

IMPROVE Composition Comparisons

Highlighting the Increasing Importance of Ammonium Nitrate to Light Extinction on Most Impaired Days since 2009 for:

- Great Smoky Mountains National Park,
- Mammoth Cave National Park, and
- Shenandoah National Park

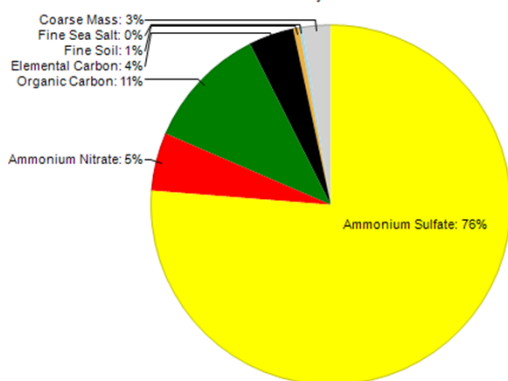


Great Smoky Mountains National Park

2009—2013

2015—2019

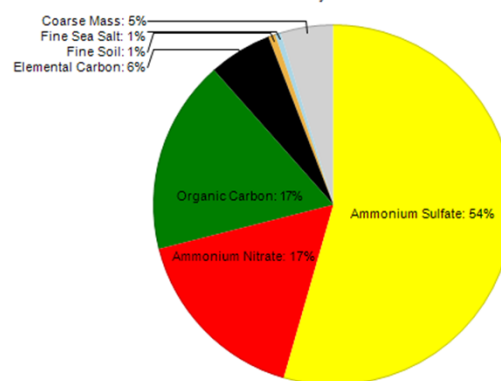
Most Impaired Days 2009-2013
Great Smoky Mountains NP



The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

IMPROVE Monitor ID: GRSM1, TN

Most Impaired Days 2015-2019
Great Smoky Mountains NP



The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

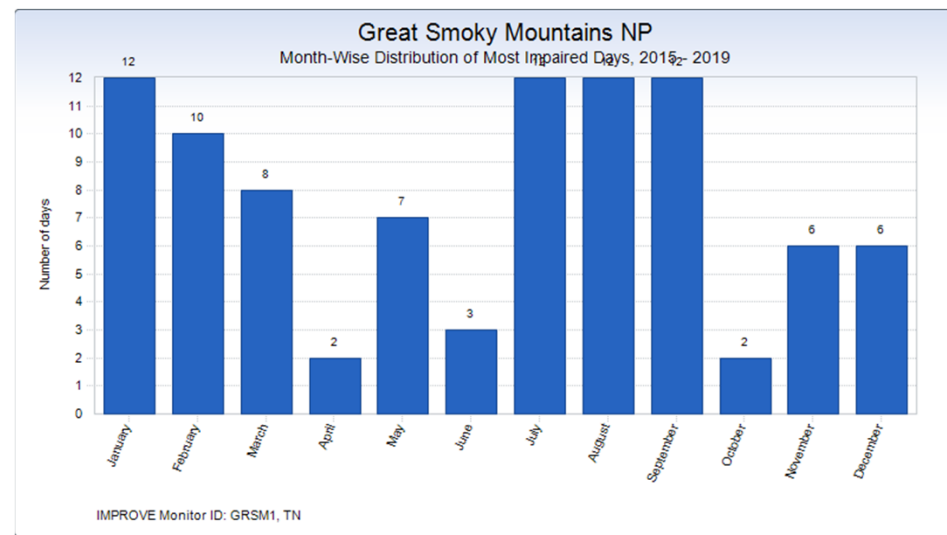
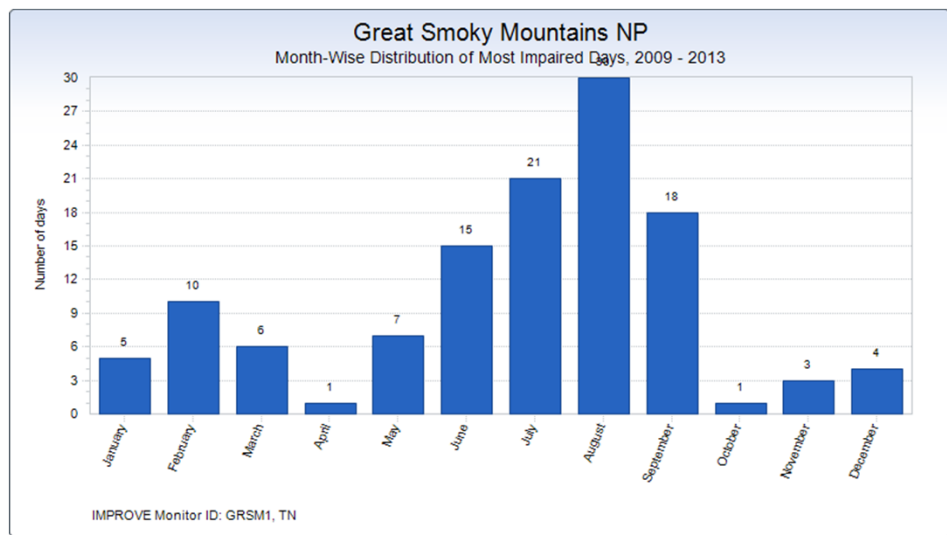
IMPROVE Monitor ID: GRSM1, TN

Percent contributions to light extinction by particle mass type on the most impaired days during two five-year periods, 2009-2013 (left) and 2015-2019 (right). The contribution of ammonium nitrate to light extinction increased from 5% during 2009-2013 to 17% during 2015-2019. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Great Smoky Mountains National Park

