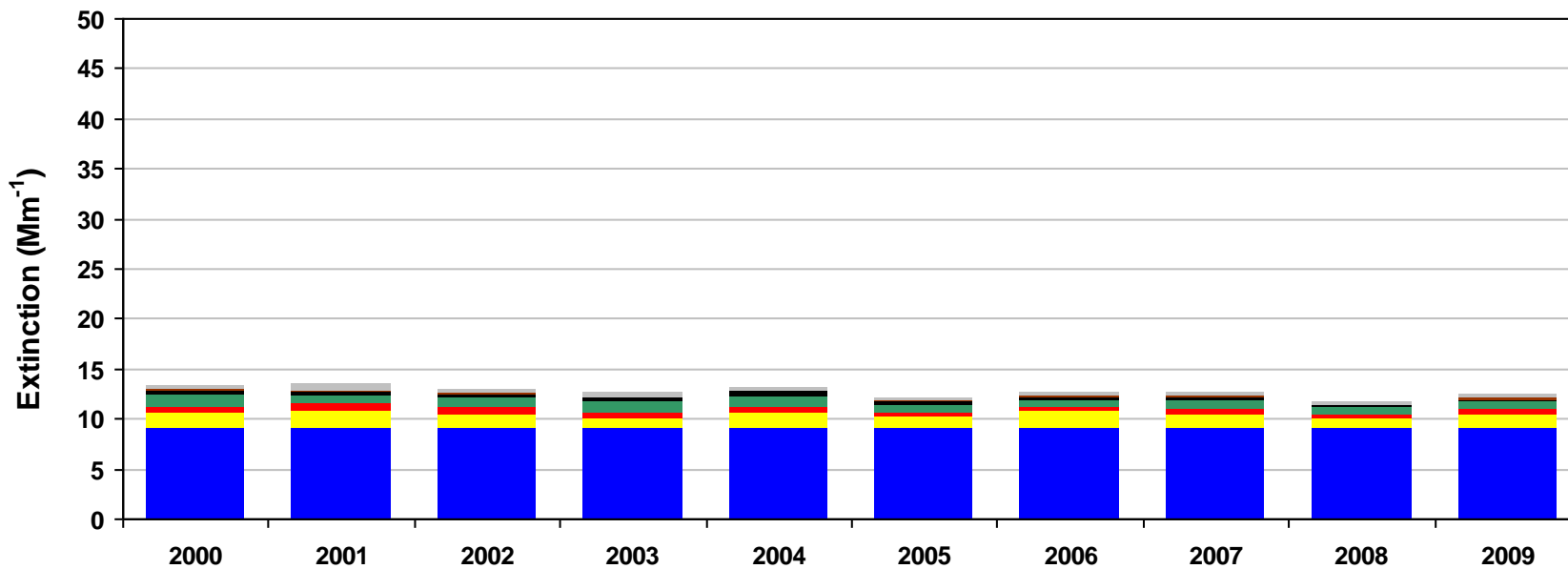
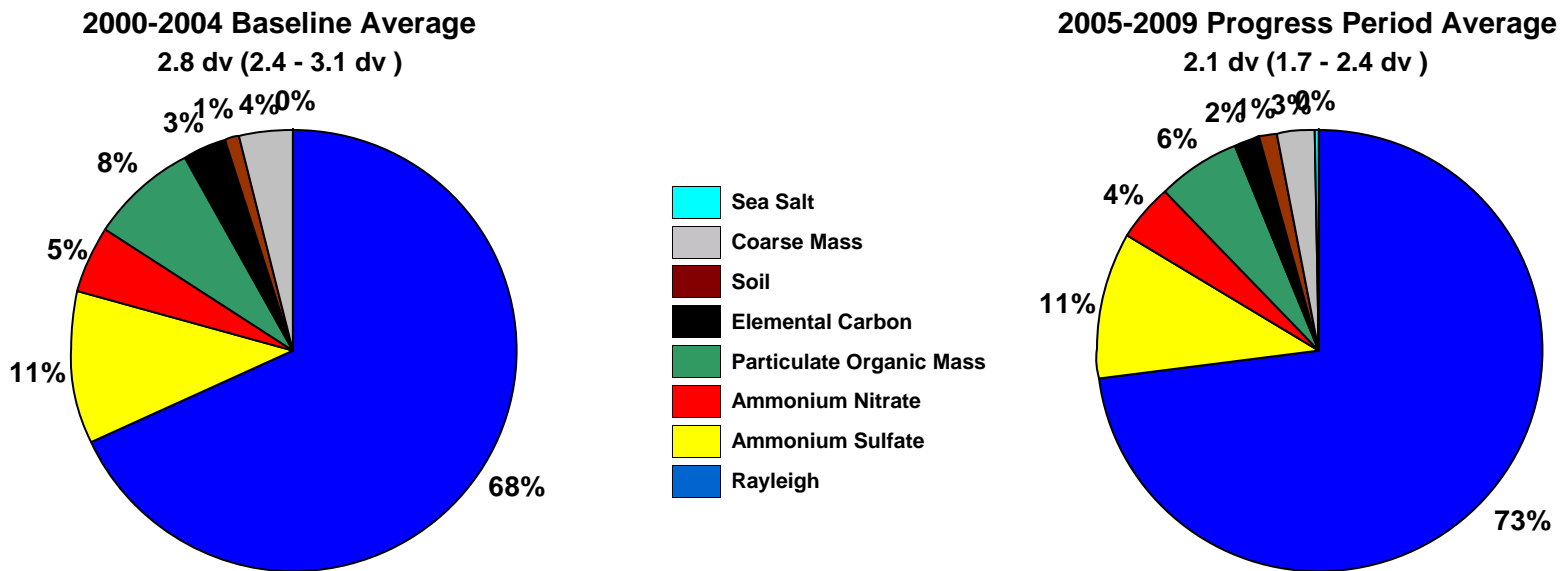
**2005-2009 Progress Period Average**  
 11.9 dv (10.7 - 13.3 dv)



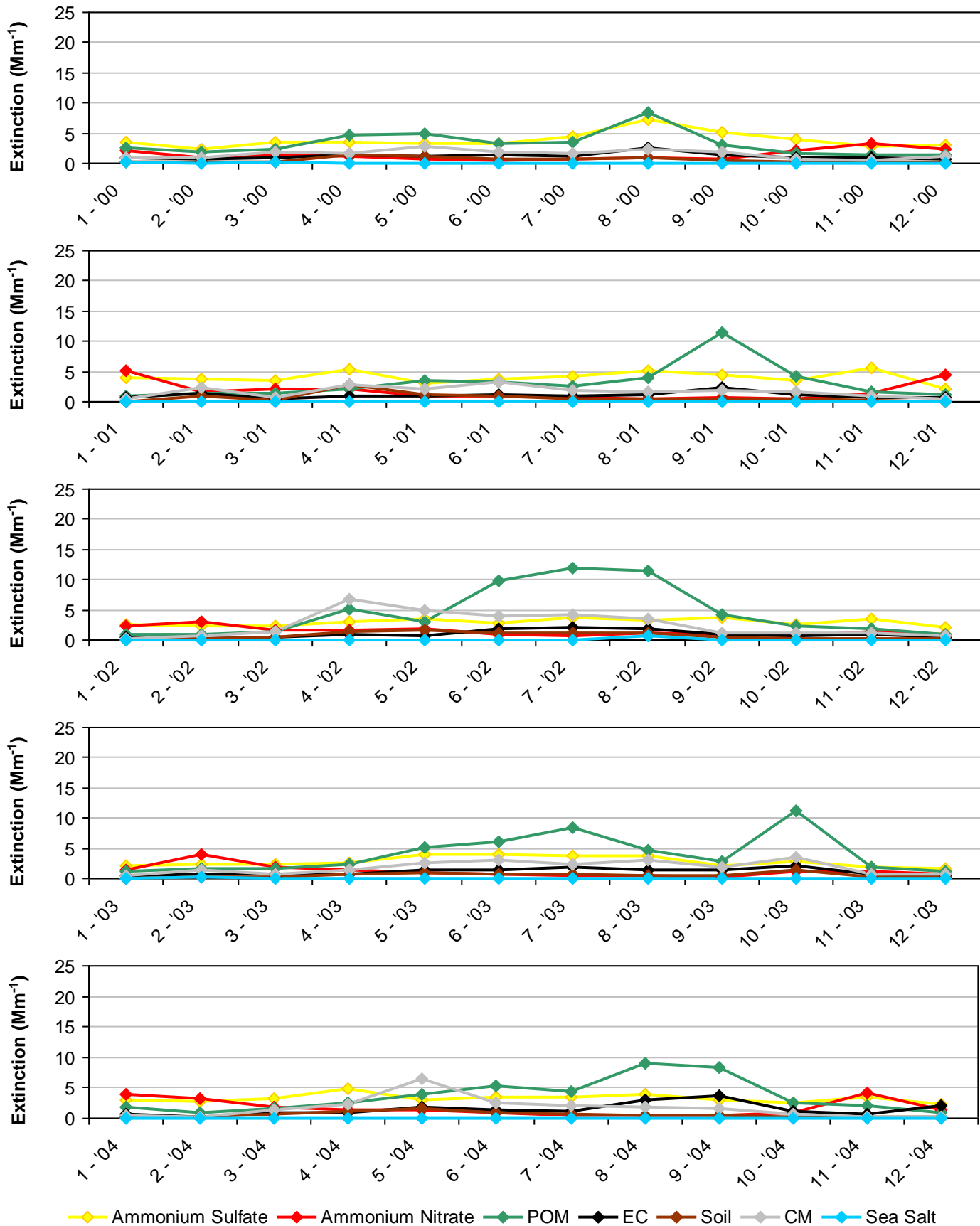
- Sea Salt
- Coarse Mass
- Soil
- Elemental Carbon
- Particulate Organic Mass
- Ammonium Nitrate
- Ammonium Sulfate
- Rayleigh



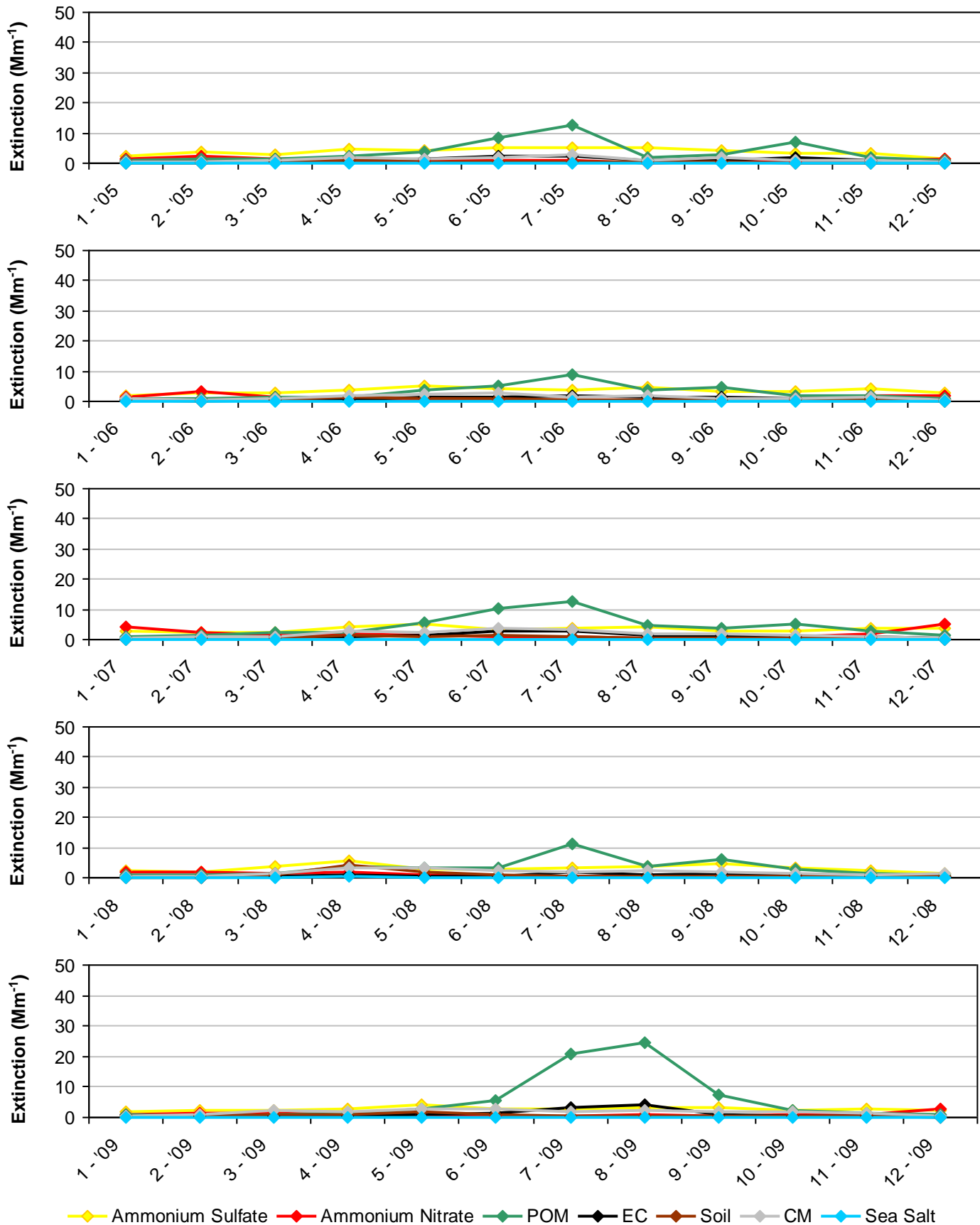
**Figure M.1-4**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**20% Least Impaired Visibility Days**



**Figure M.1-5**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**2000-2004 Monthly Average Aerosol Extinction, All Monitored Days**

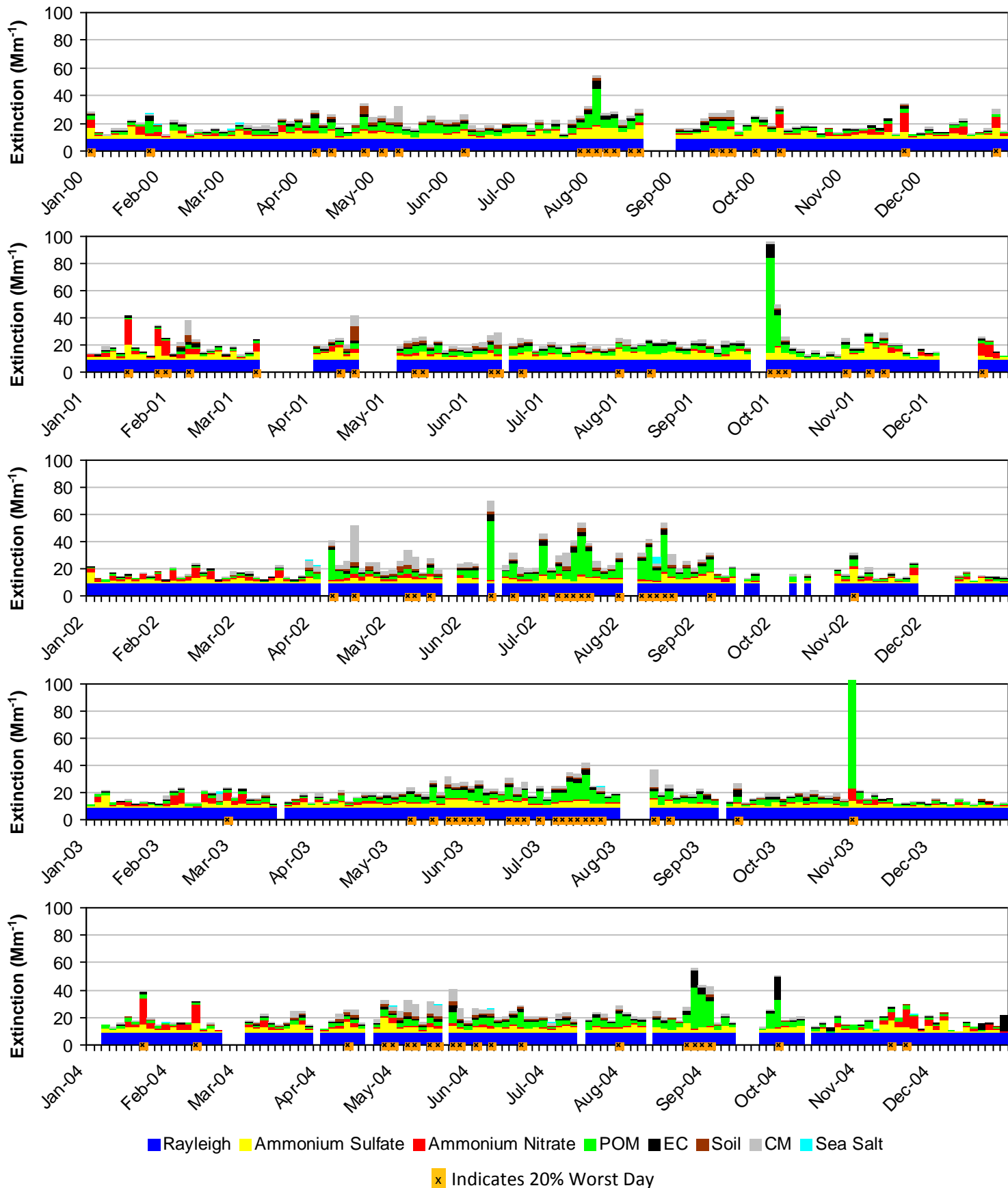


**Figure M.1-6**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**2005-2009 Monthly Average Aerosol Extinction, All Monitored Days**

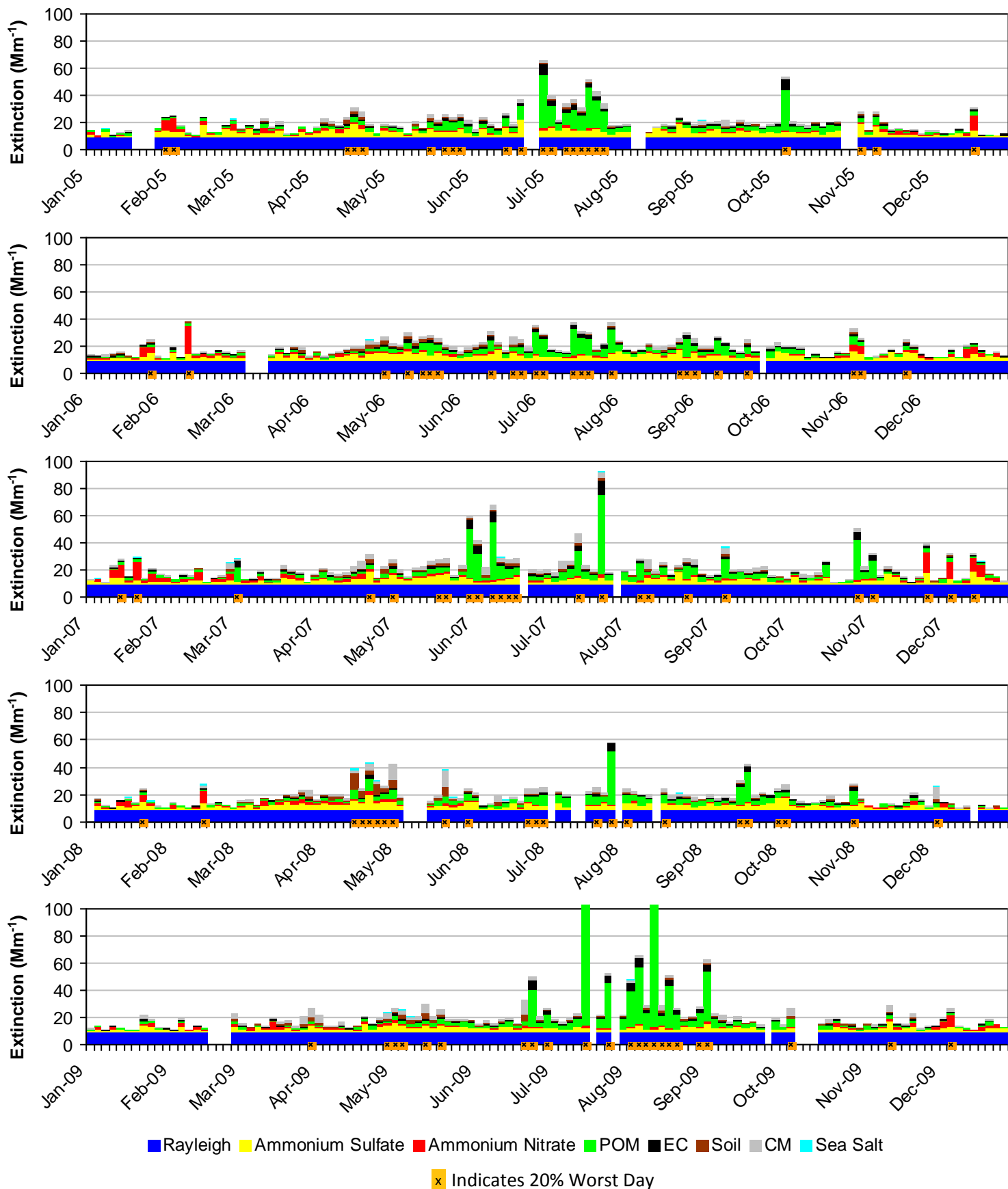




**Figure M.1-7**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**2000-2004 Progress Period Extinction, All Sampled Days**



**Figure M.1-8**  
**Bryce Canyon NP, UT (BRCA1 Site)**  
**2005-2009 Progress Period Extinction, All Sampled Days**



## M.2. CANYONLANDS NP AND ARCHES NP (CANY1)

The following tables and figures are presented in this section for the Canyonlands NP and Arches NP represented by the CANY1 IMPROVE Monitor:

- **Table M.2-1: Annual Averages, 5-Year Period Averages, and Trends:** Table of averages and other metrics for the 20% least impaired days, the 20% most impaired days, and all sampled days is presented.
- **Figure M.2-1: Annual and 5-Year Period Averages for the 20% Most Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.2-2: Annual and 5-Year Period Averages for the 20% Least Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.2-3: 20% Most Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component for the 20% most impaired days are presented.
- **Figure M.2-4: 20% Least Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component are presented.
- **Figure M.2-5: 2000-2004 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the baseline period are presented.
- **Figure M.2-6: 2005-2009 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the progress period are presented.
- **Figure M.2-7: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the baseline period are presented.
- **Figure M.2-8: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the progress period are presented.

**Table M.2-1**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**Annual Averages, 5-Year Period Averages and Trends**

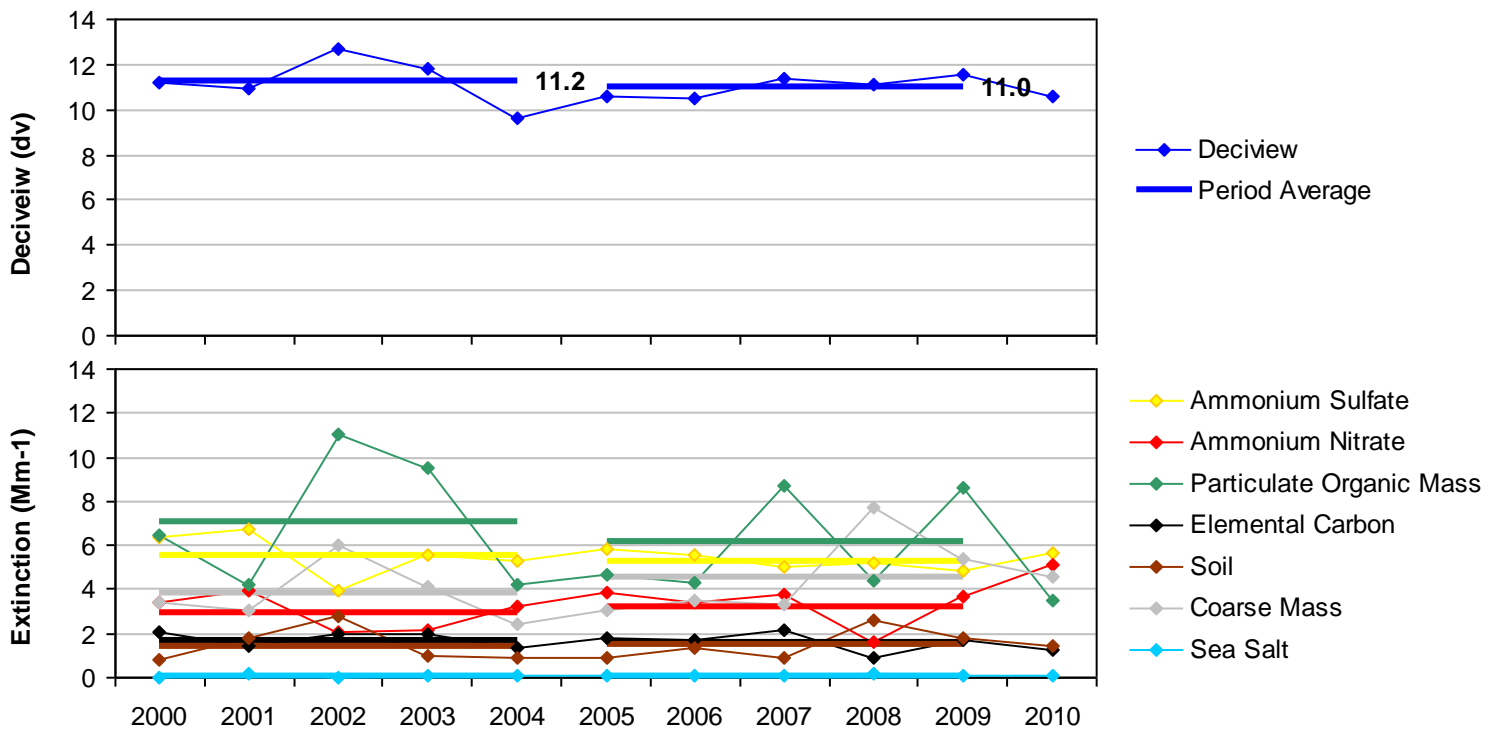
Group	Baseline Period					Progress Period					2010	2000-2009 Trend Statistics*		Period Averages**			
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		Slope (change/yr.)	p-value	Baseline (B)	Progress (P)	Difference (P -B)	Percent Change
<b>Deciview (dv)</b>																	
Best 20% Days	3.6	4.1	4.2	3.3	3.5	2.3	2.7	3.0	2.7	3.3	2.6	-0.1	0.1	3.7	2.8	-0.9	-24%
Worst 20% Days	11.2	10.9	12.7	11.8	9.6	10.6	10.5	11.4	11.1	11.5	10.6	0.0	0.5	11.2	11.0	-0.2	-2%
All Days	7.2	7.4	7.9	6.9	6.4	6.4	6.6	7.1	6.7	6.4	6.1	-0.1	0.0	7.2	6.6	-0.6	-8%
<b>Total Extinction (Mm-1)</b>																	
Best 20% Days	14.4	15.1	15.3	14.0	14.3	12.7	13.1	13.6	13.2	13.9	13.0	-0.2	0.1	14.6	13.3	-1.3	-9%
Worst 20% Days	31.6	30.3	36.9	33.2	26.5	29.2	28.9	32.8	31.7	35.2	30.4	0.2	0.4	31.7	31.6	-0.1	0%
All Days	21.4	21.6	23.3	21.1	19.5	19.8	20.1	21.4	20.6	20.5	19.4	-0.1	0.2	21.4	20.5	-0.9	-4%
<b>Ammonium Sulfate Extinction (Mm-1)</b>																	
Best 20% Days	2.1	2.3	2.4	1.9	2.1	1.8	1.9	1.7	1.7	2.0	1.7	-0.1	0.0	2.2	1.8	-0.4	-18%
Worst 20% Days	6.3	6.8	4.0	5.5	5.3	5.8	5.6	5.0	5.2	4.8	5.6	-0.1	0.1	5.6	5.3	-0.3	-5%
All Days	4.1	4.5	3.6	3.4	3.6	4.1	3.8	3.6	3.4	3.0	3.2	-0.1	0.0	3.8	3.6	-0.2	-5%
<b>Ammonium Nitrate Extinction (Mm-1)</b>																	
Best 20% Days	0.4	0.6	0.8	0.6	0.5	0.4	0.5	0.6	0.6	0.6	0.5	0.0	0.3	0.6	0.5	-0.1	-17%
Worst 20% Days	3.4	3.9	2.1	2.1	3.2	3.9	3.4	3.7	1.6	3.7	5.1	0.0	0.5	3.0	3.3	0.3	10%
All Days	1.4	1.8	1.6	1.2	1.5	1.3	1.4	1.5	1.1	1.3	1.6	0.0	0.1	1.5	1.3	-0.2	-13%
<b>Particulate Organic Mass Extinction (Mm-1)</b>																	
Best 20% Days	1.2	1.2	1.2	1.0	1.1	0.5	0.5	0.7	0.8	0.7	0.8	-0.1	0.0	1.1	0.7	-0.4	-36%
Worst 20% Days	6.4	4.2	11.0	9.5	4.2	4.7	4.3	8.7	4.4	8.6	3.5	0.0	0.5	7.1	6.2	-0.9	-13%
All Days	3.2	2.5	3.9	3.6	2.5	2.3	2.3	3.4	2.4	3.1	2.0	0.0	0.2	3.1	2.7	-0.4	-13%
<b>Elemental Carbon Extinction (Mm-1)</b>																	
Best 20% Days	0.4	0.5	0.5	0.4	0.4	0.2	0.4	0.3	0.3	0.3	0.2	0.0	0.0	0.4	0.3	-0.1	-25%
Worst 20% Days	2.1	1.4	2.0	1.9	1.3	1.8	1.7	2.1	0.9	1.7	1.2	0.0	0.2	1.7	1.6	-0.1	-6%
All Days	1.2	0.9	1.1	1.0	0.8	0.9	1.0	1.0	0.6	0.7	0.6	0.0	0.1	1.0	0.8	-0.2	-20%
<b>Soil Extinction (Mm-1)</b>																	
Best 20% Days	0.2	0.4	0.4	0.2	0.3	0.1	0.2	0.3	0.2	0.3	0.2	0.0	0.2	0.3	0.2	-0.1	-33%
Worst 20% Days	0.8	1.8	2.8	1.0	0.9	0.9	1.4	0.9	2.6	1.8	1.4	0.0	0.3	1.5	1.5	0.0	0%
All Days	0.5	0.8	1.3	0.6	0.6	0.5	0.6	0.7	1.0	0.8	0.7	0.0	0.2	0.8	0.7	-0.1	-13%
<b>Coarse Mass Extinction (Mm-1)</b>																	
Best 20% Days	1.0	1.1	1.1	0.9	0.7	0.6	0.6	0.9	0.6	0.9	0.6	-0.1	0.1	1.0	0.7	-0.3	-30%
Worst 20% Days	3.4	3.1	6.0	4.1	2.4	3.0	3.5	3.3	7.8	5.4	4.5	0.2	0.2	3.8	4.6	0.8	21%
All Days	2.0	2.0	2.7	2.3	1.6	1.7	2.0	2.2	3.0	2.5	2.3	0.1	0.2	2.1	2.3	0.2	10%
<b>Sea Salt Extinction (Mm-1)</b>																	
Best 20% Days	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0%
Worst 20% Days	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0%
All Days	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.0	0.1	0.1	0%

\*Values highlighted in blue (red) indicate statistically significant decreasing (increasing) annual trend. Significance is measured at the 85% confidence level (p-value ≤0.15).

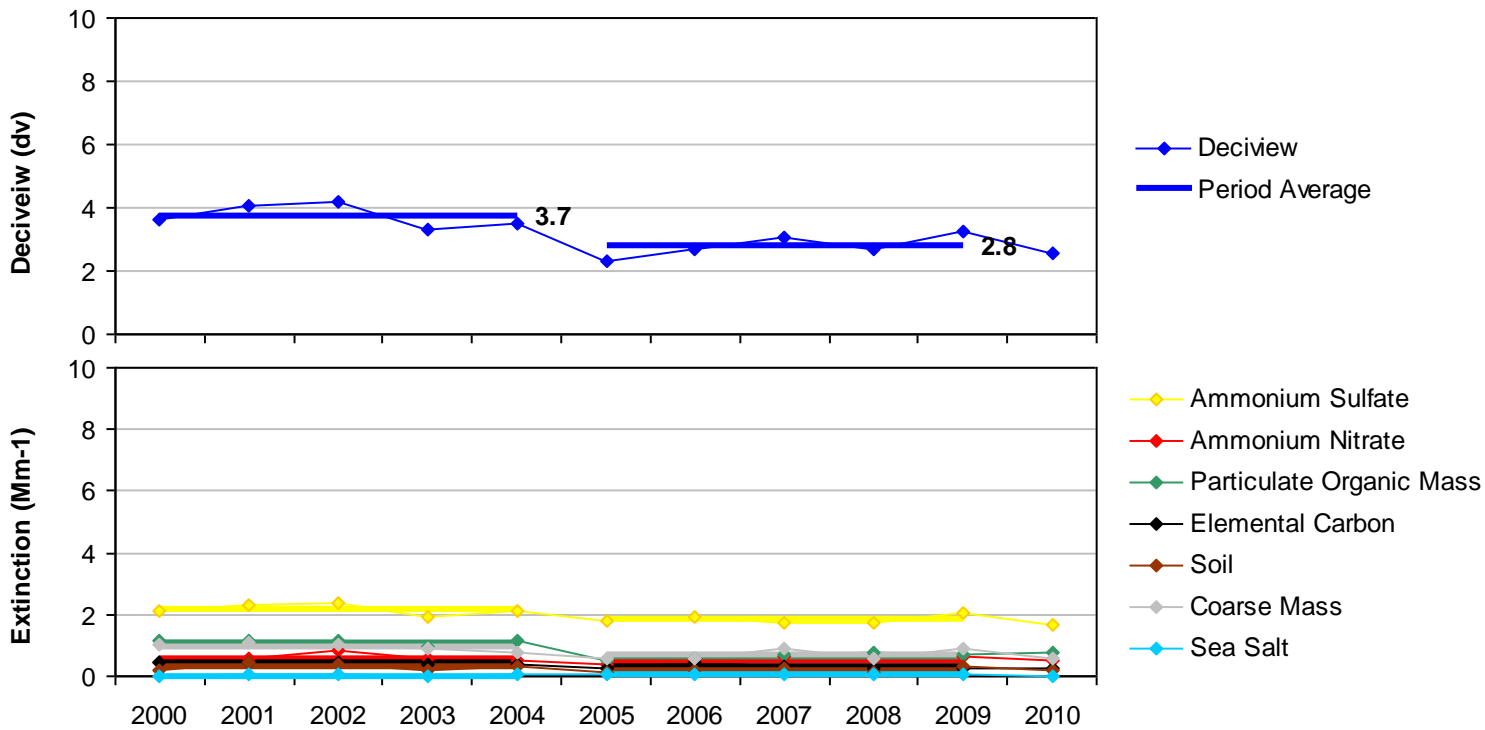
\*\*Values highlighted in blue indicate a decrease in the 5-year average, values highlighted in red indicate an increase.

