



Mid-Atlantic Network

Air Quality Resource Brief



Vista from Skyline Drive, Shenandoah NP

1999-2008 Status & Trends

Ozone: The Northeast and Mid-Atlantic regions experience high levels of atmospheric ozone due to emissions of ozone precursors, i.e., nitrogen oxides and volatile organic compounds, from the densely populated region as well as from upwind in the heavily industrialized Ohio River Valley. Because ozone is a regional pollutant, elevated concentrations occur throughout the entire Mid-Atlantic Network (MIDN). Ozone concentrations in many of the MIDN parks likely reach levels that threaten human health. Ozone levels at Valley Forge NHP are of special concern to the network due to the park's location in an Environmental Protection Agency ozone nonattainment area. Ozone levels at this park are of significant concern but show an improving trend over the last five years. The moderate ozone levels reported at Shenandoah NP are the best

in the region and are also showing an improving trend. The other five parks with available data, reported ozone levels of significant concern with no change reported over the last five years. Ultimately, ozone injury could affect plant health and fecundity leading to a reduction in competitive ability. Loss of ozone-sensitive species may result in the loss of critical habitat or food resources for wildlife and a potential reduction in species diversity.

Atmospheric deposition: is the process by which airborne particles and gases are deposited to the earth's surface either through wet deposition (rain or snow), occult deposition (cloud or fog), or dry deposition (complex atmospheric processes such as settling, impaction, and adsorption). Acids, nutrients, and toxics are the primary compounds within deposition that are of concern or interest

Objectives

1. Document annual status and trends in atmospheric ozone concentrations using metrics that are relevant to human health and plant response.
2. Document the annual status and trends in wet and dry deposition.
3. Document the annual status and trends in mercury concentration and deposition in precipitation.
4. Document the annual status and trends in fine and coarse particulate matter concentrations and composition as they pertain to visibility impairment and human health.

in park ecosystems. Nitrate and sulfate deposition was reported for three MIDN parks, Shenandoah NP, Gettysburg NMP and Eisenhower NHS. Sulfate deposition was at levels of significant concern but showing an improving trend

Importance

Air quality can affect not only human health but also the health of natural resources in parks. The Clean Air Act of 1970 set out to preserve, protect and enhance air quality in the United States, and in 1977 Congress amended the act to classify all National Park Service units greater than 6,000 acres as Class I areas, thus receiving the greatest level of protection. In the Mid-Atlantic Network, only Shenandoah National Park is a Class I park, but all parks in the network will benefit from improved air quality.

Park managers benefit from knowing the type and extent of various air pollutants affecting park resources in order to evaluate their impacts. The National Park Service Air Resources Division (ARD) administers an Air Monitoring Program that provides current air quality conditions and assesses long-term trends in pollutants that affect national park resources. This protocol relies primarily on compilation of existing information collected by other agencies and monitoring networks.



Management Applications

- Evaluate the causes of ozone formation and its impacts on natural resources.
- Determine the impact of acid deposition on aquatic and terrestrial ecosystems.
- Identify the effects of air contaminants on park biotic communities.
- Evaluate the impacts of air pollution on visibility and the consequent effects on visitor experience and biotic communities.

1999-2008 Status & Trends...

at all MIDN parks reported. Nitrate levels were also of significant concern but no signs of improvement or further degradation was reported. Direct effects include foliar necrosis and dieback in plants, or may be directly toxic to plants, animals or microorganisms.

Visibility: Impaired visibility can greatly affect visitor enjoyment as demonstrated in the IMPROVE photos of excellent and poor visibility at Shenandoah NP on this page. Altered visibility is related primarily to fine particulate matter, a type of air pollution in the form of solid



particles or liquid droplets. Particles below 2.5 micrometers are generally toxic organic compounds and heavy metals, resulting from automobile combustion, smelting and processing of metals, and forest fires. This small particulate matter

is also the main cause of many human respiratory illnesses. Visibility was reported to be of significant concern for the six MIDN parks reported. The ten-year trend from 1999-2008 showed that visibility measurements were steady with no trend of improvement or degradation.