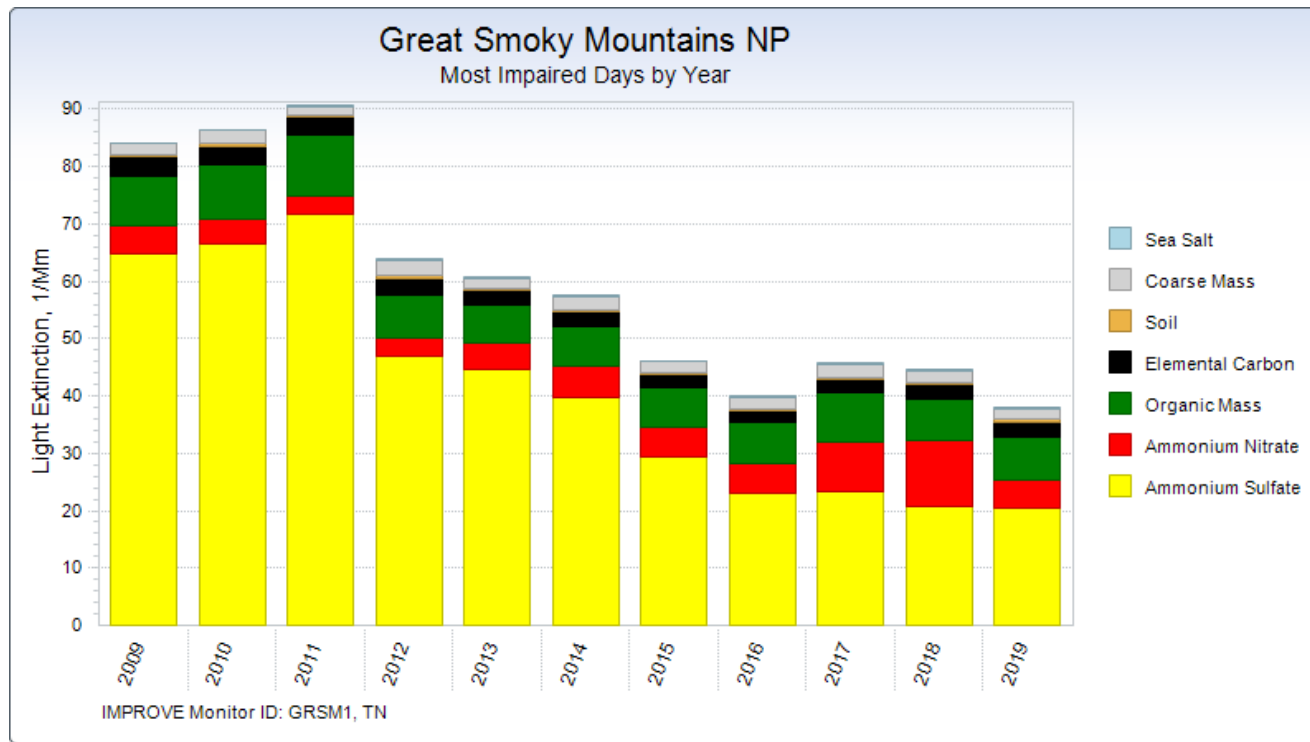
2009—2013

2015—2019



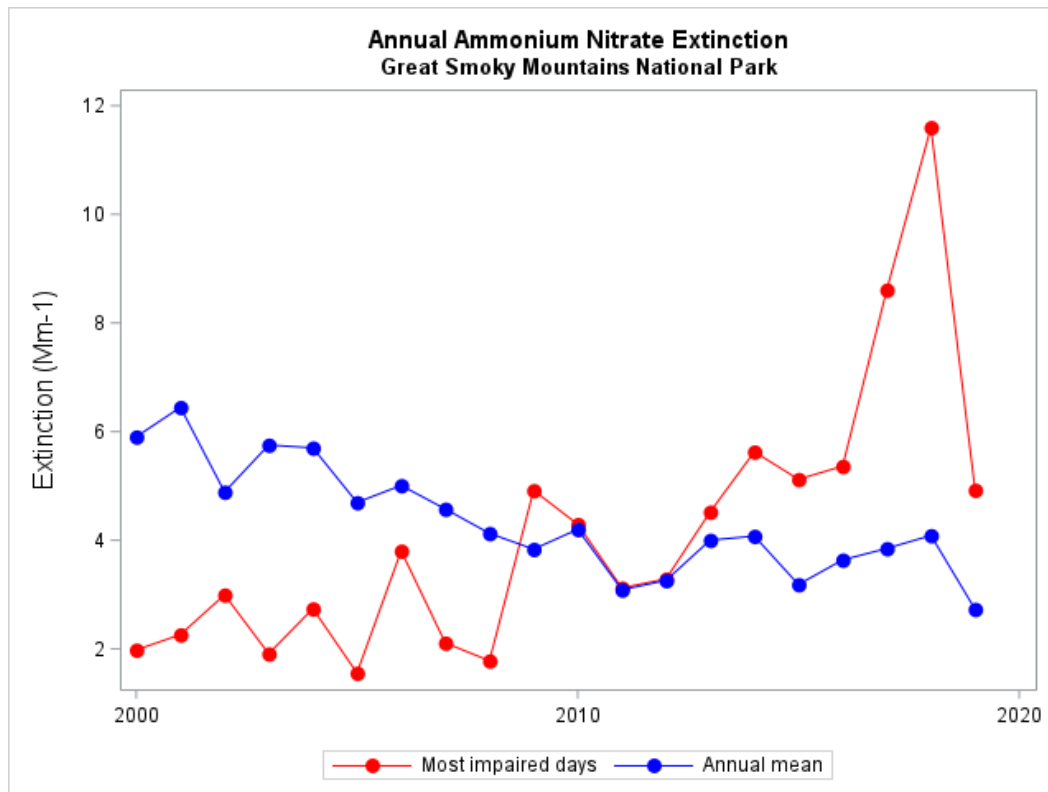
Monthly distribution of the most impaired days during two five-year periods, 2009-2013 (left) and 2015-2019 (right). The number of most impaired days occurring in the cooler months (January-April and October-December) was higher during 2015-2019 (46 days) than in 2009-2013 (30 days). (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Great Smoky Mountains National Park