"---" Indicates a missing year that did not meet RHR data completeness criteria.

**Figure M.2-1**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Most Impaired Visibility Days**

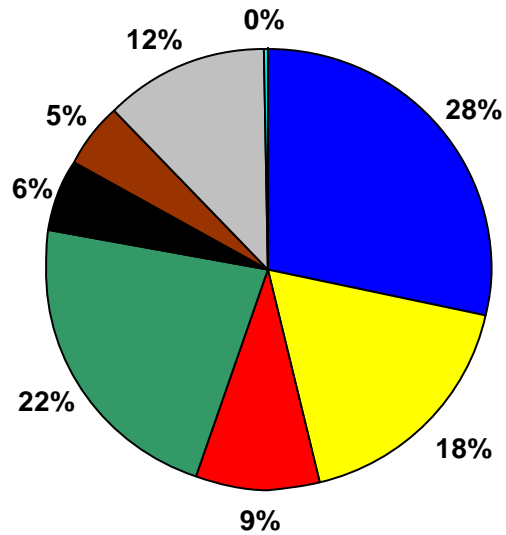


**Figure M.2-2**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Least Impaired Visibility Days**

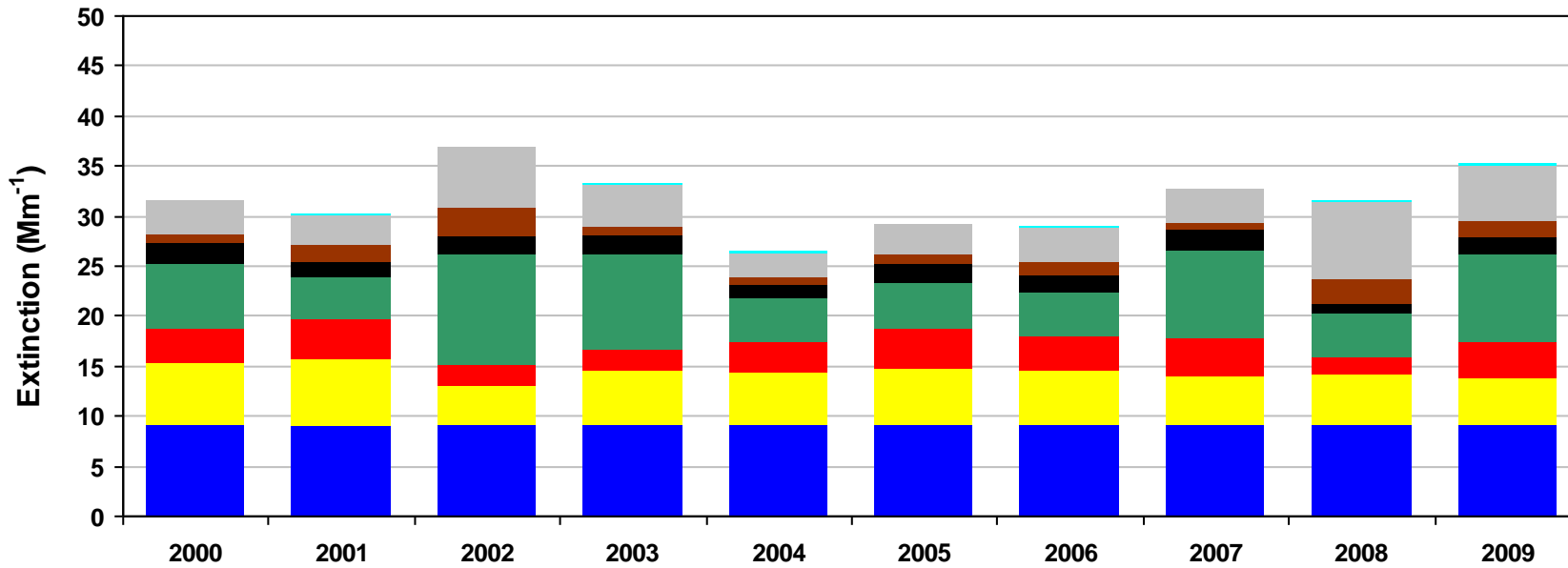
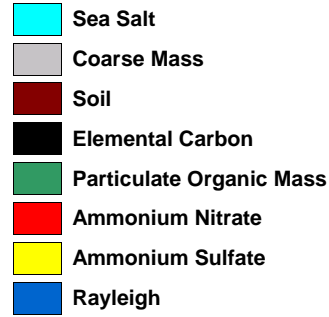
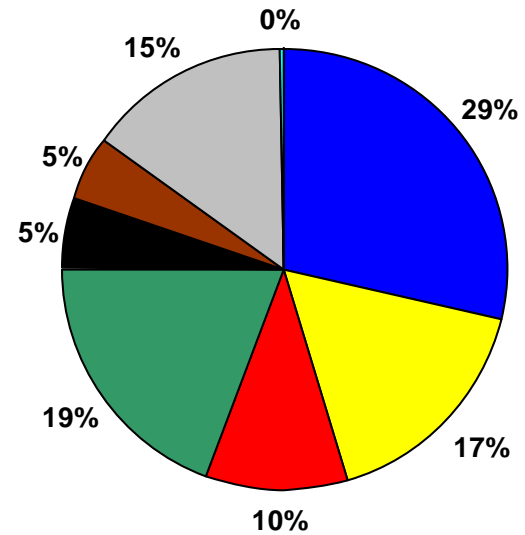


**Figure M.2-3**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**20% Most Impaired Visibility Days**

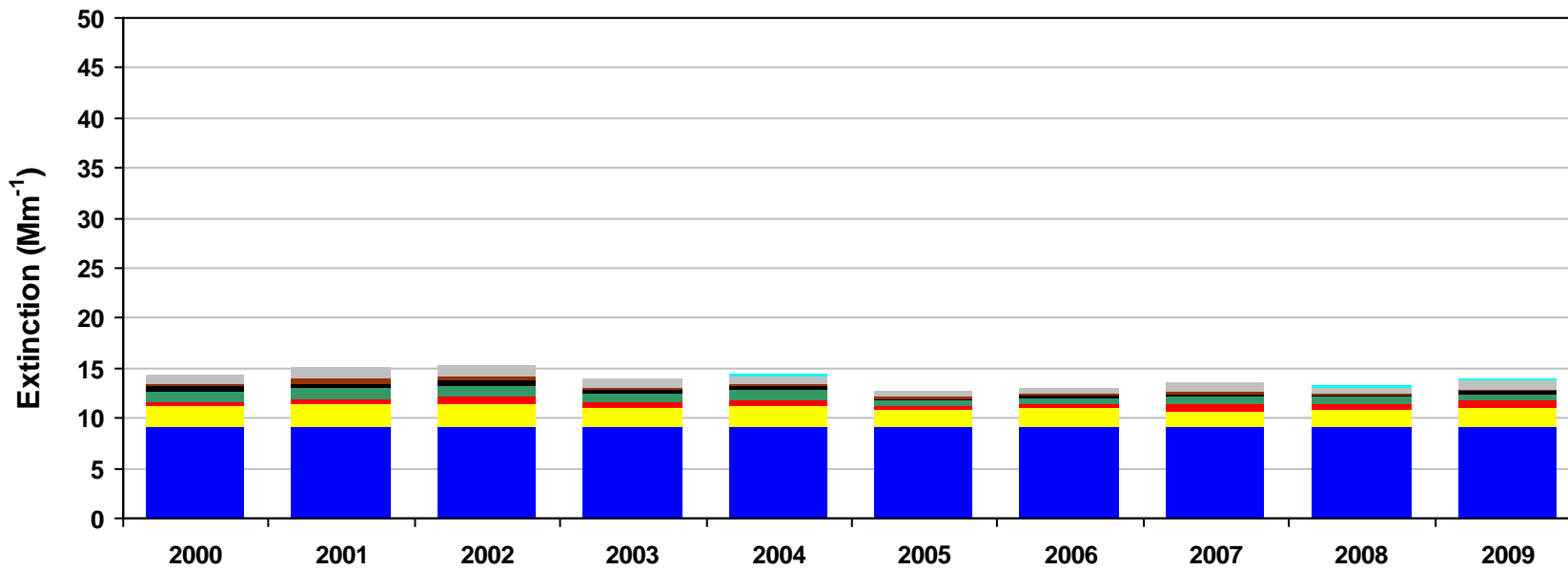
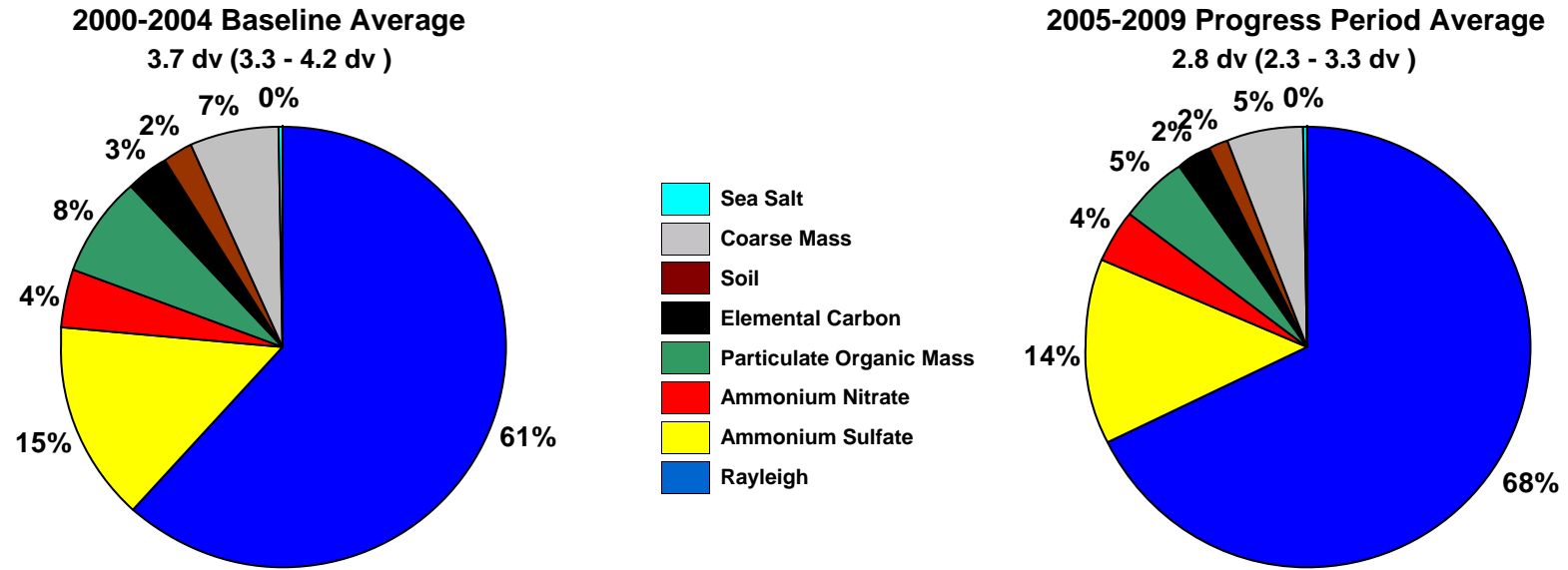
**2000-2004 Baseline Average**  
 11.2 dv (9.6 - 12.7 dv)



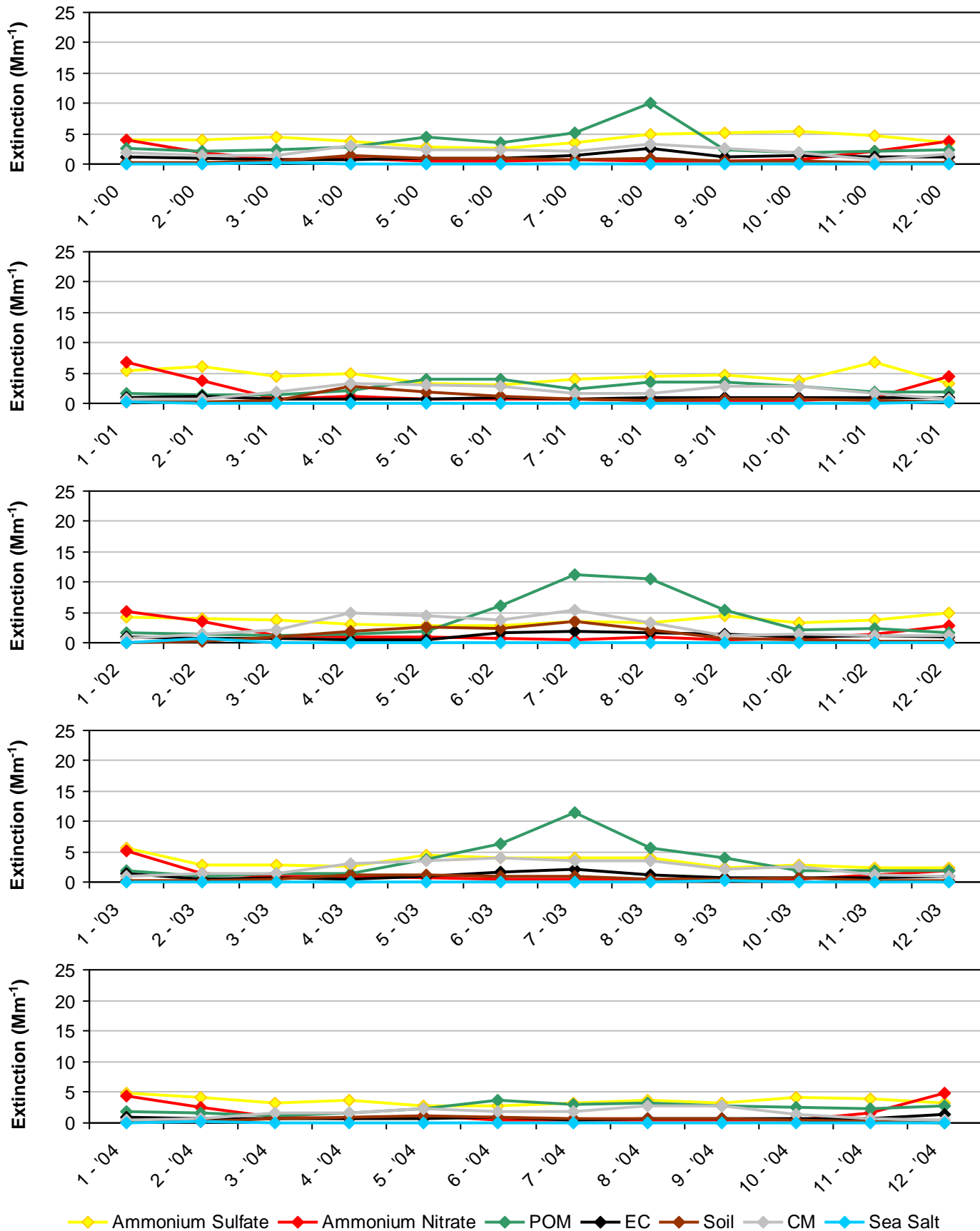
**2005-2009 Progress Period Average**  
 11 dv (10.5 - 11.5 dv)



**Figure M.2-4**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**20% Least Impaired Visibility Days**

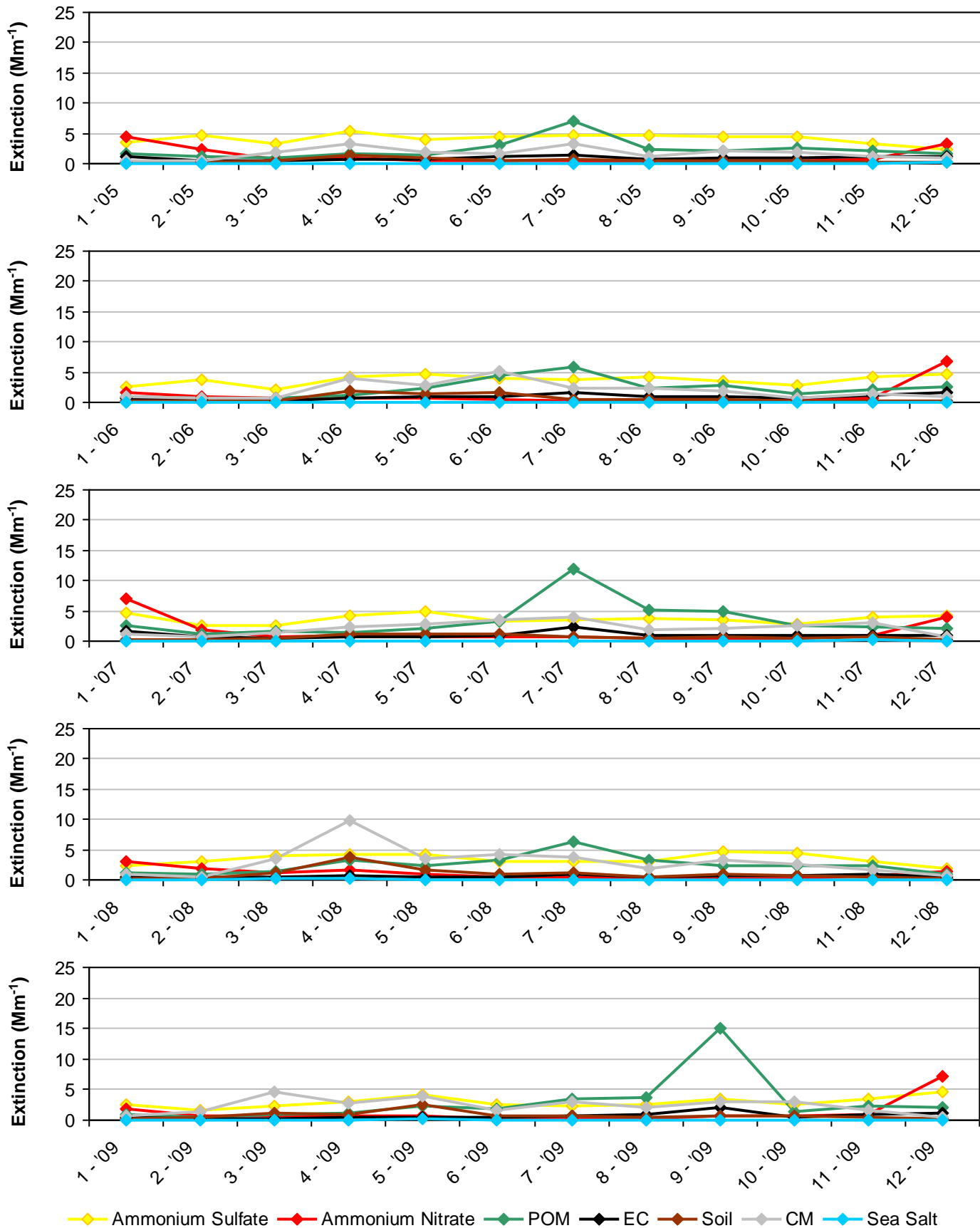


**Figure M.2-5**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**2000-2004 Monthly Average Aerosol Extinction, All Monitored Days**

