Air Quality Monitoring

Affected Parks

Big South Fork NRRA (BISO)
Blue Ridge Parkway (BLRI)
Obed Wild and Scenic River (OBRI)

[*Great Smoky Mountains National Park (GRSM) – operates a long-term air quality monitoring program separate from the rest of the Network]

Importance / Issues

The National Park Service strives to perpetuate the best possible air quality in units of the National Park System. Progress toward this goal is measured by examining trends for key air quality indicators, including:

- Ozone
- Visibility
- Atmospheric deposition - which affects ecological health through acidification and fertilization of soils and surface waters

The height and physical structure of the Southern Appalachian Mountains (the highest in eastern North America) combined with predominant weather patterns, tend to trap and concentrate anthropogenic pollutants such as those produced by fossil fuel combustion in power plants, factories, and automobiles. GRSM receives some of the highest depositions of sulfur and nitrogen in North America. Despite declining national trends, sulfur dioxide emissions affecting the Southern Appalachians have increased in the past two decades, deleteriously affecting air quality and visibility. These pollutants are deposited in the form of rainfall, dry particles and cloud water. The average annual pH of rainfall in GRSM is ten times more acidic than natural rainfall. Clouds with acidity as low as pH 2.0 bathe the high elevation forests during much of the growing season. Some high-elevation park streams have the highest nitrate levels of any systems in the U.S. that drain undisturbed watersheds. Research at GRSM has shown that some high-elevation soils in the park are receiving so much airborne nitrogen that they are suffering from advanced nitrogen saturation. This limits the availability of nutrients to forest plants and causes the mobilization of toxic ions such as aluminum that can harm vegetation and aquatic biota. It is suspected that similar conditions may exist in the high-elevation portions of BLRI.

In the Appalachian Highlands Network, Great Smoky Mountains National Park is a designated Class I air quality area; the rest of the units are Class II air quality areas. BLRI and GRSM have on-site ambient air quality monitoring; the other parks have nearby monitors. The air pollution issues of most significant concern for the APHN are ozone, acid deposition and visibility are in proposed 8-hour ozone non-attainment areas. An ozone injury risk assessment indicates the risk of injury is high in GRSM and BLRI.

Monitoring Objectives

Specific objectives are to:

1. Report on seasonal and annual trends in N and S deposition at existing monitoring stations near APHN parks.

2. Report on seasonal and annual trends in fine particle concentration at existing monitoring stations near APHN parks.

3. Report on seasonal and annual trends in ozone concentration near APHN parks using metrics that are indicative of human health (e.g., 8-hour average) and plant response (e.g., SUM06).

Protocol Development and Status

The Network is working with the NPS Air Resources Division to determine the most effective means of compiling and providing annual air quality summaries to the parks. We are also exploring the possibility of developing an air quality folio for the APHN parks.

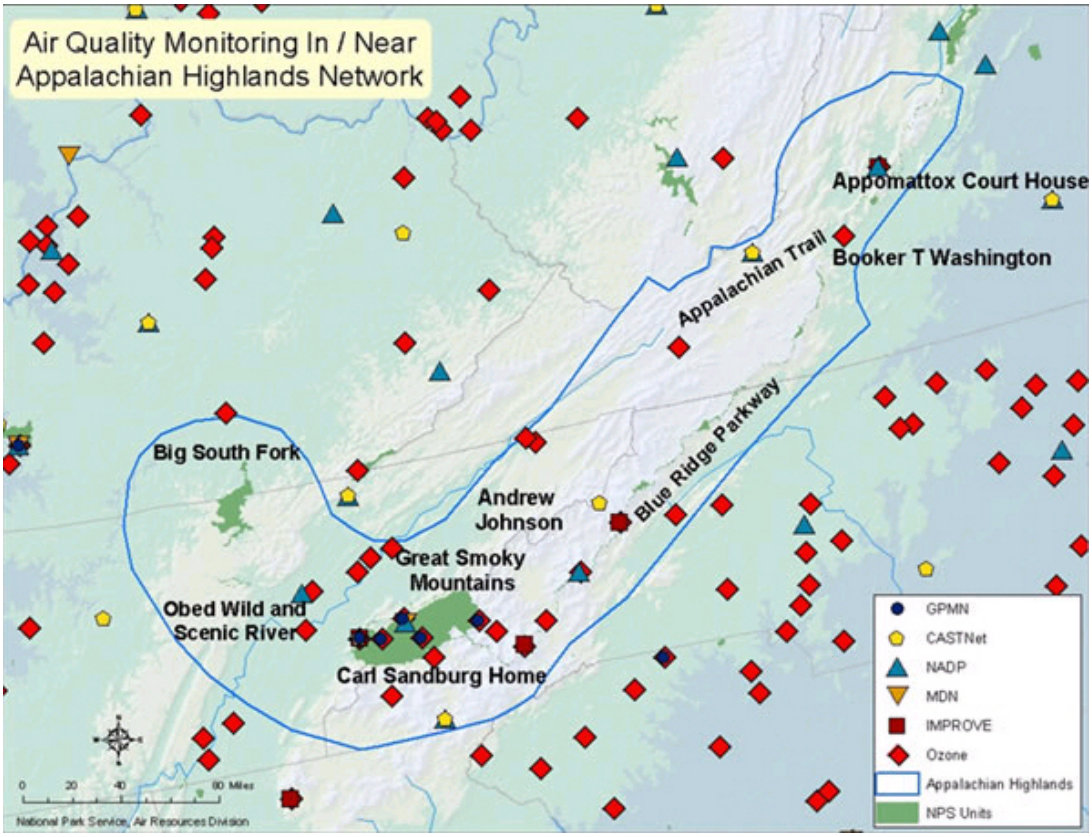
Management Applications

Air pollution affects ecological health, scenic views, human health, and visitor enjoyment, even at relatively low levels. Consistent long-term monitoring of key parameters is essential for determining if the parks are meeting their goals of maintaining stable or improving air quality, and for identifying areas of particular concern that may require further action of additional research.

Contact Information

Robert Emmott
Appalachian Highlands I&M Network
67 Ranger Drive
Asheville, NC 28805
Robert_Emmott@nps.gov

Ellen Porter
NPS Air Resources Division
Denver, CO
Ellen_Porter@nps.gov



AIR QUALITY MONITORING IN AND NEAR APHN PARKS: Ozone, sulfur dioxide, dry deposition, and meteorology are collected by the Clean Air Status and Trends (CASTNet) and Gaseous Pollutant Monitoring (GPMN) networks. Ozone is also monitored with passive samplers and portable continuous analyzers. Wet Deposition is monitored through cooperation with National Atmospheric Deposition Program/National Trends Network (NADP/NTN). The Mercury Deposition Network (MDN), part of NADP, collects precipitation samples that are analyzed for mercury. Visibility is monitored as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE).