



Visibility at Saguaro National Park

Importance

Both the Clean Air Act and the National Park Service (NPS) Organic Act protect air resources in national parks. Saguaro National Park is designated as a Class I area, receiving the highest protection under the Clean Air Act. Understanding changes in air quality can aid in interpreting changes in other monitored vital signs and support evaluation of compliance with legislative and reporting requirements. At Saguaro NP, the Sonoran Desert Network has identified ozone and visibility as high-priority vital signs for monitoring.

Long-term Monitoring

For Saguaro National Park, the Sonoran Desert Network (SODN) acquires, analyzes, and reports on air quality data from the web-based program archives of the National Park Service–Air Resources Division (NPS-ARD) Gaseous Pollutant Monitoring Program (ozone) and the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program (visibility). Because the NPS-ARD has determined that particulate (visibility) monitors within 100 km (60 miles) may be reasonably considered representative of a park’s air quality, the IMPROVE monitors at Saguaro NP are also suitable for reporting on air quality at Coronado National Memorial and Tumacácori National Historical Park.

SODN air quality monitoring objectives at Saguaro NP are to:

1. Determine the seasonal and annual status and trends in ozone concentration; and
2. Determine the seasonal and annual status and trends in concentrations of visibility-reducing pollutants.

Management Applications

Information gathered from this protocol will:

- Support evaluation of compliance with legislative requirements of the Clean Air Act, regional haze guidelines, National Environmental Policy Act, and the Government Performance and Results Act (GPRA); and
- Facilitate interpretation of other SODN vital signs, such as vegetation and water-quality measurements.

Park Overview

Both local and distant air pollution sources affect air quality in Saguaro NP. The air quality related values (AQRVs) of Saguaro NP are those resources that are potentially sensitive to



Airshed, Saguaro National Park.

NPS/A. WONDRAK/BIEL

air pollution, and include vegetation, wildlife, water quality, soils, and visibility. At present, visibility has been identified as the most sensitive AQRV in the park; other AQRVs may also be very sensitive, but have not been sufficiently studied. Although visibility in the park is still superior to that in many parts of the country, visibility in the park is often impaired by light-scattering pollutants (haze).

Visibility

Overview

Visibility includes not only how far we can see, but how well we can see. Visibility is often expressed in terms of light extinction measured in deciviews (dv). Small pollutant particles in the air scatter and absorb light, causing haze and reducing visibility. As light extinction increases, visibility decreases.

Saguaro National Park was designated a Class I air quality area in 1977. Visibility in Class I air quality areas has been granted special protection under the Clean Air Act through state air-quality permits and regional haze regulations. The “regional haze” regulations require states to establish goals for each Class I area to improve visibility on the haziest 20% of days and ensure that no degradation occurs on the clearest 20% of days. A goal of regional haze regulations is to achieve natural visibility conditions by 2064, although individual states may make the case for a different long-term goal. Visibility is monitored in parks and wilderness areas as part of the IMPROVE program, a cooperative effort that includes the U.S. Environmental

Protection Agency, U.S. Forest Service, NPS, U.S. Fish and Wildlife Service, Bureau of Land Management, National Oceanic and Atmospheric Administration, and several interstate air-quality management organizations. The State of Arizona is an associate member of IMPROVE, and funded the Saguardo West site (see below).

Monitoring results

Natural visibility condition is about 7 deciviews (dv). In 2008, the average light extinction for the 20% clearest days at Saguardo NP was 6.05 dv (Saguardo East) and 7.79 dv (Saguardo West). For the 20% haziest days, light extinction was 13.29 dv (Saguardo East) and 14.93 dv (Saguardo West) (Figure 1). Light-extinction showed no trend for the 20% clearest days or the 20% haziest days, based on three-year running averages from 1998 to 2007.

Visibility impairment results largely from small particles in the atmosphere. Figure 2 shows the contributions made by different classes of particles toward haze. The primary visibility-impairing pollutants were ammonium sulfate, ammonium nitrate, coarse mass, and organic carbon. Ammonium sulfate comes mainly from power plants and smelters. Motor vehicles are the primary source of ammonium nitrate in the atmosphere. Coarse mass consists of wind-blown dust, while organic carbon comes primarily from combustion of fossil fuels and vegetation.

Because visibility for Saguardo NP, Coronado NMem, and Tumacacori NHP has been improving on clear days, and visibility on the haziest days has shown no degrading trends, these parks are currently meeting their 2008 GPRA goals for visibility, which is rated as moderate with a stable trend.