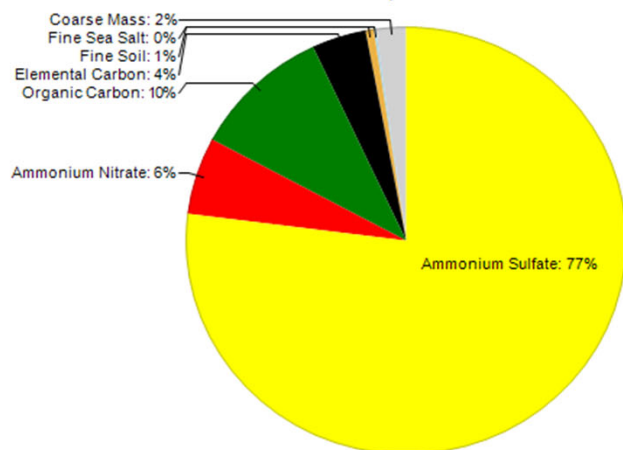
Annual contributions to light extinction by particle mass type on the most impaired days from 2009 through 2019. The relative contribution of ammonium nitrate to light extinction on the most impaired days generally increased during this period. (NPS chart 20<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Great Smoky Mountains National Park

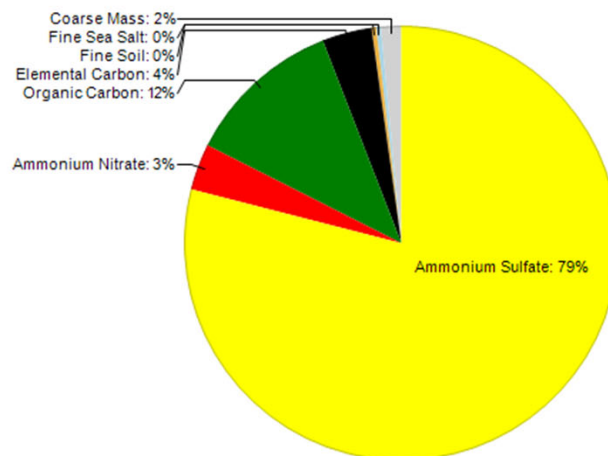


Annual mean ammonium nitrate light extinction on most impaired days (red) and all days (blue). Beginning around 2013, mean light extinction due to ammonium nitrate is higher on most impaired days than on all days. (NPS plot 2021)

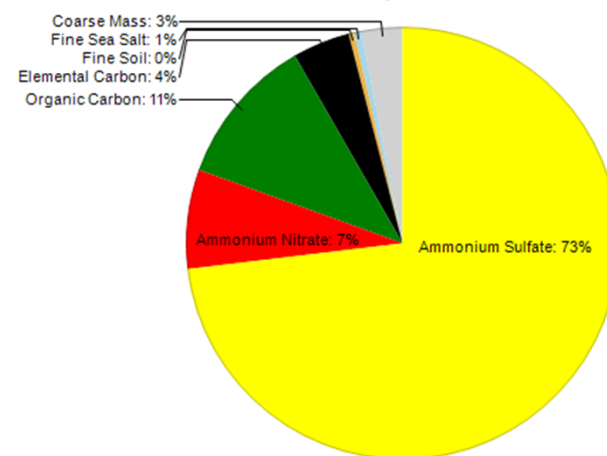
Most Impaired Days 2009-2009
Great Smoky Mountains NP



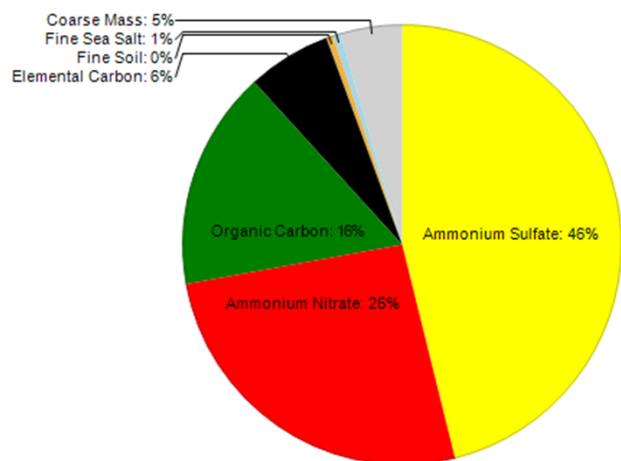
Most Impaired Days 2011-2011
Great Smoky Mountains NP



Most Impaired Days 2013-2013
Great Smoky Mountains NP



Most Impaired Days 2018-2018
Great Smoky Mountains NP



Great Smoky Mountains National Park

Percent contributions to light extinction by particle mass type on the most impaired days in 2009, 2011, 2013, and 2018. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