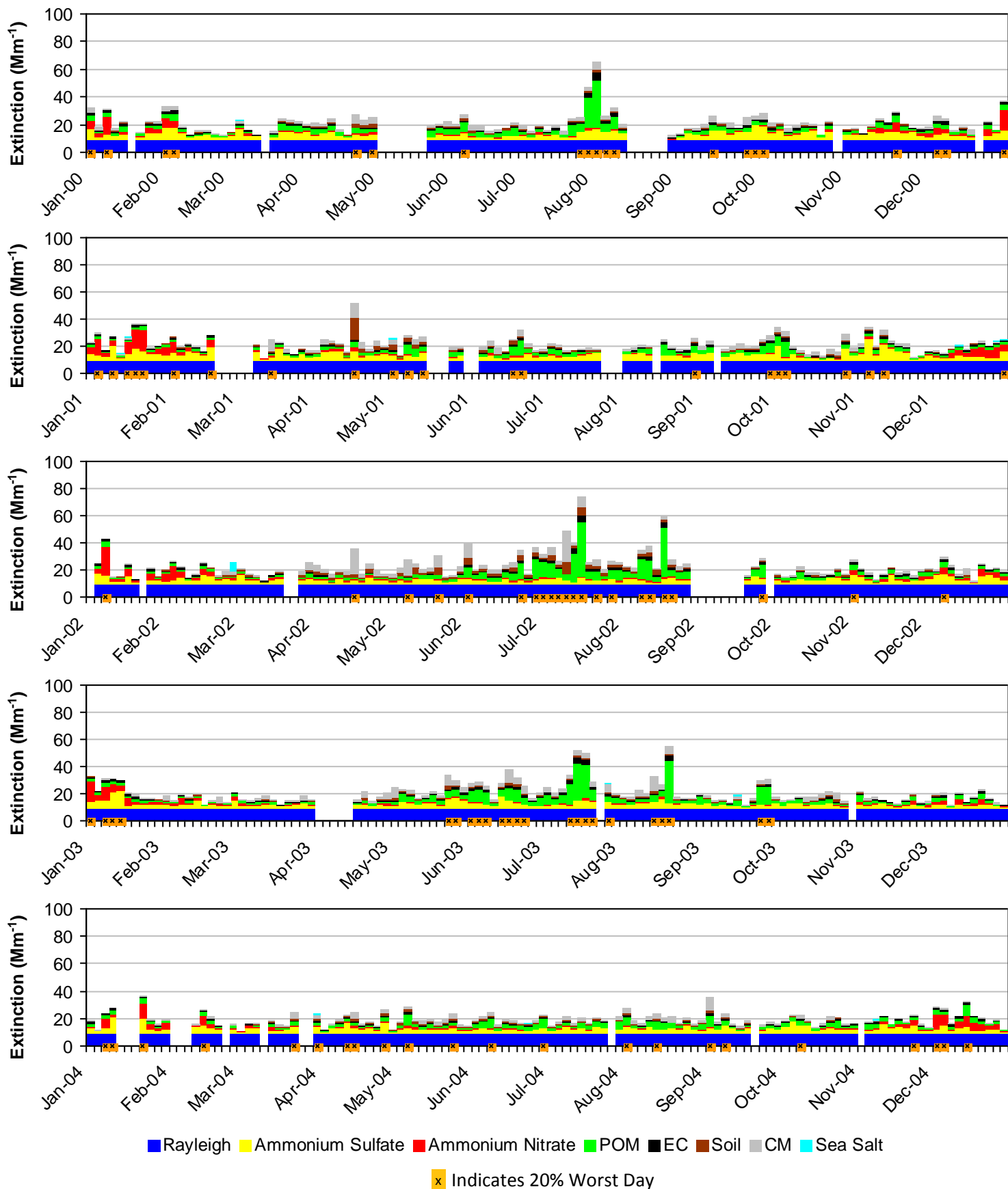




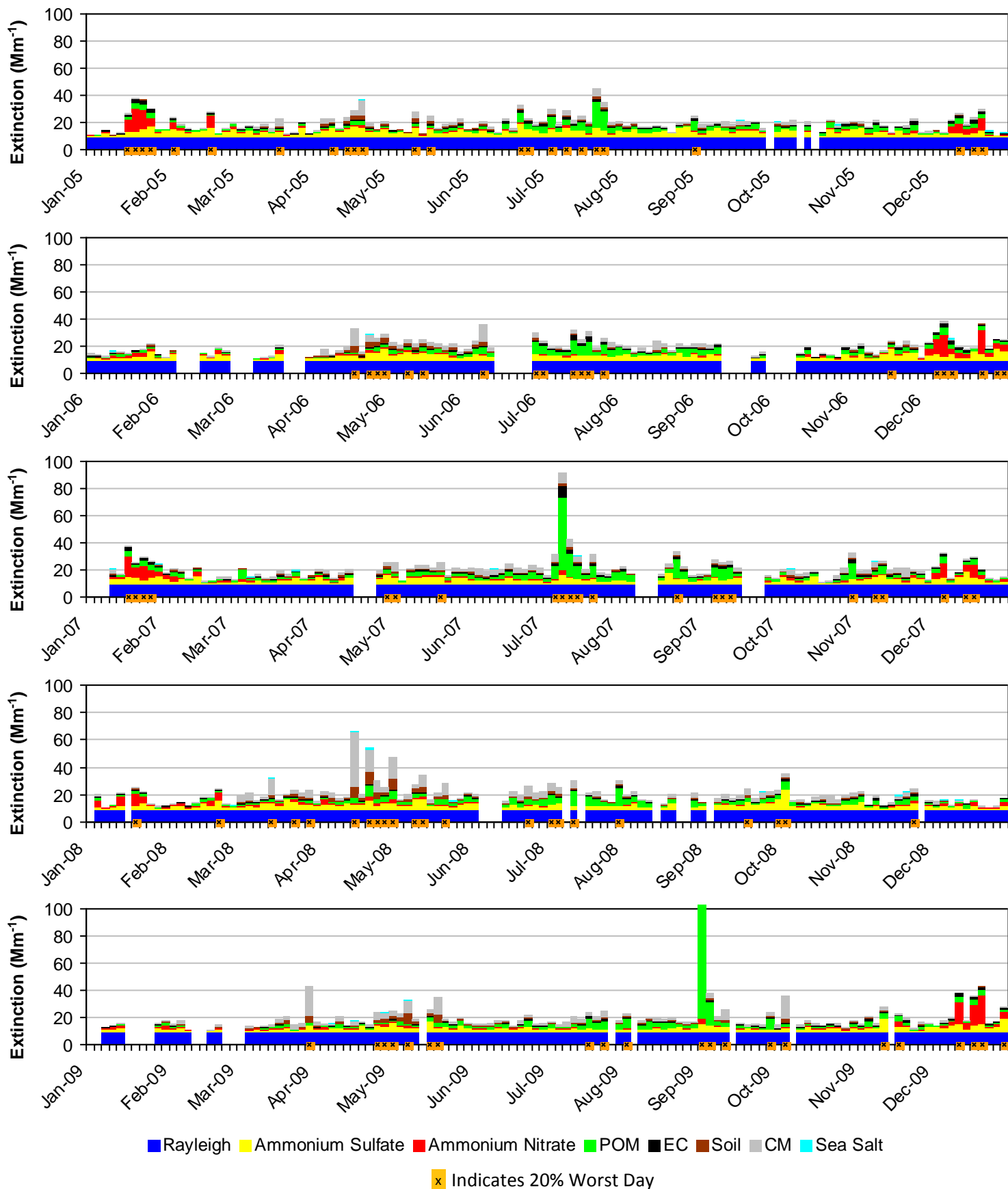
**Figure M.2-6**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**2005-2009 Monthly Average Aerosol Extinction, All Monitored Days**



**Figure M.2-7**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**2000-2004 Progress Period Extinction, All Sampled Days**



**Figure M.2-8**  
**Canyonlands NP and Arches NP, UT (CANY1 Site)**  
**2005-2009 Progress Period Extinction, All Sampled Days**



### M.3. CAPITOL REEF NP (CAPI1)

The following tables and figures are presented in this section for the Capitol Reef NP represented by the CAPI1 IMPROVE Monitor:

- **Table M.3-1: Annual Averages, 5-Year Period Averages, and Trends:** Table of averages and other metrics for the 20% least impaired days, the 20% most impaired days, and all sampled days is presented.
- **Figure M.3-1: Annual and 5-Year Period Averages for the 20% Most Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.3-2: Annual and 5-Year Period Averages for the 20% Least Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.3-3: 20% Most Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component for the 20% most impaired days are presented.
- **Figure M.3-4: 20% Least Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component are presented.
- **Figure M.3-5: 2000-2004 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the baseline period are presented.
- **Figure M.3-6: 2005-2009 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the progress period are presented.
- **Figure M.3-7: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the baseline period are presented.
- **Figure M.3-8: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the progress period are presented.

**Table M.3-1**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**Annual Averages, 5-Year Period Averages and Trends**

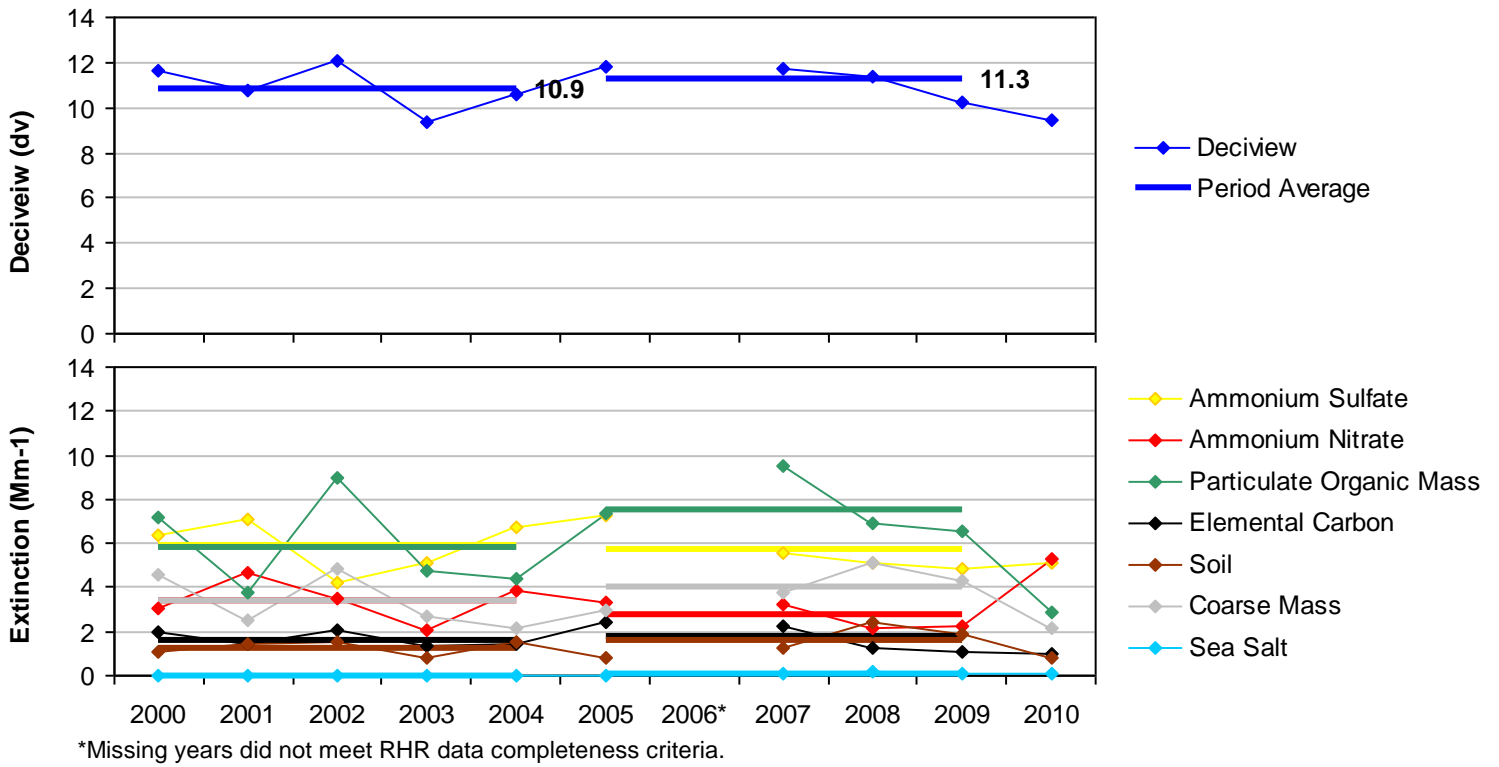
Group	Baseline Period					Progress Period					2010	2000-2009 Trend Statistics*		Period Averages**			
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		Slope (change/yr.)	p-value	Baseline (B)	Progress (P)	Difference (P-B)	Percent Change
<b>Deciview (dv)</b>																	
Best 20% Days	4.5	4.6	4.3	3.1	4.1	2.6	---	3.1	2.5	2.7	2.0	-0.2	0.0	4.1	2.7	-1.4	-34%
Worst 20% Days	11.6	10.8	12.1	9.4	10.6	11.8	---	11.7	11.4	10.3	9.5	-0.1	0.3	10.9	11.3	0.4	4%
All Days	7.6	7.6	7.7	6.1	7.2	7.0	---	7.0	6.6	6.3	5.7	-0.1	0.0	7.2	6.7	-0.5	-7%
<b>Total Extinction (Mm-1)</b>																	
Best 20% Days	15.7	15.8	15.4	13.7	15.2	13.0	---	13.7	12.9	13.2	12.2	-0.3	0.0	15.2	13.2	-2.0	-13%
Worst 20% Days	33.2	29.8	34.1	25.7	29.1	33.4	---	34.7	32.2	30.1	26.2	0.0	0.5	30.4	32.6	2.2	7%
All Days	22.2	22.0	22.5	19.0	21.1	21.4	---	21.6	20.5	19.8	18.4	-0.2	0.1	21.4	20.8	-0.6	-3%
<b>Ammonium Sulfate Extinction (Mm-1)</b>																	
Best 20% Days	1.9	2.2	1.9	1.4	2.2	1.6	---	1.6	1.4	1.9	1.3	-0.1	0.1	1.9	1.6	-0.3	-16%
Worst 20% Days	6.3	7.1	4.2	5.1	6.7	7.3	---	5.6	5.1	4.8	5.1	-0.1	0.3	5.9	5.7	-0.2	-3%
All Days	4.1	4.5	3.2	3.1	4.0	4.4	---	3.6	3.4	3.1	3.0	-0.1	0.1	3.8	3.6	-0.2	-5%
<b>Ammonium Nitrate Extinction (Mm-1)</b>																	
Best 20% Days	1.1	1.2	1.1	0.7	0.9	0.4	---	0.6	0.6	0.6	0.3	-0.1	0.0	1.0	0.6	-0.4	-40%
Worst 20% Days	3.1	4.7	3.5	2.0	3.8	3.3	---	3.2	2.2	2.2	5.3	-0.2	0.1	3.4	2.7	-0.7	-21%
All Days	1.8	2.1	2.1	1.3	2.0	1.4	---	1.6	1.2	1.2	1.8	-0.1	0.0	1.9	1.3	-0.6	-32%
<b>Particulate Organic Mass Extinction (Mm-1)</b>																	
Best 20% Days	1.7	1.1	1.6	1.0	1.4	1.0	---	1.1	0.9	0.5	0.8	-0.1	0.0	1.3	0.9	-0.4	-31%
Worst 20% Days	7.2	3.8	9.0	4.8	4.4	7.4	---	9.5	6.9	6.6	2.9	0.2	0.4	5.8	7.6	1.8	31%
All Days	3.4	2.6	3.7	2.5	2.8	3.2	---	3.6	2.9	2.7	1.8	0.0	0.5	3.0	3.1	0.1	3%
<b>Elemental Carbon Extinction (Mm-1)</b>																	
Best 20% Days	0.6	0.6	0.8	0.5	0.5	0.4	---	0.4	0.3	0.2	0.3	0.0	0.0	0.6	0.3	-0.3	-50%
Worst 20% Days	2.0	1.4	2.0	1.3	1.4	2.5	---	2.2	1.3	1.1	1.0	0.0	0.2	1.6	1.8	0.2	13%
All Days	1.2	1.0	1.2	0.9	0.9	1.2	---	1.0	0.7	0.7	0.6	0.0	0.1	1.0	0.9	-0.1	-10%
<b>Soil Extinction (Mm-1)</b>																	
Best 20% Days	0.2	0.3	0.2	0.4	0.4	0.1	---	0.3	0.1	0.3	0.2	0.0	0.5	0.3	0.2	-0.1	-33%
Worst 20% Days	1.0	1.4	1.5	0.8	1.5	0.8	---	1.3	2.4	1.9	0.8	0.1	0.1	1.3	1.6	0.3	23%
All Days	0.5	0.8	0.8	0.6	1.0	0.5	---	0.7	0.9	0.9	0.6	0.0	0.2	0.7	0.8	0.1	14%
<b>Coarse Mass Extinction (Mm-1)</b>																	
Best 20% Days	1.2	1.4	0.8	0.7	0.7	0.4	---	0.7	0.6	0.7	0.4	-0.1	0.0	1.0	0.6	-0.4	-40%
Worst 20% Days	4.6	2.5	4.9	2.7	2.1	3.0	---	3.8	5.1	4.3	2.2	0.1	0.2	3.4	4.1	0.7	21%
All Days	2.2	2.1	2.5	1.5	1.4	1.6	---	2.0	2.2	2.1	1.5	0.0	0.5	2.0	2.0	0.0	0%
<b>Sea Salt Extinction (Mm-1)</b>																	
Best 20% Days	0.0	0.1	0.0	0.1	0.1	0.0	---	0.1	0.1	0.0	0.0	0.0	0.4	0.1	0.0	-0.1	-100%
Worst 20% Days	0.0	0.0	0.0	0.0	0.0	0.0	---	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0%
All Days	0.0	0.0	0.0	0.0	0.1	0.0	---	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0%

\*Values highlighted in blue (red) indicate statistically significant decreasing (increasing) annual trend. Significance is measured at the 85% confidence level (p-value ≤0.15).

