

Air Quality in the National Parks - Executive Summary

Visitors to national parks expect clean, clear air. They cherish the natural resources and majestic vistas associated with parks. Monitoring conducted in national parks over the past 20 years documents that, in most parks, air quality is better than standards set by the Environmental Protection Agency (EPA) to protect public health and welfare. In addition, air quality is improving or remaining stable in about half the parks where monitoring occurs. Some parks occasionally experience essentially pristine air quality conditions unaffected by air pollution. Unfortunately, air quality in national parks is not always as pristine as people may think nor are park natural resources free of noticeable impacts.

Many park resources are affected by air pollution. Some of the air pollutants affecting parks are emitted directly from sources such as industrial facilities and automobiles (primary pollutants) and some are formed as a result of chemical reactions in the atmosphere (secondary pollutants). The National Park Service air quality monitoring program acquires information about air pollutants that can impair visibility, harm human health, injure various species of trees and other plants, acidify streams and lakes, leach nutrients from soils, and erode buildings and monuments. The monitoring program focuses on visibility, acidic precipitation, and gaseous pollutant concentrations.

Among the experiences that visitors to national parks treasure is the breathtaking scenery – majestic mountains contrasted against a pure blue sky or the form, color, and texture of unique landscapes and geologic features. Spectacular scenic views need to be seen to be appreciated. In 1977, Congress specifically recognized this by establishing a national goal of remedying any existing and preventing any future human-caused visibility impairment in most of our largest national parks. Unfortunately, air pollution currently impairs visibility to some degree in every national park.

- The best visibility occurs in Denali National Park in Alaska and in an area centered around Great Basin National Park, Nevada.
- The worst visibility occurs in eastern parks such as Mammoth Cave, Shenandoah and Great Smoky Mountains National Parks.
- Years of visibility monitoring show that seasonal differences in visibility conditions exist in parks. For most areas of the country, visibility tends to be best during the winter months and worst during the summer.
- Sulfate particles formed from sulfur dioxide emissions associated with fossil fuel combustion - mostly for electric generation - account for 60% to 85% of the visibility impairment observed in eastern parks. In contrast, sulfates account for between 30% to 40% of visibility impairment in the western U.S.

Atmospheric deposition is the process by which airborne particles and gases are deposited to the earth's surface either through precipitation or as a result of atmospheric processes, such as settling. Acid deposition changes water and soil chemistry, which in turn, affects algae, aquatic invertebrates and soil microorganisms, and can lead to impacts higher on the food chain.

- High elevation ecosystems in the Rocky Mountains, Cascades, Sierra Nevada, southern California, and the upland areas of the eastern U.S. are generally the most sensitive to atmospheric deposition due to their poor ability to neutralize acid deposition.
- Streams in both Shenandoah and Great Smoky Mountains National Parks are experiencing chronic and episodic acidification and brook trout fisheries in Shenandoah have been affected.
- Rocky Mountain National Park is currently undergoing subtle changes in aquatic and

- terrestrial ecosystems attributable to atmospheric deposition.
- Other sensitive areas include the upper Midwest, New England, and Florida, including shallow bays and estuaries along the Atlantic and Gulf Coasts.

Ground-level ozone, produced by the reaction of nitrogen oxides and volatile organic compounds in the presence of sunlight, is one of the most widespread pollutants affecting vegetation and public health throughout the world. Plants are generally more sensitive to ozone than humans. Effects range from visible injury on leaves and needles to premature leaf loss, reduced photosynthesis, and reduced growth in sensitive plants species.

- Most parks where ozone is monitored experience ozone levels high enough to cause foliar injury.
- Field surveys have documented injury in Shenandoah, Great Smoky Mountains, Sequoia, Kings Canyon, Yosemite and Lassen Volcanic National Parks.
- NPS has found that, in general, higher ozone exposure levels occur at high elevation sites and, therefore, high elevation vegetation is possibly more at risk to injury.
- In some parks in the Southeast, Northeast and California, ozone concentrations have exceeded standards set by EPA to protect human health. Concern for the health and safety of visitors and employees has led to an ozone advisory system in several parks where levels are likely to approach or exceed the ozone standard.
- Parks in the Pacific Northwest and Intermountain West experience lower levels of ozone pollution than parks in other regions of the country, but an increasing ozone trend is evident in the Colorado Plateau and Rocky Mountains regions.

Under the Clean Air Act, park managers have an affirmative responsibility to protect “air quality related values (including visibility)” from the adverse effects of air pollution. This responsibility is carried out by communicating information about air quality conditions in parks to the public; providing advice and technical assistance to state, federal, and tribal regulatory agencies; working cooperatively through partnerships with a variety of stakeholders in the development of air pollution control strategies; and promoting pollution prevention practices in parks. The information, expertise, and management concerns that the National Park Service brings to various decision-making arenas have made a difference, but restoring clean air to parks will require concerted, continuing efforts.