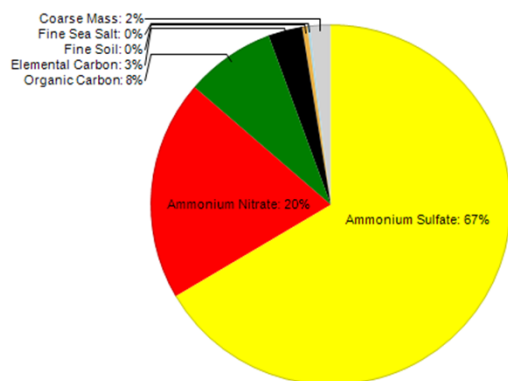
Mammoth Cave National Park

2009—2013

2015—2019

Most Impaired Days 2009-2013

Mammoth Cave NP

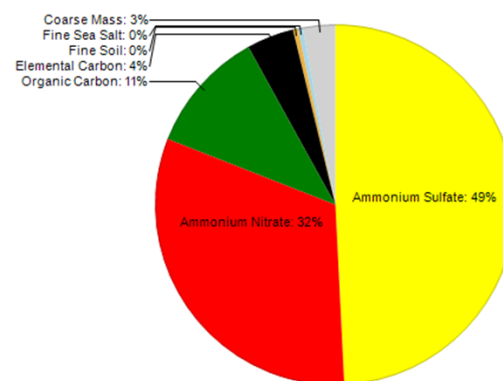


The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

IMPROVE Monitor ID: MACA1, KY

Most Impaired Days 2015-2019

Mammoth Cave NP



The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

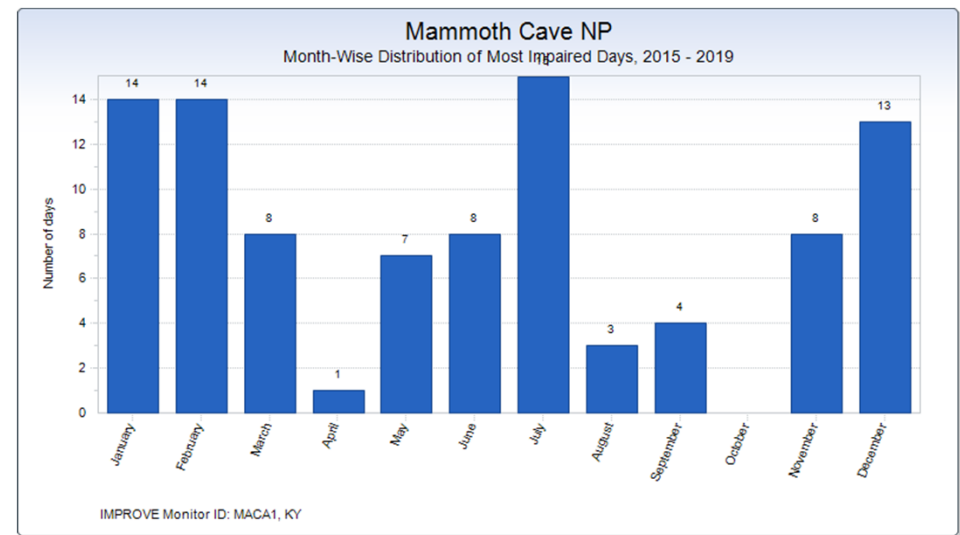
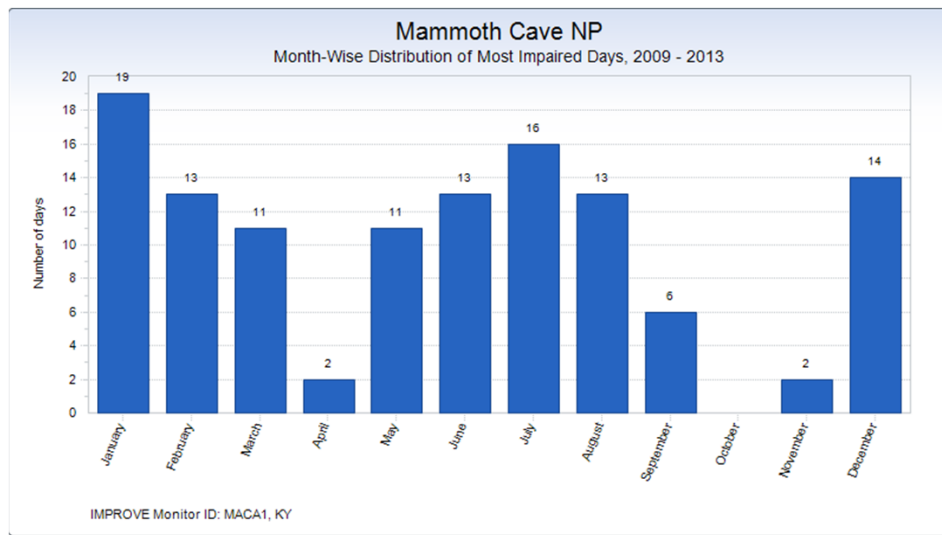
IMPROVE Monitor ID: MACA1, KY

Percent contributions to light extinction by particle mass type on the most impaired days two five-year periods, 2009-2013 (left) and 2015-2019 (right). The contribution of ammonium nitrate to light extinction increased from 20% during 2009-2013 to 32% during 2015-2019. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Mammoth Cave National Park