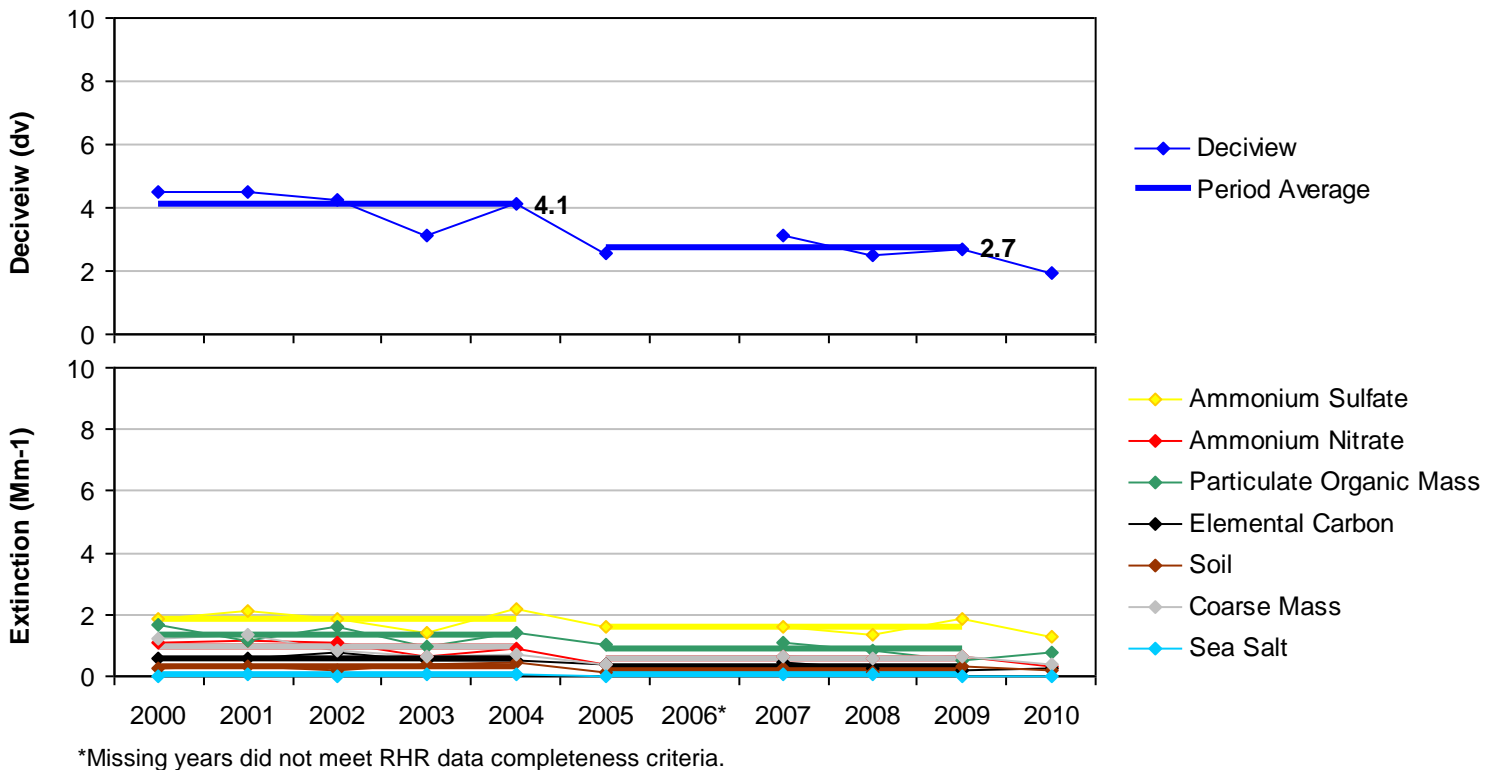
\*\*Values highlighted in blue indicate a decrease in the 5-year average, values highlighted in red indicate an increase.

---" Indicates a missing year that did not meet RHR data completeness criteria.

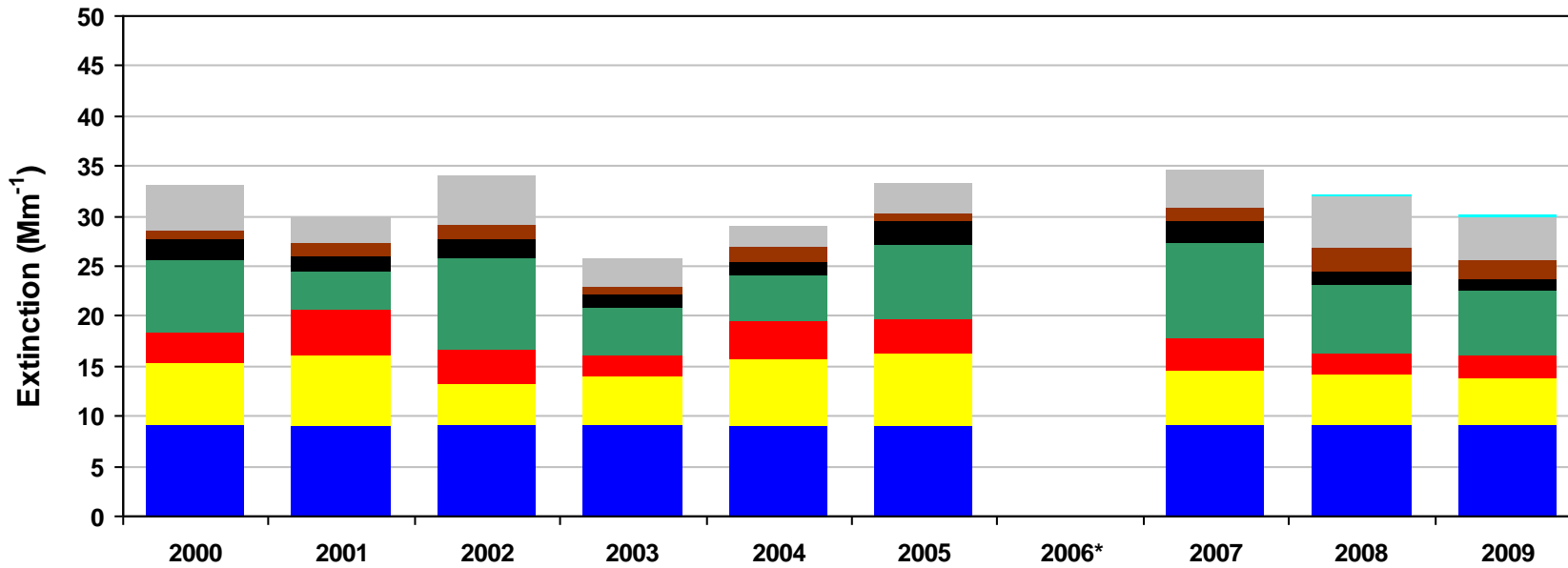
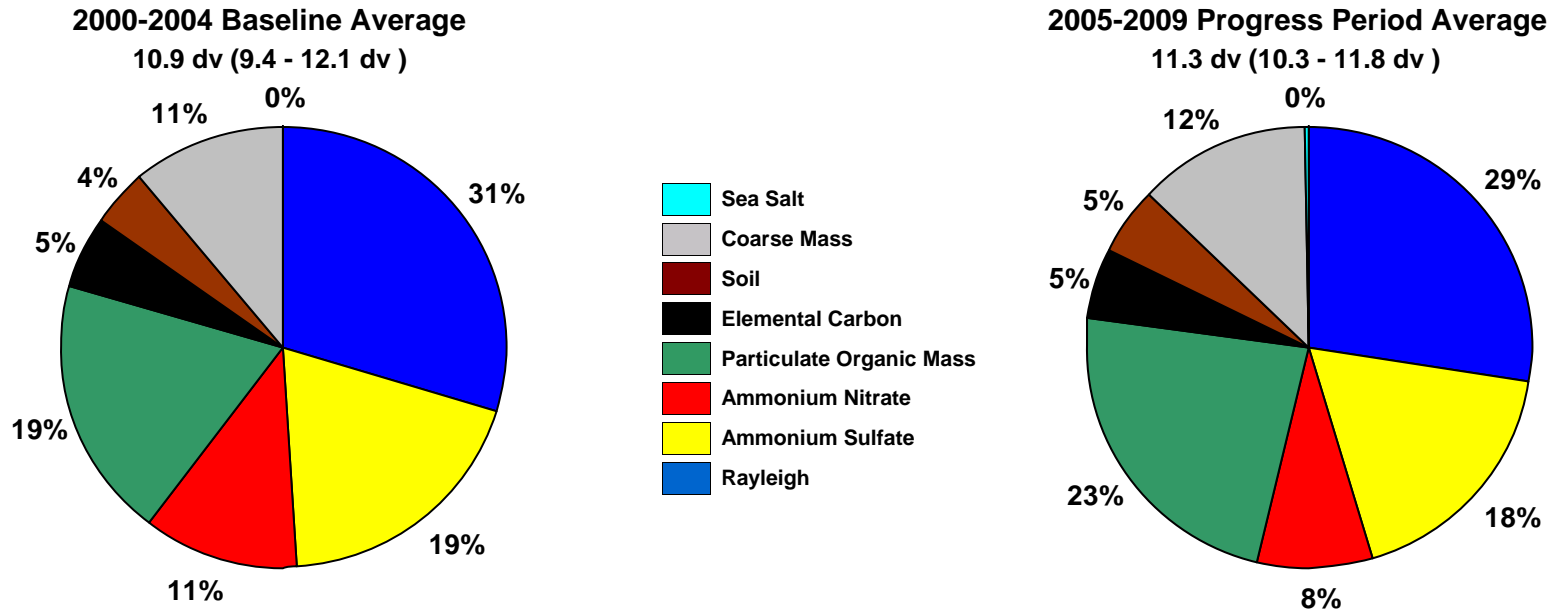
**Figure M.3-1**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Most Impaired Visibility Days**



**Figure M.3-2**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Least Impaired Visibility Days**

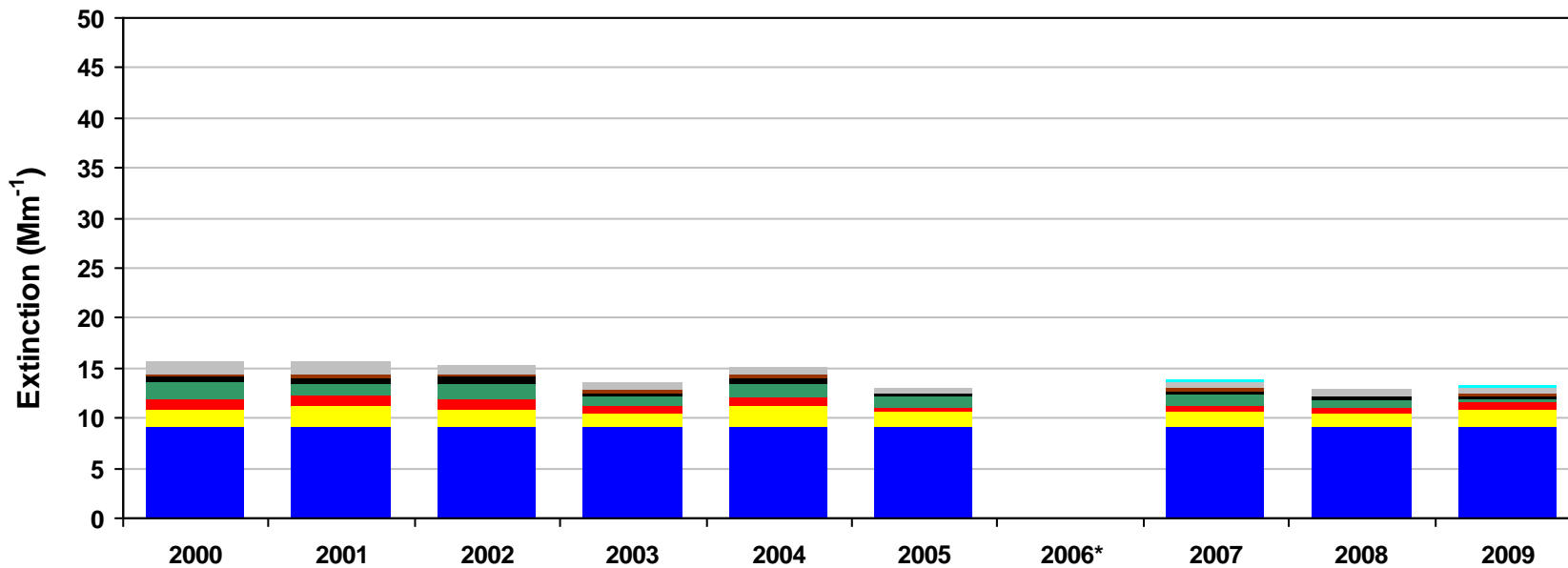
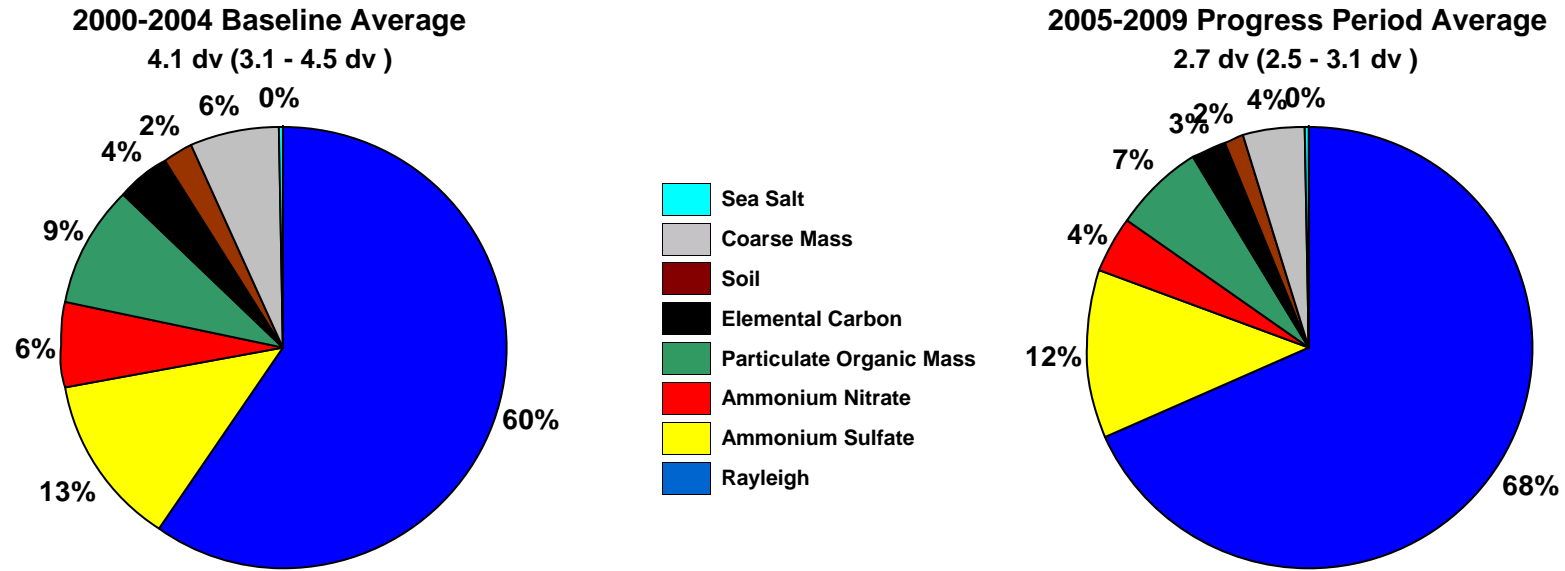


**Figure M.3-3**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**20% Most Impaired Visibility Days**



\*Missing years did not meet RHR data completeness criteria. Only complete years are included in 5-year average pie charts.