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Long-term Monitoring

MIDN acquires air quality monitoring data summaries and annual reports developed by NPS ARD based on ongoing air quality monitoring programs (NPS 2009). These programs include a network reporting to the EPA on ground level ozone, the National Atmospheric Deposition Program/National Trends Network (NADP/NTN) and the Mercury Deposition Network (MDN) for the monitoring wet atmospheric deposition, the Clean Air Status and Trends Network (CASTNet) monitoring dry

atmospheric deposition, and the Inter-agency Monitoring of Protected Visual Environments (IMPROVE) which monitors visibility. These reports use interpolated data averaged over five years. For trends, the change between two five-year periods is evaluated for ozone, wet deposition, and visibility. Condition is based on the last five-year period for ozone, deposition, and visibility. Not all MIDN parks are currently reported by ARD, and for those reported, not all metrics are included.

Condition & Trends in Air Quality 1999-2008

	Visibility	Deposition		Ozone
		NO ₃	SO ₄	
Appomattox Court House NHP	↔	-	-	-
Booker T. Washington NM	↔	-	-	-
Eisenhower NHS	↔	↔	↓	↔
Fredericksburg & Spotsylvania NMP	↔	-	-	↔
Gettysburg NMP	↔	↔	↓	↔
Hopewell Furnace NHS	-	-	-	-
Petersburg NB	-	-	-	↔
Richmond NBP	-	-	-	↔
Shenandoah NP	↔	↔	↓	↓
Valley Forge NHP	-	-	-	↓

↔ Condition of significant concern showing no trend

↓ Condition of significant concern showing an improving trend (contaminant level decreasing)

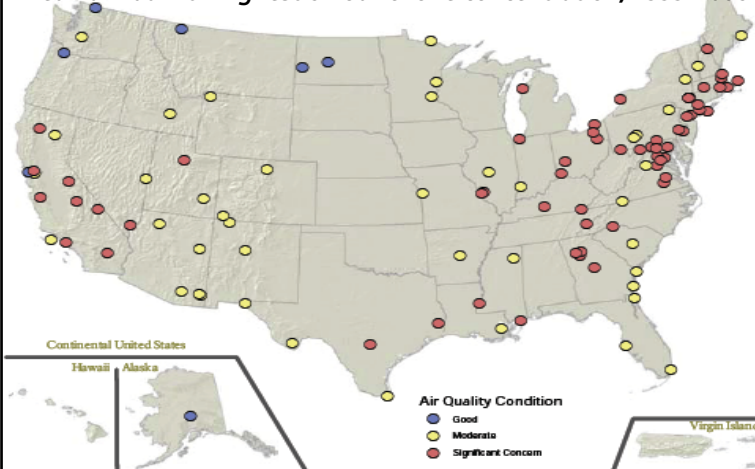
↓ Moderate condition showing an improving trend (contaminant level decreasing)

- No data available or reported

Looking Forward

Ten-year air quality trends (1999 – 2008) are showing signs of improving air quality in MIDN parks. Visibility measurements on the haziest days are improving in Gettysburg NMP and Eisenhower NHS and data from Shenandoah are showing improvement on the clearest days. Ozone levels measured at Valley Forge NHP and Shenandoah NP over this time period showed signs of improvement. Air quality in MIDN parks is likely to further improve as many regional air pollution sources install Best Available Retrofit Technology for compliance with the Regional Haze Program and implement other measures required by the EPA's Nitrogen Oxide State Implement Plan and Acid Rain Program.

Mean annual 4th highest 8 hour ozone concentration, 1999-2008



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Parks monitored: Appomattox Court House NHP • Booker T. Washington NM • Eisenhower NHS • Fredericksburg & Spotsylvania NMP • Gettysburg NMP • Hopewell Furnace NHS • Petersburg NB • Richmond NBP • Valley Forge NHP • Shenandoah NP

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