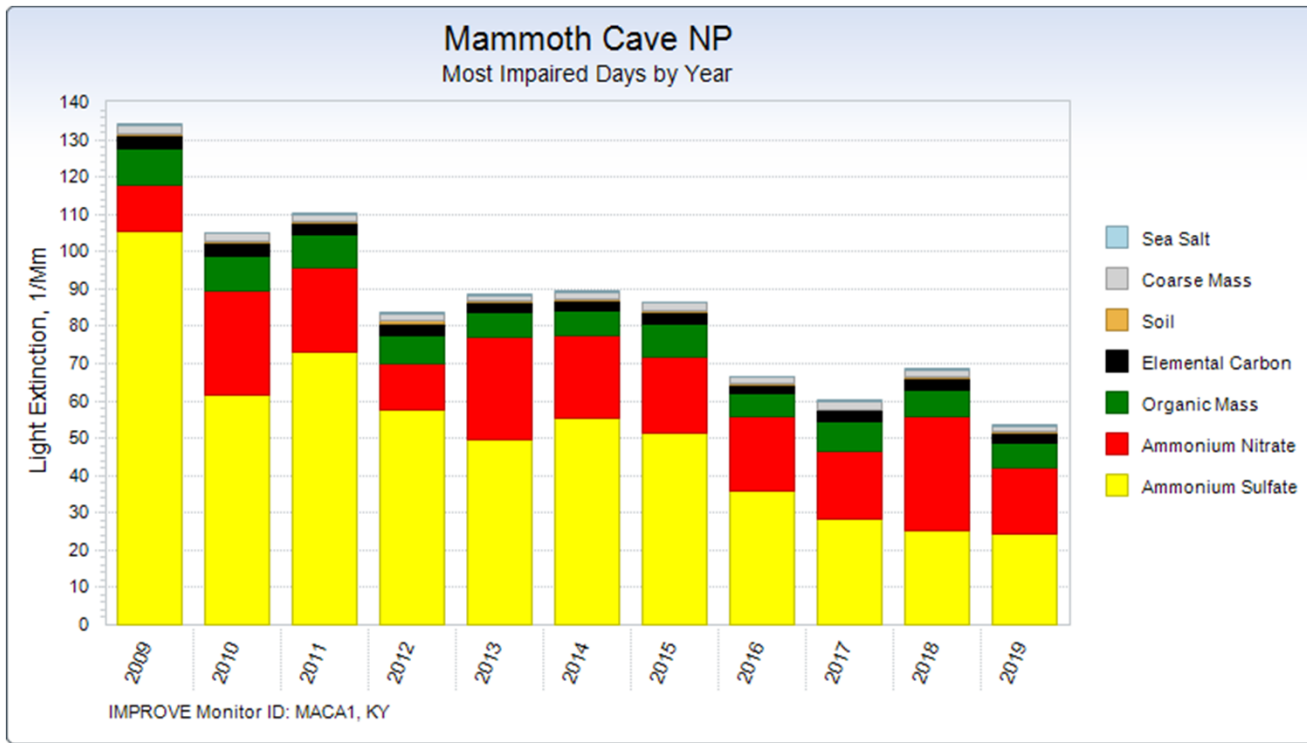
2009—2013

2015—2019



Monthly distribution of the most impaired days during two five-year periods, 2009-2013 (left) and 2015-2019 (right). The number of most impaired days occurring in the cooler months (January-April and October-December) was 58 during 2015-2019 and 61 in 2009-2013. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

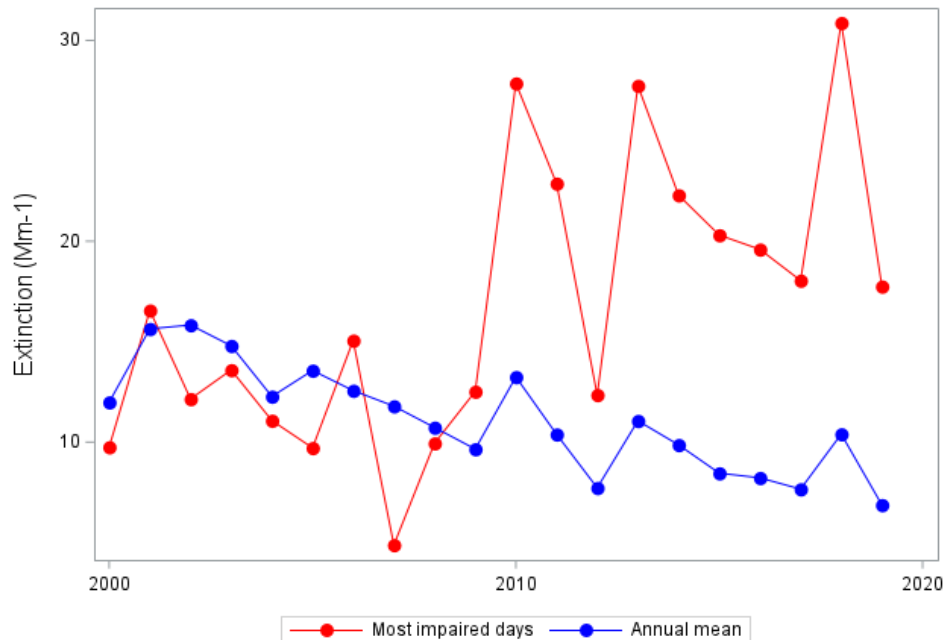
Mammoth Cave National Park



Annual contributions to light extinction by particle mass type on the most impaired days from 2009 through 2019. The relative contribution of ammonium nitrate to light extinction on the most impaired days generally increased during this period.
(<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Mammoth Cave National Park

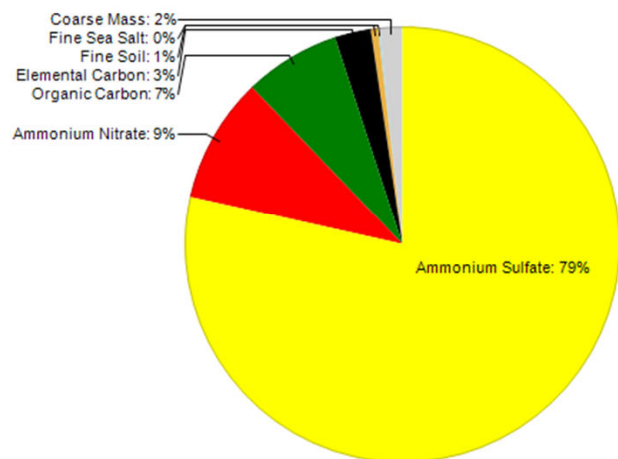
Annual Ammonium Nitrate Extinction
Mammoth Cave National Park



Annual mean ammonium nitrate light extinction on most impaired days (red) and all days (blue). Beginning around 2009, mean light extinction due to ammonium nitrate is higher on most impaired days than on all days. (NPS plot 2021)