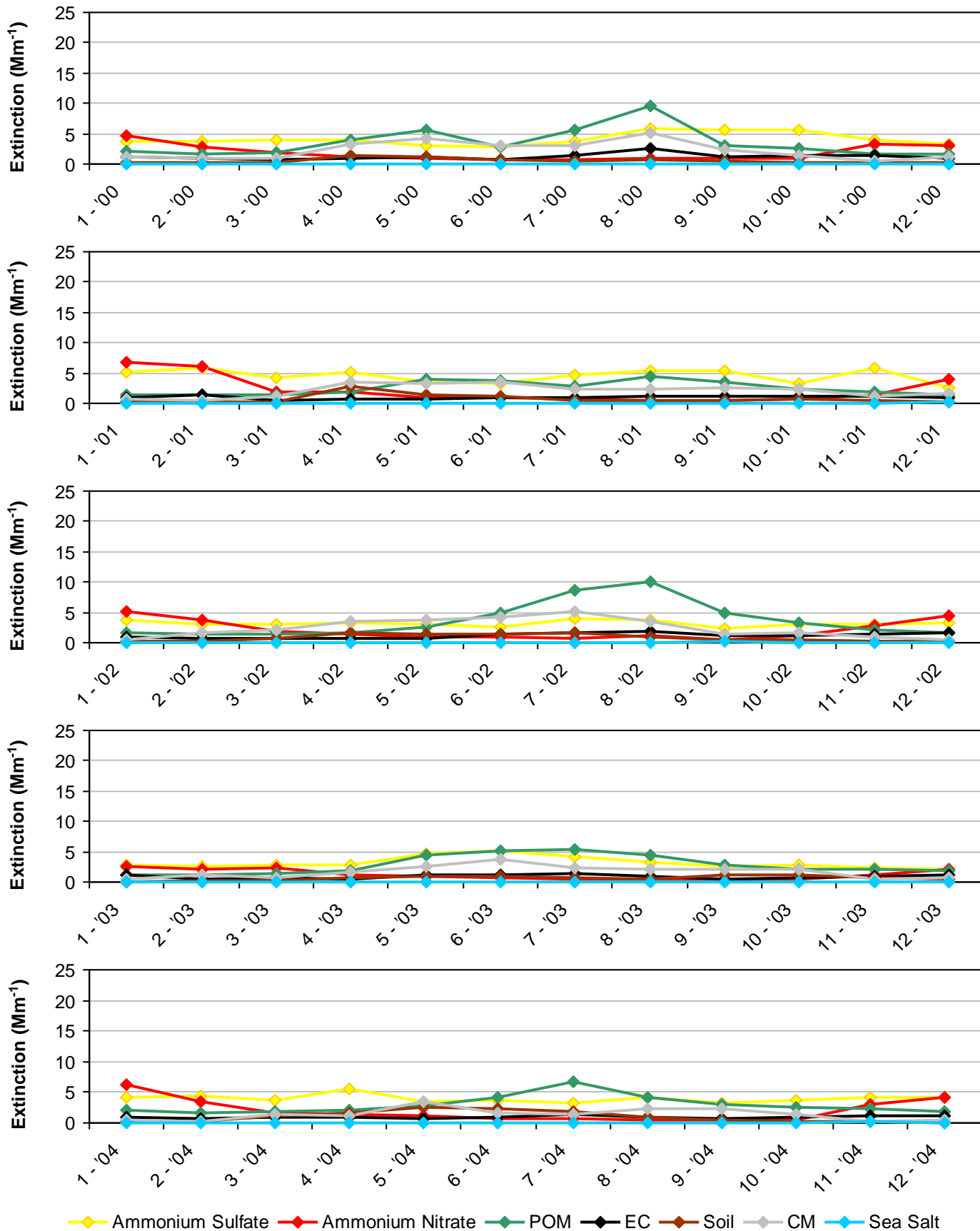
**Figure M.3-4**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**20% Least Impaired Visibility Days**



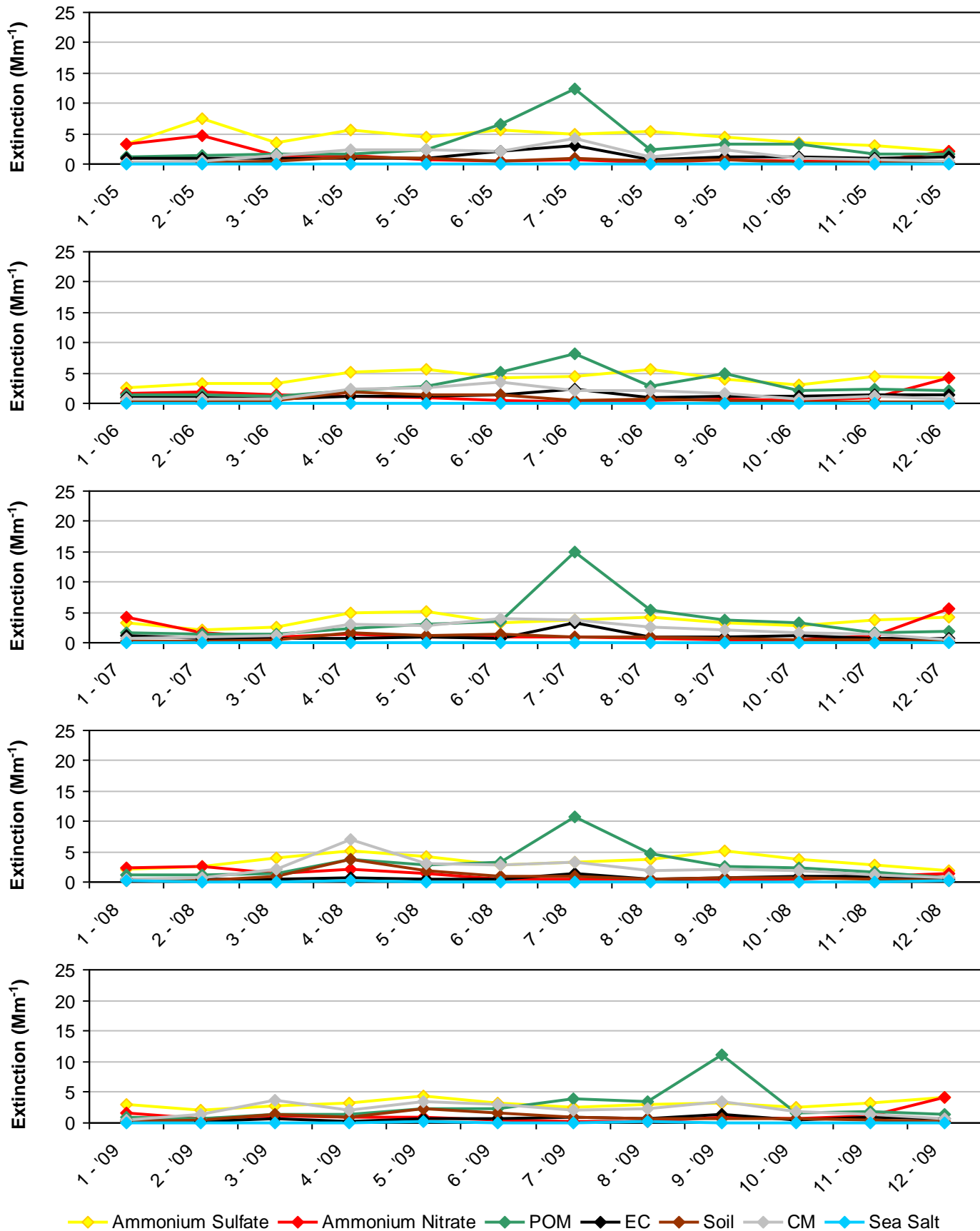
\*Missing years did not meet RHR data completeness criteria. Only complete years are included in 5-year average pie charts.



**Figure M.3-5**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**2000-2004 Monthly Average Aerosol Extinction, All Monitored Days**

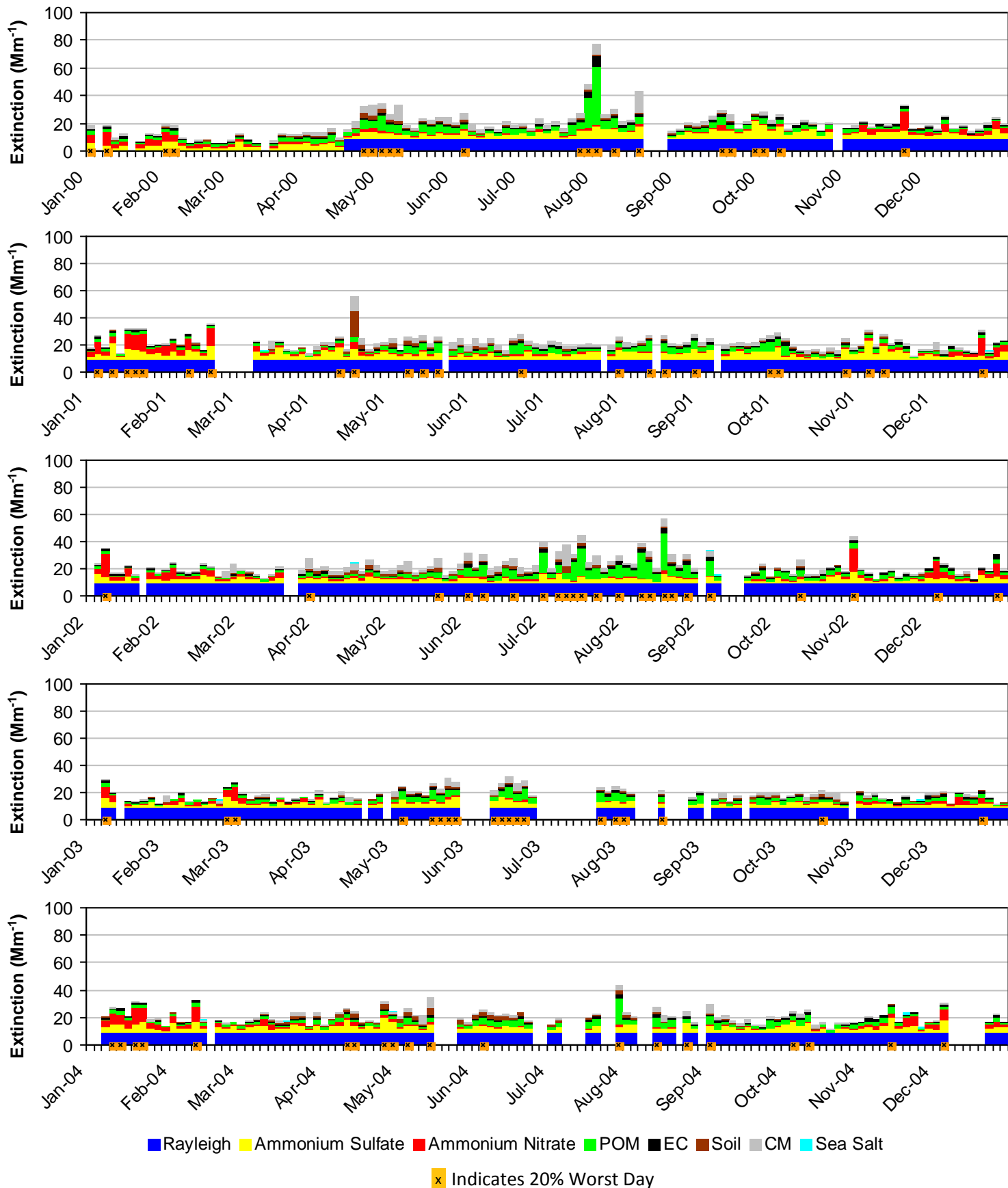


**Figure M.3-6**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**2005-2009 Monthly Average Aerosol Extinction, All Monitored Days**

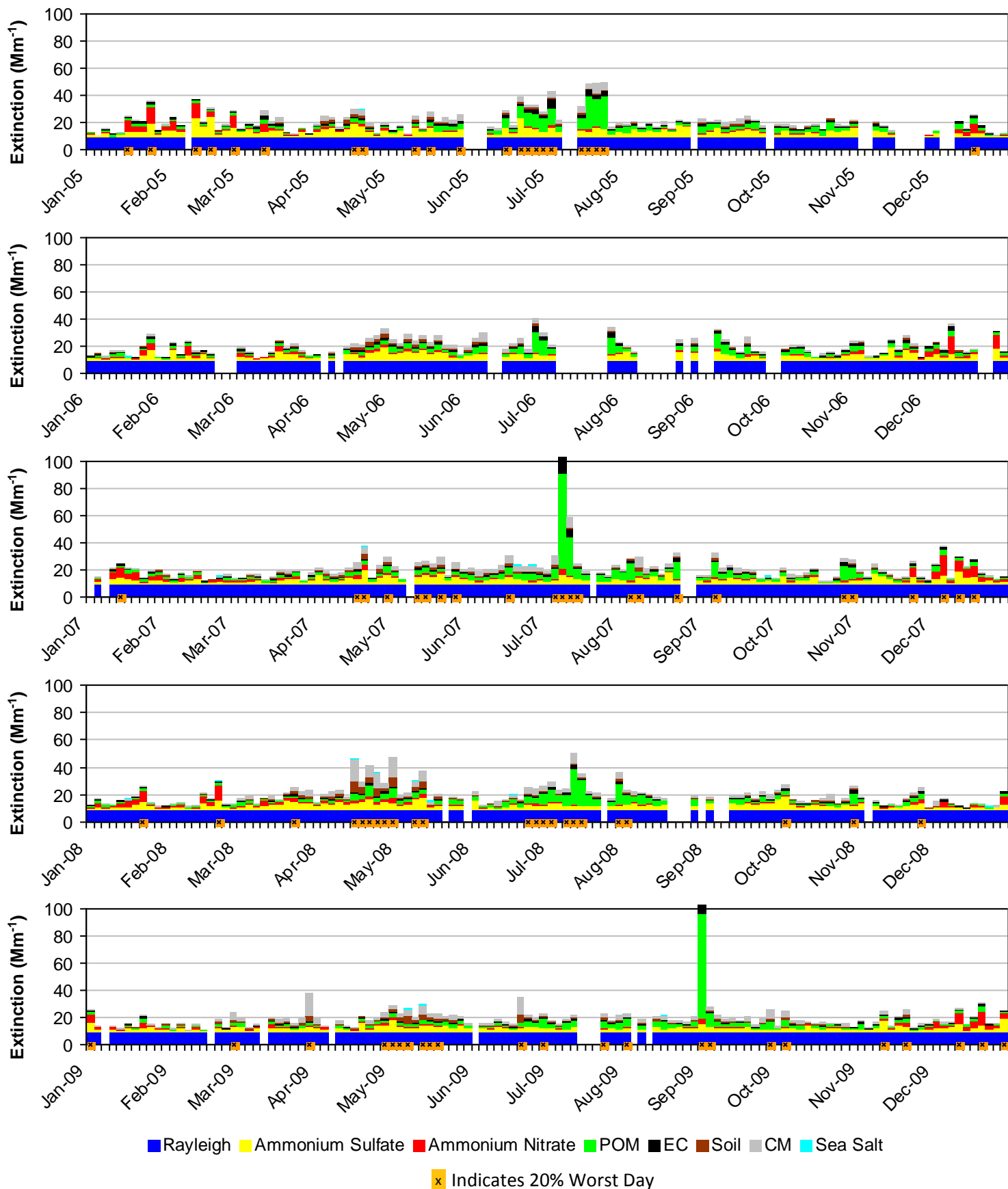


\*Note that monthly averages for the year 2006 are shown here, but this year did not meet RHR data completeness criteria.

**Figure M.3-7**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**2000-2004 Progress Period Extinction, All Sampled Days**



**Figure M.3-8**  
**Capitol Reef NP, UT (CAPI1 Site)**  
**2005-2009 Progress Period Extinction, All Sampled Days**



\*Note that daily averages for the year 2006 are shown here, but this year did not meet RHR data completeness criteria.

#### M.4. ZION NP (ZICA1)

The following tables and figures are presented in this section for the Zion NP represented by the ZICA1 IMPROVE Monitor:

- **Table M.4-1: Annual Averages, 5-Year Period Averages, and Trends:** Table of averages and other metrics for the 20% least impaired days, the 20% most impaired days, and all sampled days is presented.
- **Figure M.4-1: Annual and 5-Year Period Averages for the 20% Most Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.4-2: Annual and 5-Year Period Averages for the 20% Least Impaired Visibility Days:** Line graphs depicting annual and period averages by component are presented.
- **Figure M.4-3: 20% Most Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component for the 20% most impaired days are presented.
- **Figure M.4-4: 20% Least Impaired Visibility Days:** Pie charts depicting period averages and stacked bar charts depicting annual averages by component are presented.
- **Figure M.4-5: 2000-2004 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the baseline period are presented.
- **Figure M.4-6: 2005-2009 Monthly Average Aerosol Extinction, All Monitored Days:** Line graphs depicting monthly averages by year and component for the progress period are presented.
- **Figure M.4-7: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the baseline period are presented.
- **Figure M.4-8: 2000-2004 Progress Period Extinction, All Sampled Days:** Stacked bar charts depicting daily averages by year and component for the progress period are presented.