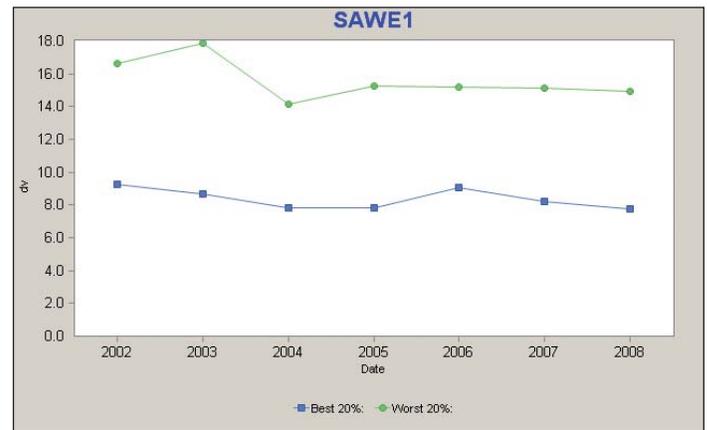
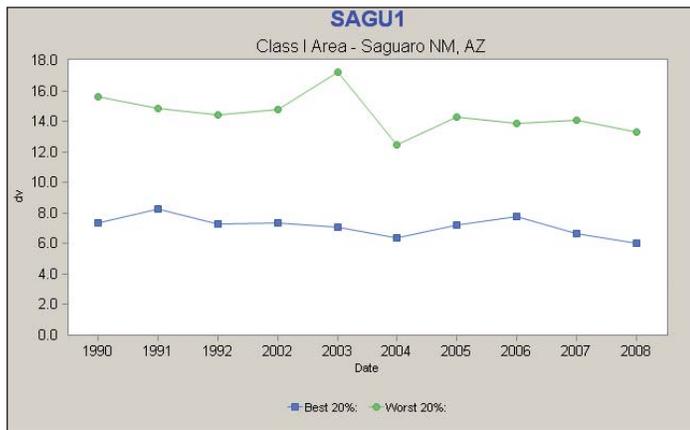


Figure 1. Trends in aerosol light extinction on the 20% best (clearest) days and 20% worst (haziest) days at Saguardo National Park East (left) and West (right), 2002–2008.

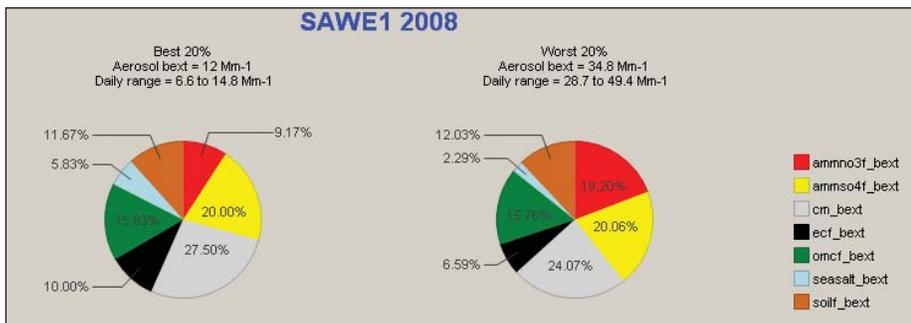
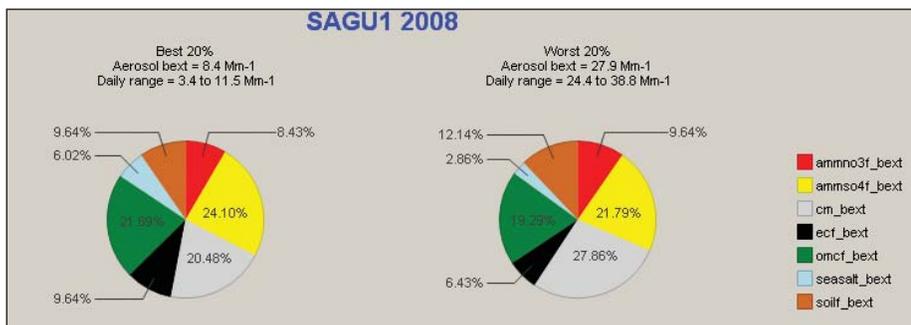


Figure 2. Composition of fine particles at Saguardo National Park East (top) and West (bottom), 2008.



For more information

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