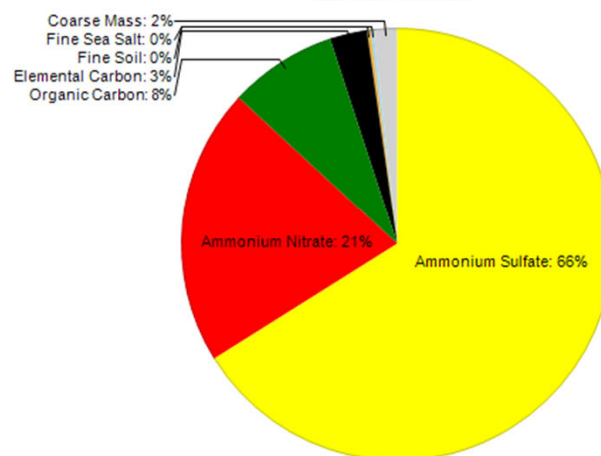
Most Impaired Days 2009-2009

Mammoth Cave NP



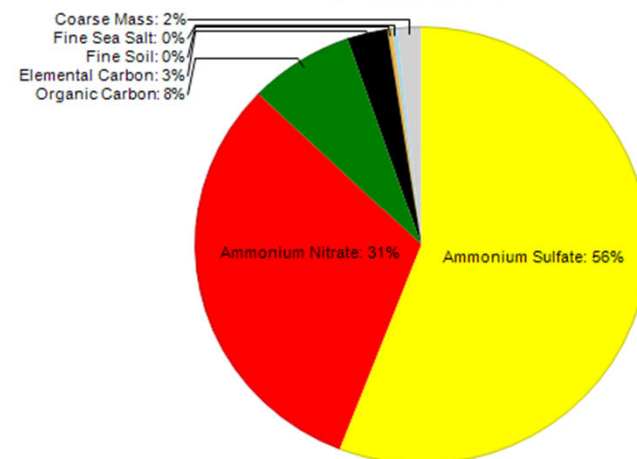
Most Impaired Days 2011-2011

Mammoth Cave NP



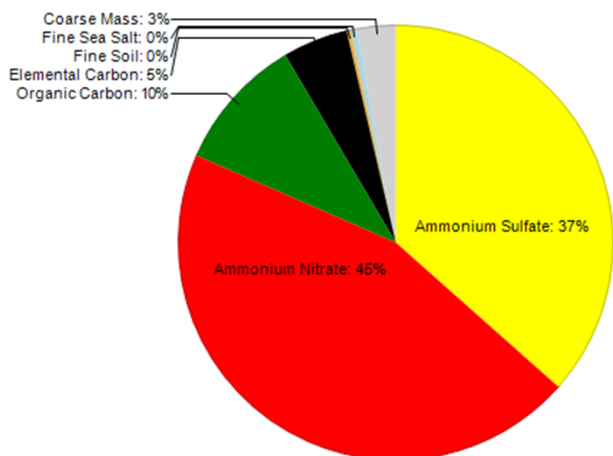
Most Impaired Days 2013-2013

Mammoth Cave NP



Most Impaired Days 2018-2018

Mammoth Cave NP



Mammoth Cave National Park

Percent contributions to light extinction by particle mass type on the most impaired days in 2009, 2011, 2013, and 2018. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

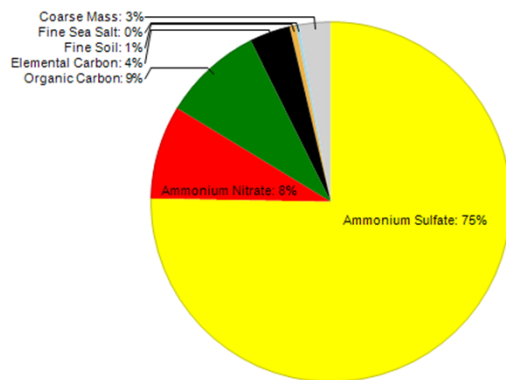
Shenandoah National Park

2009—2013

2015—2019

Most Impaired Days 2009-2013

Shenandoah NP

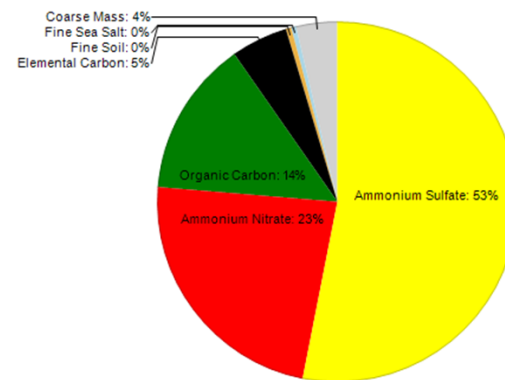


The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

IMPROVE Monitor ID: SHEN1, VA

Most Impaired Days 2015-2019

Shenandoah NP



The chart above illustrates particle contribution to light extinction on most impaired days. Light extinction is the gradual loss in light intensity due to scattering and absorption measured in inverse megameters (1/Mm).

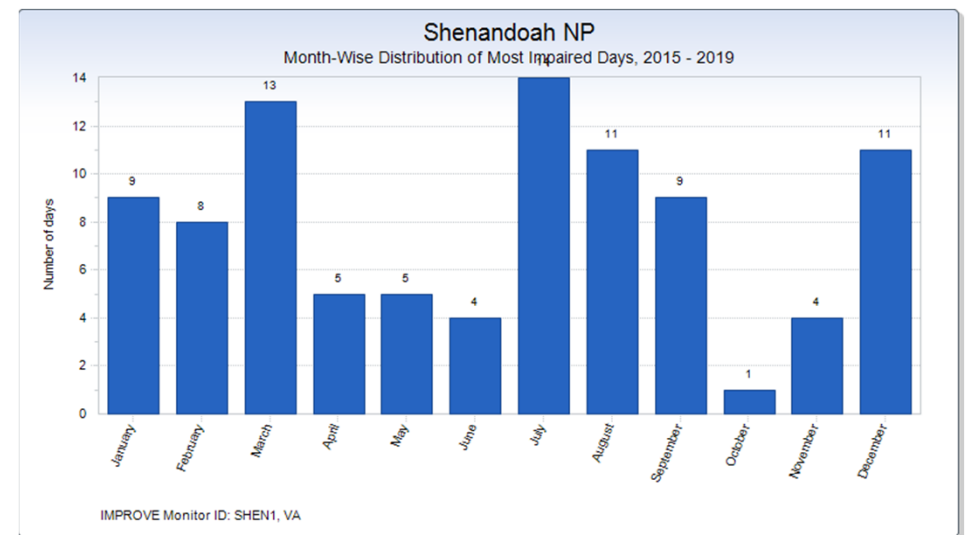
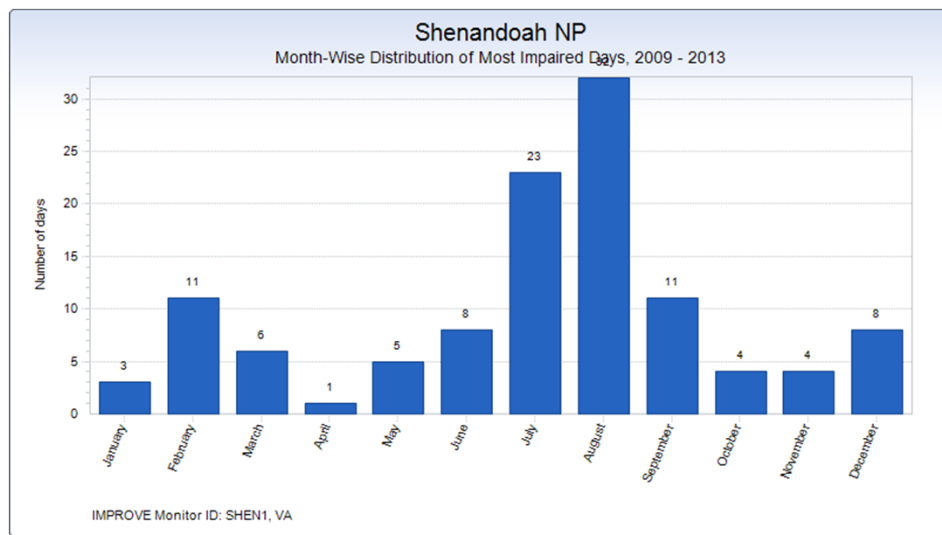
IMPROVE Monitor ID: SHEN1, VA