**Table M.4-1**  
**Zion NP, UT (ZICA1 Site)**  
**Annual Averages, 5-Year Period Averages and Trends**

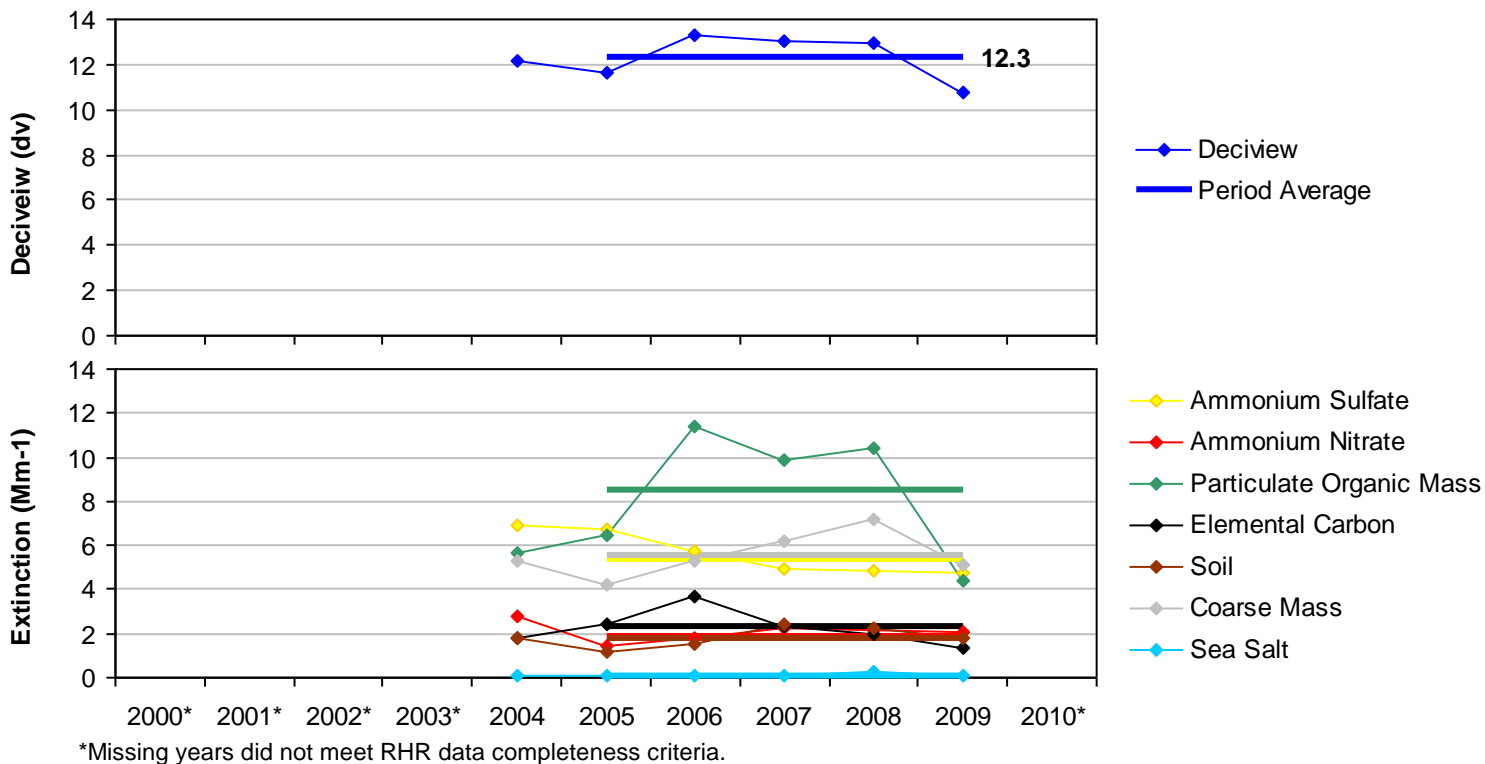
Group	Baseline Period					Progress Period					2010	2000-2009 Trend Statistics*		Period Averages**			
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		Slope (change/yr.)	p-value	Baseline (B)	Progress (P)	Difference (P -B)	Percent Change
<b>Deciview (dv)</b>																	
Best 20% Days	---	---	---	---	4.5	3.9	4.7	4.9	4.0	4.2	---	0.0	0.5	5.0	4.3	-0.7	-14%
Worst 20% Days	---	---	---	---	12.2	11.6	13.3	13.0	12.9	10.8	---	-0.2	0.4	12.5	12.3	-0.2	-2%
All Days	---	---	---	---	8.2	7.7	8.3	8.7	8.1	7.3	---	-0.1	0.4	8.3	8.0	-0.3	-4%
<b>Total Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	15.7	14.8	16.0	16.4	15.0	15.3	---	0.1	0.5	16.5	15.5	-1.0	-6%
Worst 20% Days	---	---	---	---	34.3	32.6	39.4	38.0	39.1	29.6	---	-0.2	0.5	36.9	35.7	-1.2	-3%
All Days	---	---	---	---	23.7	22.4	24.4	25.0	24.2	21.3	---	-0.1	0.5	24.4	23.5	-0.9	-4%
<b>Ammonium Sulfate Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	1.8	1.7	1.9	1.6	1.4	1.7	---	0.0	0.1	1.8	1.7	-0.1	-6%
Worst 20% Days	---	---	---	---	6.9	6.8	5.7	4.9	4.9	4.8	---	-0.5	0.0	5.2	5.4	0.2	4%
All Days	---	---	---	---	4.1	4.2	3.9	3.5	3.5	3.2	---	-0.2	0.0	3.6	3.6	0.0	0%
<b>Ammonium Nitrate Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	0.7	0.5	0.4	0.8	0.5	0.8	---	0.0	0.2	0.8	0.6	-0.2	-25%
Worst 20% Days	---	---	---	---	2.8	1.5	1.8	2.2	2.1	2.1	---	-0.1	0.5	2.2	1.9	-0.3	-14%
All Days	---	---	---	---	1.3	0.8	1.0	1.5	1.1	1.0	---	0.0	0.5	1.3	1.1	-0.2	-15%
<b>Particulate Organic Mass Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	1.6	1.1	1.4	1.3	1.4	1.1	---	-0.1	0.4	1.8	1.3	-0.5	-28%
Worst 20% Days	---	---	---	---	5.6	6.5	11.4	9.9	10.4	4.4	---	0.6	0.5	9.3	8.5	-0.8	-9%
All Days	---	---	---	---	3.2	3.0	4.1	4.0	4.1	2.5	---	0.0	0.5	4.0	3.5	-0.5	-13%
<b>Elemental Carbon Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	0.7	0.5	0.8	0.6	0.5	0.4	---	0.0	0.1	0.8	0.6	-0.2	-25%
Worst 20% Days	---	---	---	---	1.8	2.5	3.7	2.3	2.0	1.4	---	-0.2	0.2	2.4	2.4	0.0	0%
All Days	---	---	---	---	1.2	1.4	1.7	1.3	1.0	0.9	---	-0.1	0.1	1.4	1.3	-0.1	-7%
<b>Soil Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	0.2	0.2	0.3	0.4	0.2	0.3	---	0.0	0.1	0.3	0.3	0.0	0%
Worst 20% Days	---	---	---	---	1.8	1.2	1.5	2.4	2.3	1.8	---	0.1	0.2	1.7	1.8	0.1	6%
All Days	---	---	---	---	0.9	0.6	0.8	1.2	1.0	1.0	---	0.1	0.1	0.9	0.9	0.0	0%
<b>Coarse Mass Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	0.7	0.8	1.1	1.5	0.9	0.9	---	0.0	0.2	1.1	1.0	-0.1	-9%
Worst 20% Days	---	---	---	---	5.3	4.2	5.3	6.2	7.2	5.1	---	0.3	0.4	5.6	5.6	0.0	0%
All Days	---	---	---	---	3.0	2.5	2.8	3.5	3.3	2.7	---	0.1	0.5	3.1	3.0	-0.1	-3%
<b>Sea Salt Extinction (Mm-1)</b>																	
Best 20% Days	---	---	---	---	0.0	0.0	0.0	0.0	0.1	0.0	---	0.0	0.1	0.0	0.0	0.0	0%
Worst 20% Days	---	---	---	---	0.1	0.1	0.1	0.1	0.3	0.1	---	0.0	0.4	0.1	0.1	0.0	0%
All Days	---	---	---	---	0.0	0.0	0.0	0.1	0.1	0.0	---	0.0	0.2	0.0	0.1	0.1	0%

\*Values highlighted in blue (red) indicate statistically significant decreasing (increasing) annual trend. Significance is measured at the 85% confidence level (p-value ≤0.15).

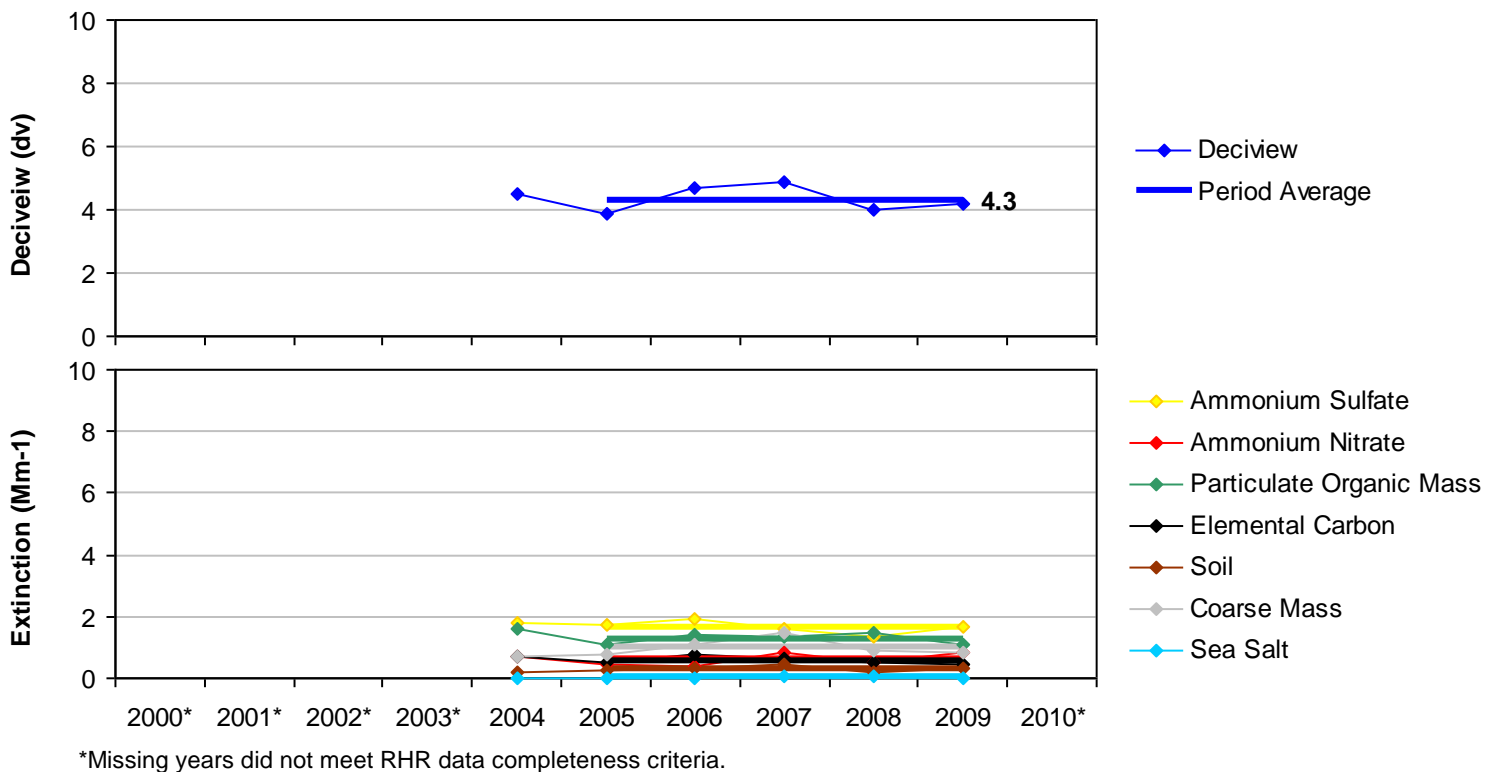
\*\*Values highlighted in blue indicate a decrease in the 5-year average, values highlighted in red indicate an increase.

---" Indicates a missing year that did not meet RHR data completeness criteria.

**Figure M.4-1**  
**Zion NP, UT (ZICA1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Most Impaired Visibility Days**

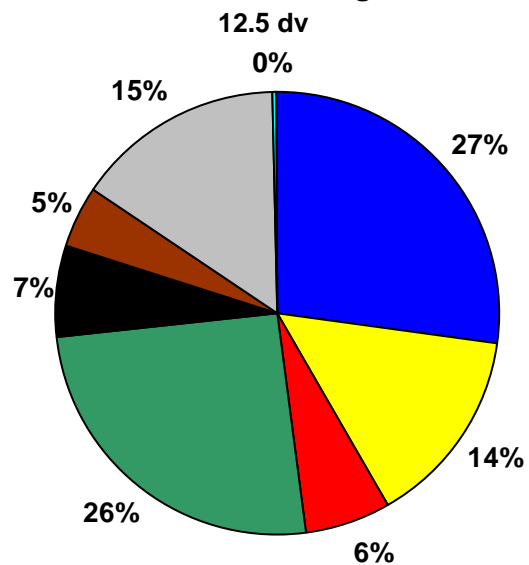


**Figure M.4-2**  
**Zion NP, UT (ZICA1 Site)**  
**Annual and 5-Year Period Averages**  
**20% Least Impaired Visibility Days**

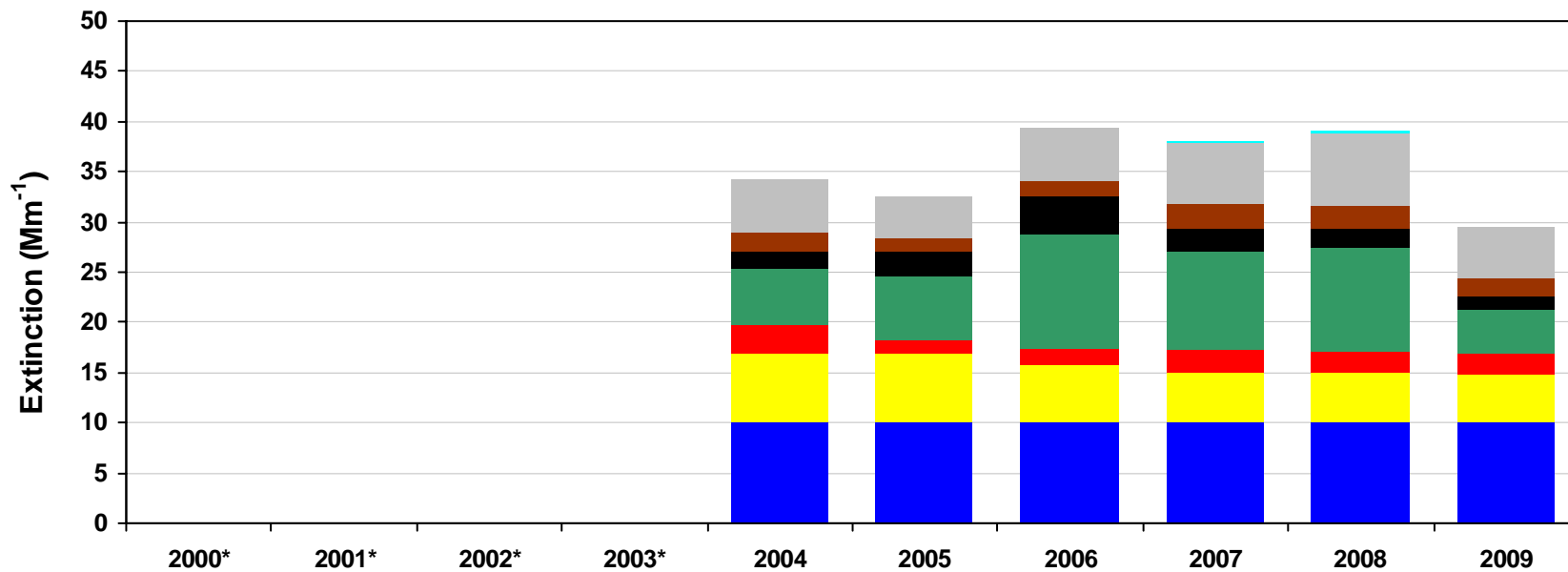
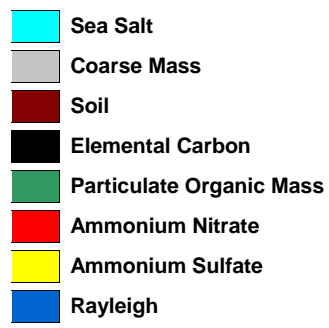
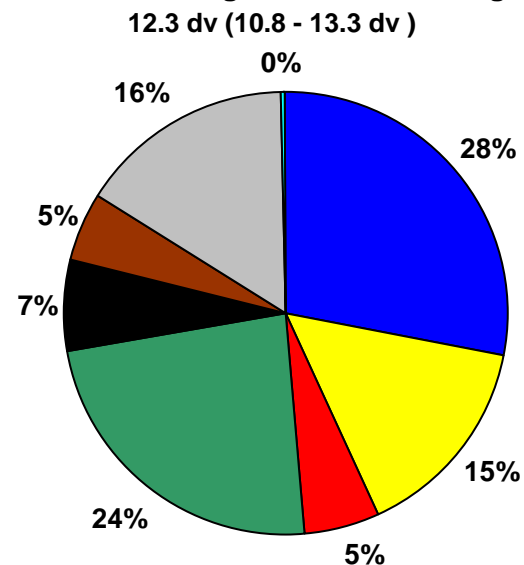


**Figure M.4-3**  
**Zion NP, UT (ZICA1 Site)**  
**20% Most Impaired Visibility Days**

**2000-2004 Baseline Average Estimate\***



**2005-2009 Progress Period Average**

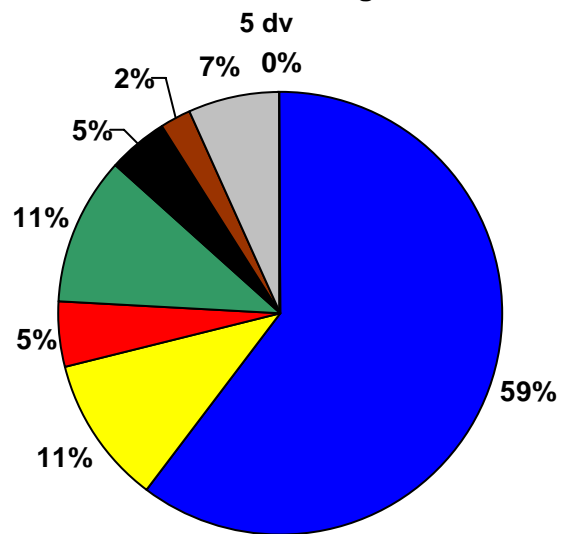


\*Baseline years did not meet RHR data completeness criteria. The 5-year baseline average represents an approximation based on methods described in text.

