

Acadia National Park Air Resource Monitoring Program

Acadia's Air Resource Program is conducted in cooperation with the NPS Air Quality Division (AQD), Maine Department of Environmental Protection (MDEP) and the US Environmental Protection Agency. The AQD is responsible for providing supervision and technical expertise to the various servicewide air resources programs. Individual park areas such as Acadia are responsible for providing field operators for the individual monitoring programs; and assuring that data are collected in accordance with standardized procedures and protocols, and are submitted to AQD in a timely manner. In addition park units are responsible for establishing and maintaining contacts with state and local air resource agencies, and alerting AQD to local issues that have the potential to adversely effect a park's air quality related values. The program is designed to establish baseline conditions, determine changes and trends over time, and to provide the data necessary to make decisions regarding permits for new emission sources as well as changes to state and federal air quality regulations. Major components of Acadia's program:

A. Gaseous Pollutant Monitoring

1. Ozone

- continuous monitoring, Oct 1982 to present;
- cooperative effort with Maine Dept. Environmental Protection.
- Acadia exceeded National Ambient Air Quality Standard of .120 ppm in '83, '84, '87, '88, and '89. The highest recorded hourly average was .179 ppm in June 1988 (.202 ppm, MDEP monitor on IAH). Hancock county is currently in the process of being designated a Non-attainment Area under the Clean Air Act.
- ANP exceeded State Standard of .080 ppm, 33 days in 1988.
- most exceedence events occur May -Sept. under climatic conditions characterized by high pressure system to the east and winds from the southwest which stall polluted air masses over the area.
- It is important to distinguish between low level (Troposphere) and high level (Stratosphere) ozone. High level ozone is beneficial in protecting the earth from the harmful effects of solar radiation, and is destroyed by cfc's from aerosol sprays and refrigerants. Low level ozone formed from the by-products of various combustion processes is harmful to human health, plants and other resources.

2. Sulfur Dioxide

- continuous monitoring, initiated by NPS in May 1988, to present.
- objective is to establish SO₂ baseline for ANP.

- preliminary data indicate very low SO₂ levels, less than .015 ppm, NAAQS = .140 ppm. This means that the SO₂ levels should remain low because the Class I status of ANP allows for very small increments above the baseline.

B. Visibility Monitoring, Acadia National Park is a National IMPROVE (Interagency Monitoring for Protected Visual Environments) site, one of 36 nationwide. Only three IMPROVE sites are located in the eastern U.S., including Shennandoah N.P., Virginia; and Great Smokies N.P., Tennessee.

1. Particulate Monitoring, four sample filters sample particles in the 2.5 and 10 micron range, the size most effective in scattering and absorbing light in the wavelength perceived by humans. Filters are analyzed for:

- 2.5 um Mass, elemental analysis (H, Na - pb)
- ammonium nitrate and ammonium sulfate
- organic and elemental carbon
- 10 um Mass

These analyses can be used to differentiate between biogenic and anthropogenic pollution sources and, with climatology data and modeling, source locations.

2. Transmissometer monitoring, measures light transmission properties of the atmosphere. The Transmissometer employs a computerized receiver unit that measures the loss in light received from a light source of known intensity, as the light beam travels a known distance. Data can be reduced to yield atmospheric extinction (point at which light cannot be seen due to fog, clouds, smoke, or air pollution); or standard visual range (distance one can see an object through the atmosphere). Transmissometer monitoring was initiated at Acadia in the fall 1987. Currently 17 sites nationwide use this technology.

3. 35mm Camera monitoring, qualitatively documents visual impairment of a specific vista under ambient air quality conditions. Acadia's camera is located on Cadillac Mountain and documents the view toward Blue Hill, Me., three times daily at 0900, 1200, 1500 hours.

C. Acid Precipitation Monitoring

Acadia in cooperation with MDEP is one of more than 200 sites nationwide who participate in the National Atmospheric Deposition Program (NADP). NADP is a long-term program designed to determine the chemical composition of atmospheric precipitation as well as the spatial and temporal trends of deposition. The Acadia/MDEP site has been in operation since 1980. MDEP provides monitoring equipment and Acadia is responsible for site operation and field chemistry. Acidity levels have an average pH of

approximately 4.5, with a range of 3.2 to 5.6 or higher (normal rainfall). Fog tends to be more acidic than snow or rainfall. A 1985 study by the University of Maine assessed water quality on Acadia's ponds and streams and found with few exceptions pH values to be non-acidic. However, alkalinities were low indicating buffering capacity may be diminishing. Additional study is ongoing.

D. Biological effects

Several studies have been conducted in recent years to assess the impact of air pollution on vegetation in Acadia NP. Although research has shown that ozone causes visible injury to white pines and other tree species e.g. chlorotic mottle and needle necrosis, scientists are uncertain what impact this has to specific individual plants or to populations. Complicating matters is the fact that other stresses e.g. acid precipitation, fungi, drought, nutrient deficiencies can cause similar symptoms. There is also evidence to suggest that there may be some loss in genetic diversity as some populations appear to be less sensitive to higher levels of pollution than others. A six year study is currently underway to better assess the impacts of ozone pollution on vegetation in Acadia NP. This study has four major objectives:

1. Response of a variety of plants to known doses of ozone under controlled conditions. Potted seedling and grafted plants will be placed in open top fumigation chambers and exposed to ambient ozone levels, ambient plus 50%, ambient plus 100%, and filtered air. Plants will be examined for visible injury, growth effects, and physiological effects.
2. Spectral reflectance. An attempt will be made to spectrally identify changes in plants due to ozone injury in the hope that large scale assessment of injury can be measured. This is pioneering research in that it has only been successful in clearly declining forest conditions with high mortality rates.
3. Long term monitoring plots will be established to look at ecological changes over time.
4. Assessment of genetic diversity within selected species, correlate ozone sensitivity with genetic diversity of these species.

E. Prevention of Significant Deterioration Issues

Acadia NP is one of 48 areas nationwide that have been designated as a Class I area under the Clean Air Act (CAA), the highest level of protection under the act. Any new major emission source, such as a power plant, must prove as part of their permit application that the proposed facility will not exceed the Class I increment levels of the CAA, or adversely effect air quality related values in a Class I area.

Applied Energy Services (AES) is proposing to build a 180 megawatt coal fired power plant in Bucksport, Maine. AES will have to demonstrate that the emission levels from their proposed

plant will not adversely effect Acadia NP resources including visibility.

The state of Maine has the authority to grant or deny the permit. The EPA has review authority and can override or reverse the state's decision.

The AQD will thoroughly review the AES permit application and provide technical comments and a recommendation which will be submitted to the state through the Regional Director.

NPS concern is limited those effects that have the potential to adversely impact park resources. With the AES proposal in Bucksport, the only effects that are of concern are air emissions related. Issues such as noise levels, thermal pollution to the Penobscot river, the need for additional energy, and economic concerns are not relevant to Acadia NP.