Percent contributions to light extinction by particle mass type on the most impaired days two five-year periods, 2009-2013 (left) and 2015-2019 (right). The contribution of ammonium nitrate to light extinction increased from 8% during 2009-2013 to 23% during 2015-2019. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Shenandoah National Park

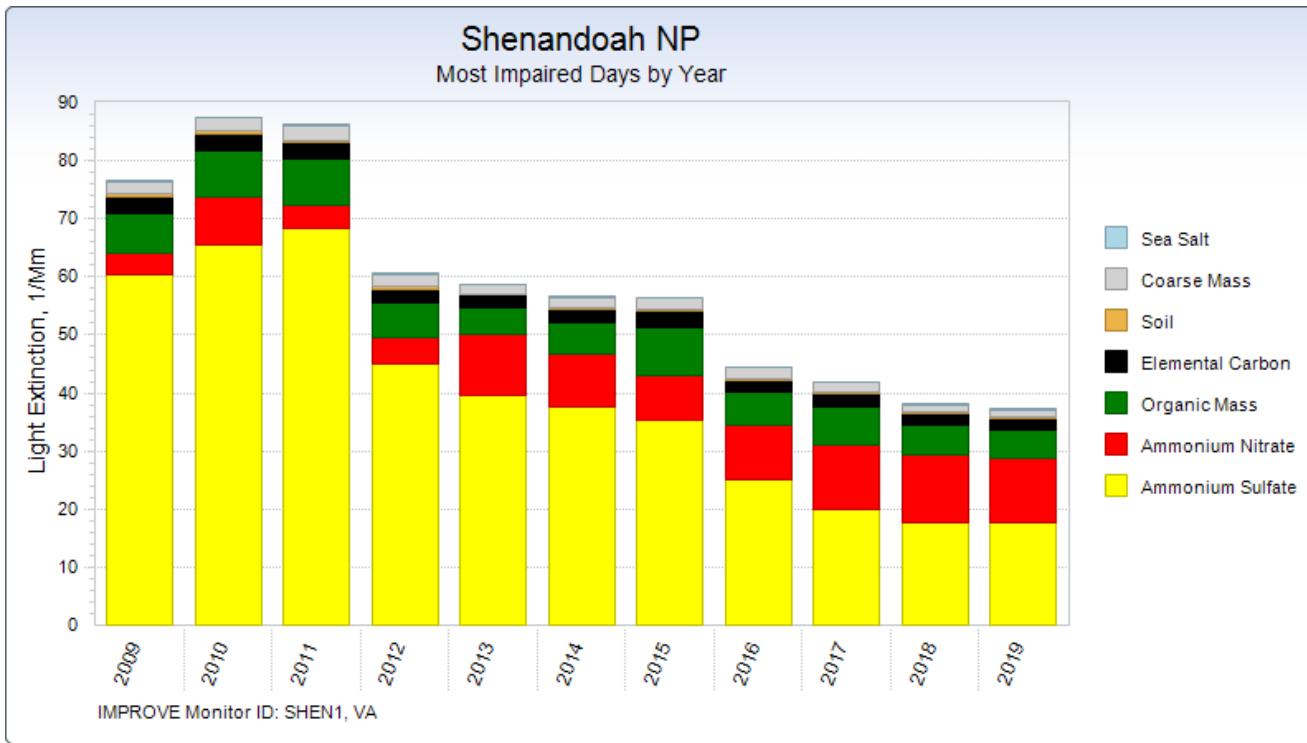
2009—2013

2015—2019



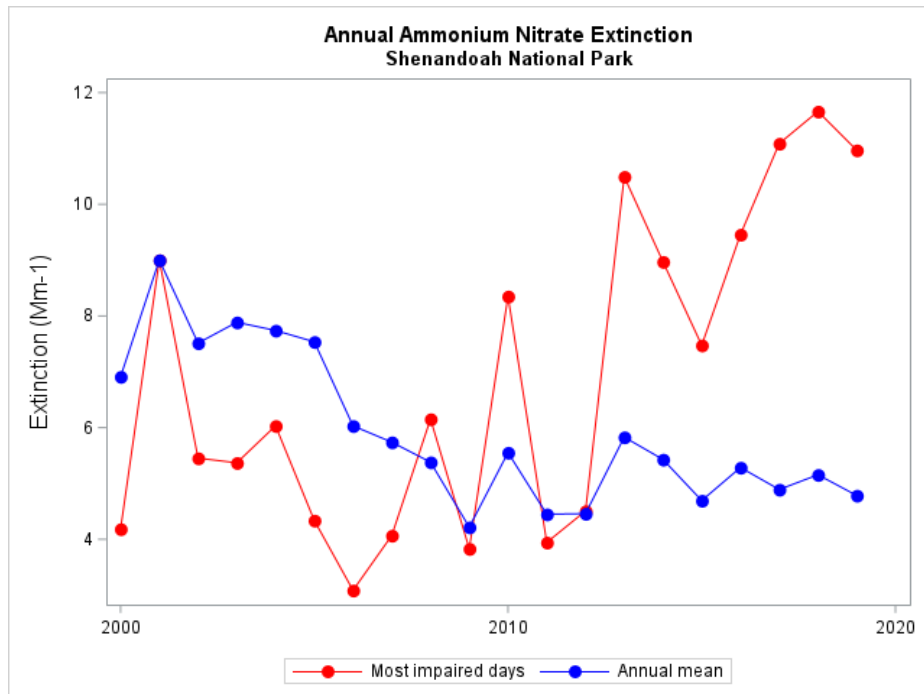
Monthly distribution of the most impaired days during two five-year periods, 2009-2013 (left) and 2015-2019 (right). The number of most impaired days occurring in the cooler months (January-April and October-December) was higher during 2015-2019 (63 days) than in 2009-2013 (37 days). (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Shenandoah National Park



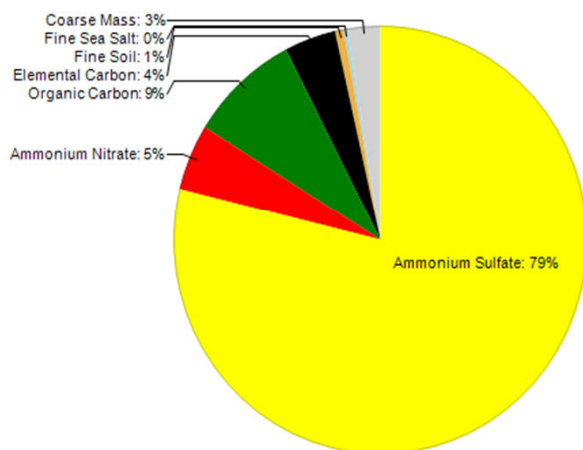
Annual contributions to light extinction by particle mass type on the most impaired days from 2009 through 2019. The relative contribution of ammonium nitrate to light extinction on the most impaired days generally increased during this period. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)

Shenandoah National Park

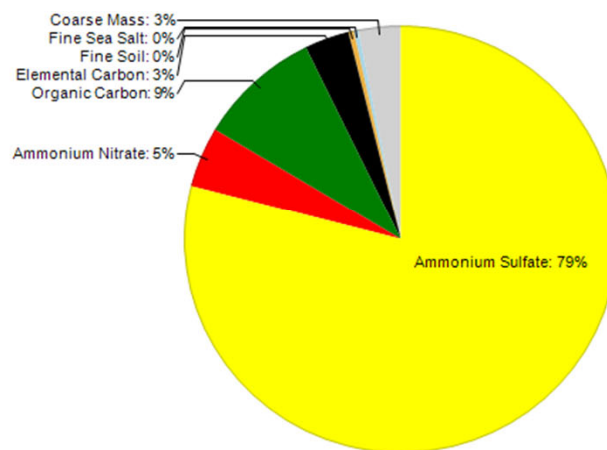


Annual mean ammonium nitrate light extinction on most impaired days (red) and all days (blue). Beginning around 2013, mean light extinction due to ammonium nitrate is higher on most impaired days than on all days. (NPS plot 2021)

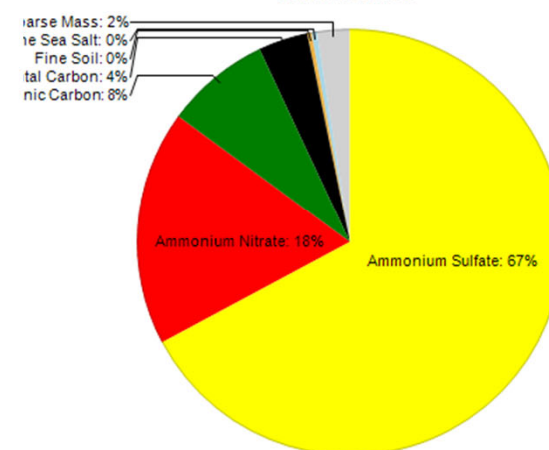
Most Impaired Days 2009-2009
Shenandoah NP



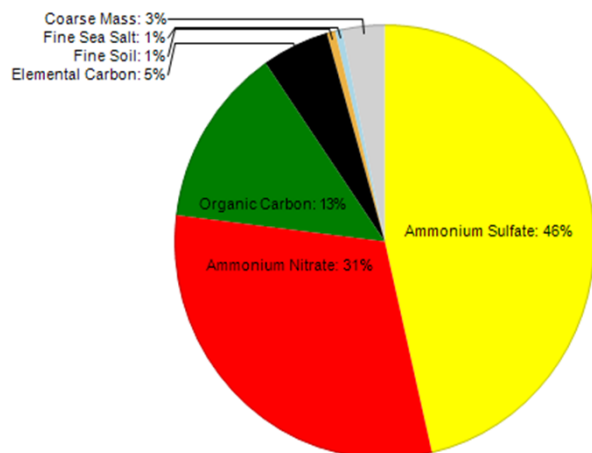
Most Impaired Days 2011-2011
Shenandoah NP



Most Impaired Days 2013-2013
Shenandoah NP



Most Impaired Days 2018-2018
Shenandoah NP



Shenandoah National Park

Percent contributions to light extinction by particle mass type on the most impaired days in 2009, 2011, 2013, and 2018. (<http://vista.cira.colostate.edu/Improve/aqrv-summaries/>)