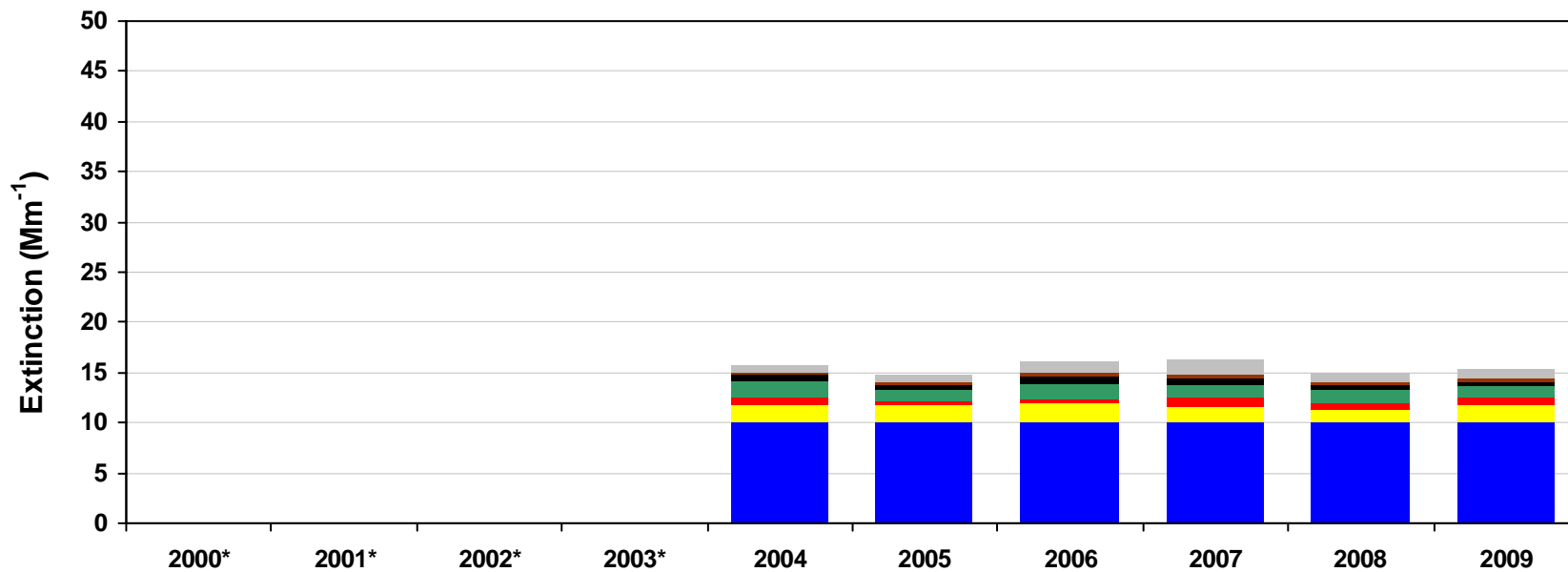
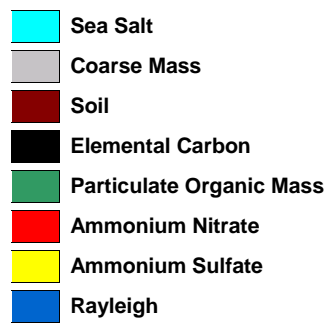
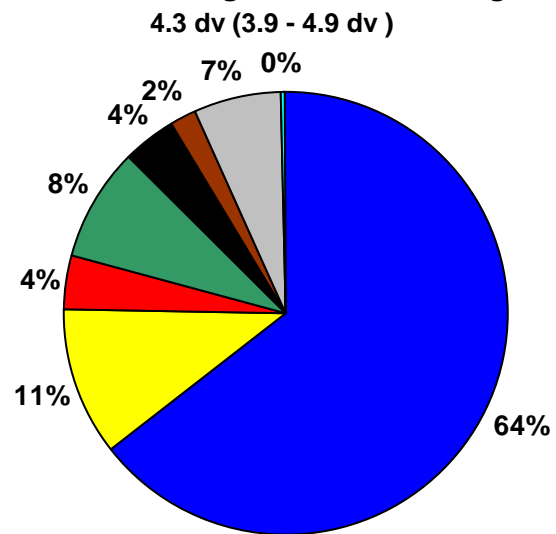


**Figure M.4-4**  
**Zion NP, UT (ZICA1 Site)**  
**20% Least Impaired Visibility Days**

**2000-2004 Baseline Average Estimate\***

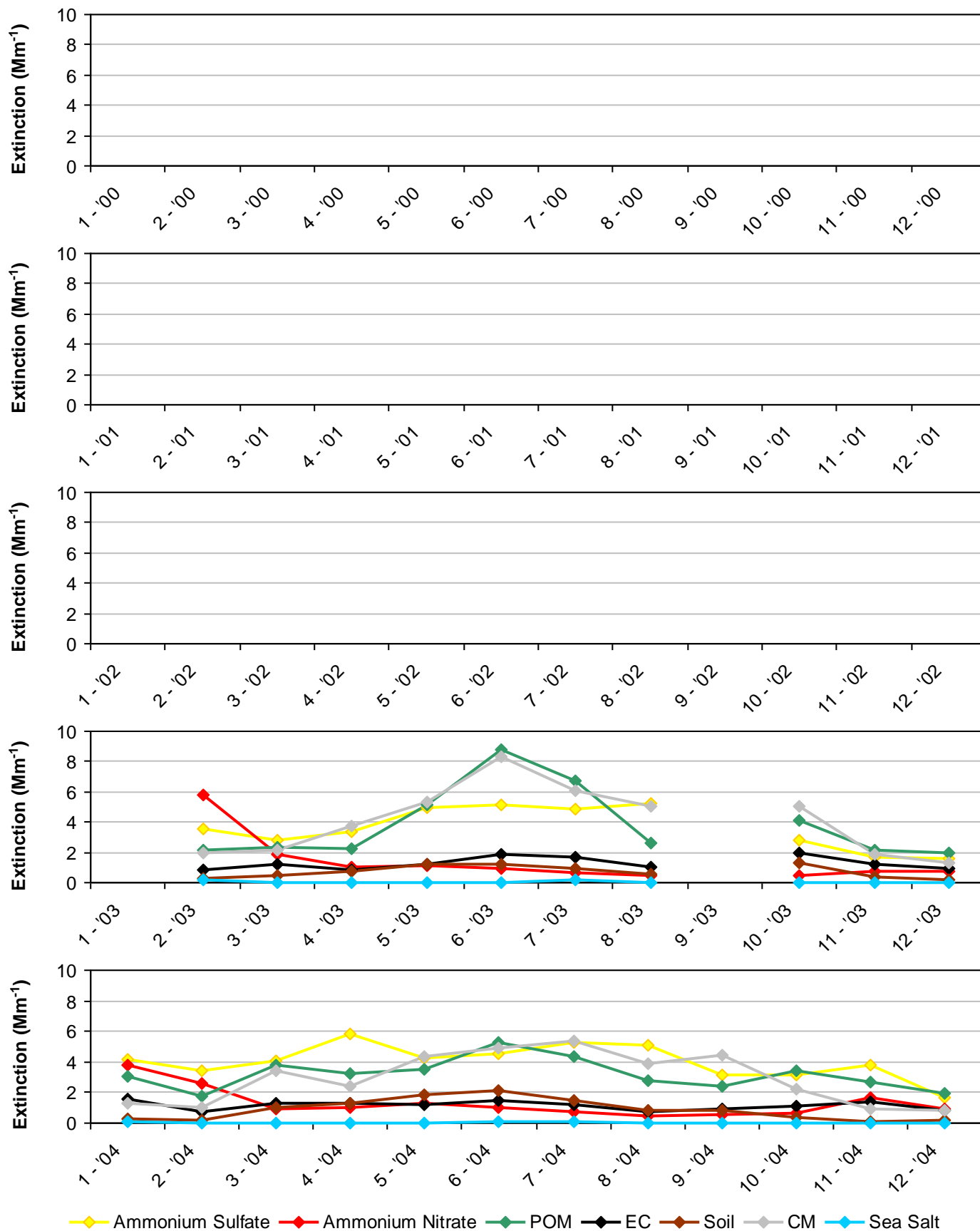


**2005-2009 Progress Period Average**



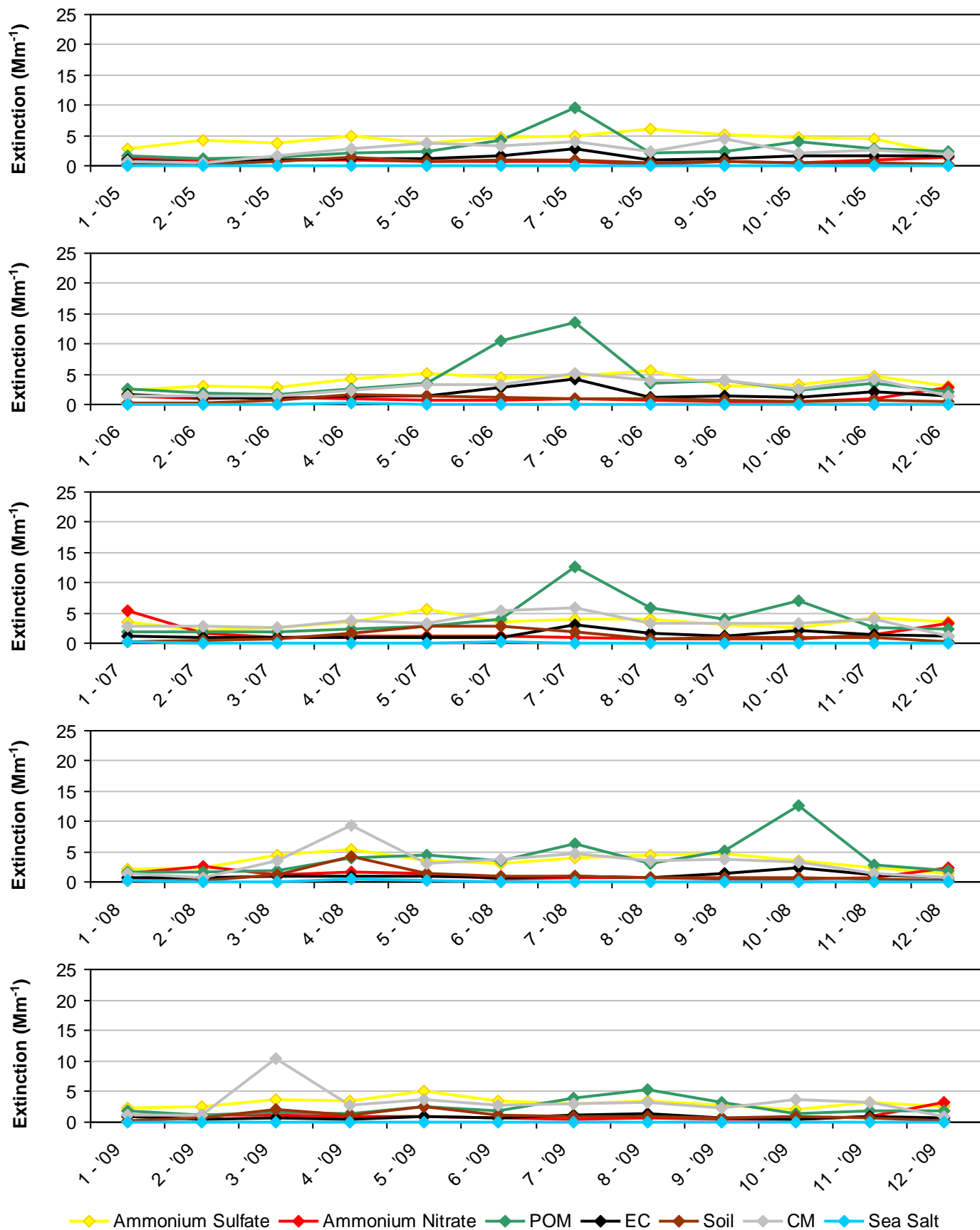
\*Baseline years did not meet RHR data completeness criteria. The 5-year baseline average represents an approximation based on methods described in text.

**Figure M.4-5**  
**Zion NP, UT (ZICA1 Site)**  
**2000-2004 Monthly Average Aerosol Extinction, All Monitored Days**

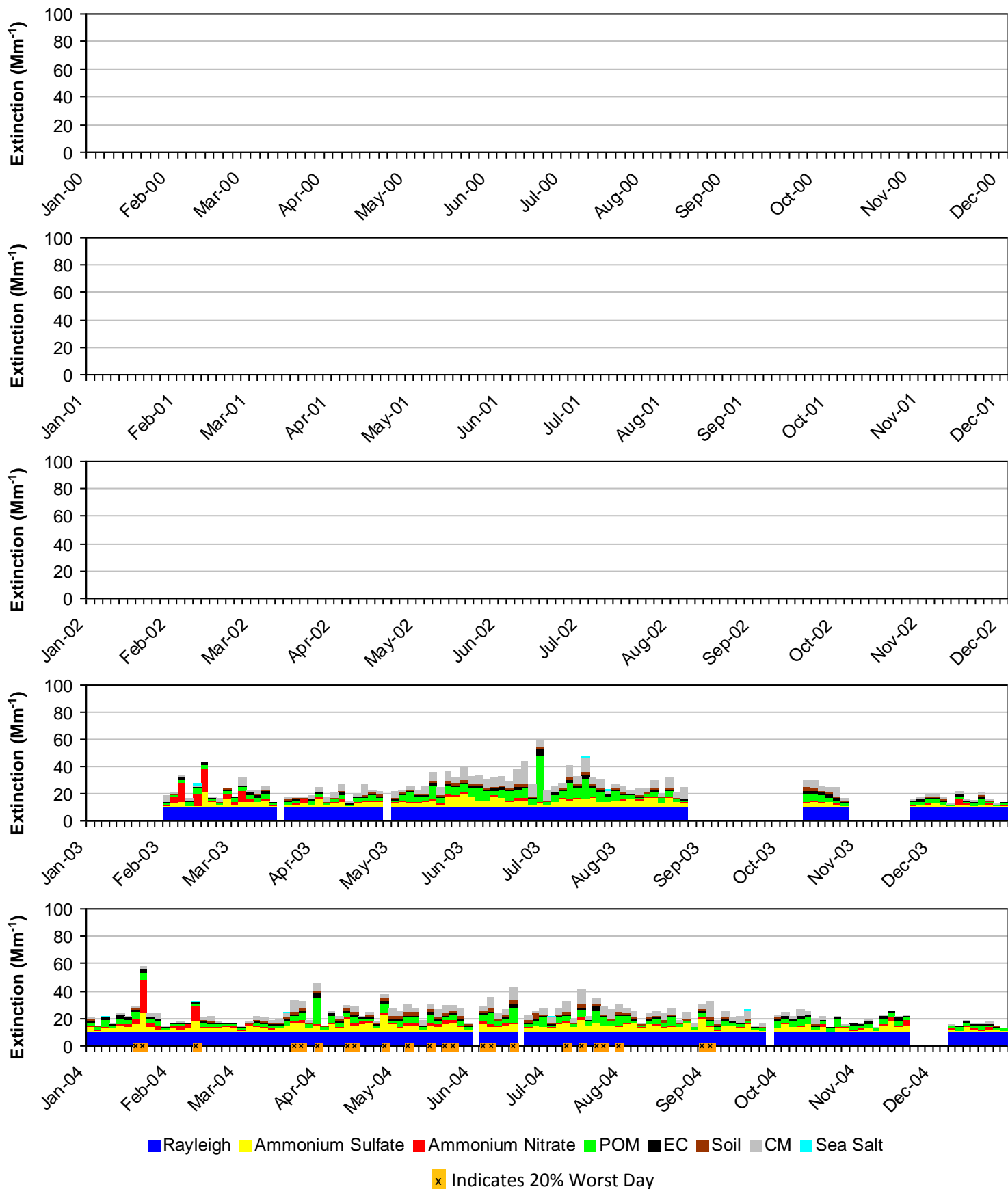


\*Note that monthly averages for the years 2000, 2001, 2002 and 2003 are shown here, but these years did not meet RHR data completeness criteria.

**Figure M.4-6**  
**Zion NP, UT (ZICA1 Site)**  
**2005-2009 Monthly Average Aerosol Extinction, All Monitored Days**



**Figure M.4-7**  
**Zion NP, UT (ZICA1 Site)**  
**2000-2004 Progress Period Extinction, All Sampled Days**



\*Note that daily averages for the years 2000, 2001, 2002 and 2003 are shown here, but these years did not meet RHR data completeness criteria.

**Figure M.4-8**  
**Zion NP, UT (ZICA1 Site)**  
**2005-2009 Progress Period Extinction, All Sampled Days**

