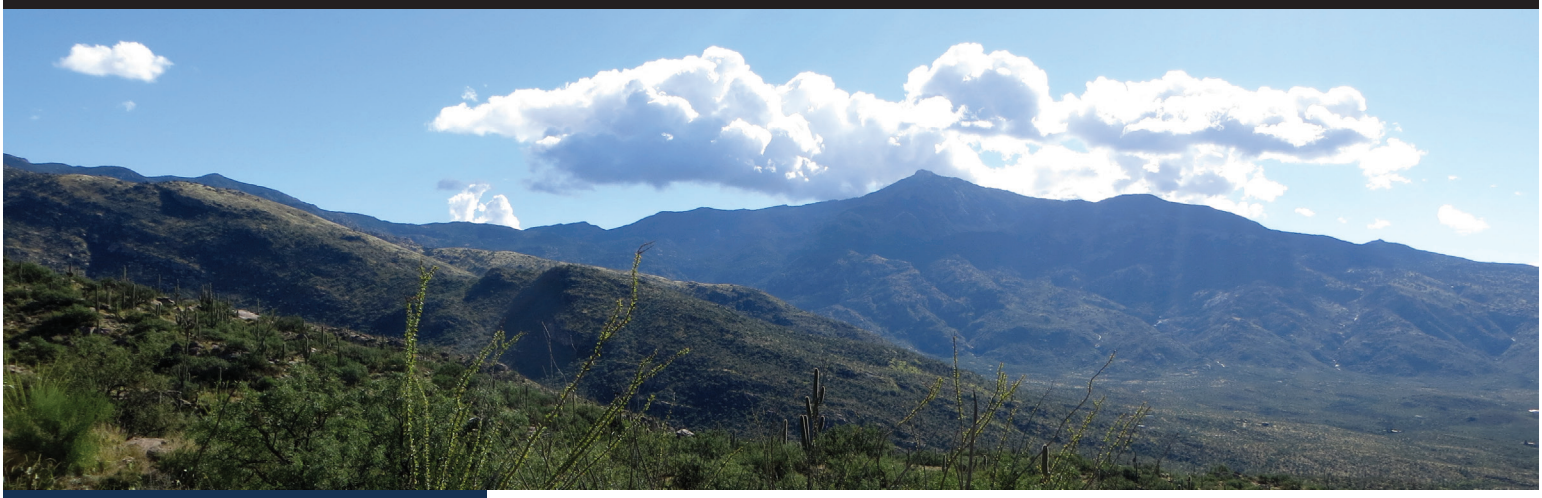


Air Quality Monitoring

in the Sonoran Desert Network

Changes in air quality can affect many park resources, including vegetation, water, soils, fish, wildlife, and viewshed—as well as human health.

PHOTOS

FROM TOP: RINCON MOUNTAIN DISTRICT, SAGUARO NATIONAL PARK (NPS/A.W. BIEL); FIRE ON THE GILA NATIONAL FOREST, 2012 (U.S. FOREST SERVICE/K. GREER); SUNSET AT ORGAN PIPE CACTUS NATIONAL MONUMENT (NPS/A.W. BIEL)

Why Monitor Air Quality?

Park resources affected by air quality include scenic views, night skies, vegetation, water, and wildlife. Understanding changes in air quality can help us to interpret changes in other monitored vital signs and help park managers to evaluate compliance with legislative requirements. Both the Clean Air Act and the National Park Service Organic Act protect air resources in national parks. Two Sonoran Desert Network (SODN) parks, Chiricahua National Monument (NM) and Saguaro National Park (NP), are designated as Class I areas under the Clean Air Act, providing special protection for air quality; sensitive ecosystems; and clean, clear views in these areas.

What's the Most Recent News?

In the past, SODN compiled information from the National Park Service's Air Resources Division (ARD) and the websites of several cooperating programs to produce an air-quality monitoring report for network parks. However, recent improvements to the ARD website have made it easier than ever for park managers to access air-quality information (see page 2). The website centralizes much of the information that the network used to assemble for reporting purposes.

Park-specific data (and often, graphics) on condition and trends for the air-quality indicators of ozone, visibility, and deposition are available at the website, along with a wide variety of other information. Given the ease with which park managers can now access this material, SODN plans to suspend its regular reporting on air quality, except in special circumstances.

How is the Information Used?

The overarching goal of SODN air-quality monitoring is to apply air-quality data in a way that helps us to understand the reasons for trends seen in other network vital signs. Park staff should also be able to use the ARD website to answer many resource-related questions.

Where is Air Quality Monitored?

In the Sonoran Desert Network, air quality is actively monitored at Chiricahua NM, Organ Pipe Cactus NM, Saguaro NP, and Tonto NM. However, the ARD website interpolates more distant data to provide information on air-quality condition and trends for all network park units.

How is the Monitoring Done?

Over the past three decades, the NPS has developed a comprehensive air-quality monitoring program through participation in cooperative national monitoring networks. These include the Interagency Monitoring of Protected Visual Environments (visibility), the Gaseous Pollutants Monitoring Network (ozone), the Clean Air Status and Trends Network (ozone/deposition), the National Atmospheric Deposition Program (deposition), and the U.S. Environmental Protection Agency's Air Quality System.

How Can I Learn More?

Visit http://www.nature.nps.gov/air/index.cfm, or contact andy_hubbard@nps.gov.

Casa Grande Ruins NM • Chiricahua NM • Coronado NMem • Fort Bowie NHS • Gila Cliff Dwellings NM • Montezuma Castle NM • Organ Pipe Cactus NM • Saguaro NP • Tonto NM • Tumacácori NHP • Tuzigoot NM

What's in the Air?

The NPS Air Resources Division Can Provide Clear Answers

At the website of the National Park Service (NPS) Air Resources Division (ARD), any user can find information on air quality for more than 350 NPS units. At a minimum, this consists of a summary table showing current conditions based on the latest and best available data.

Saguaro NP - Air Quality

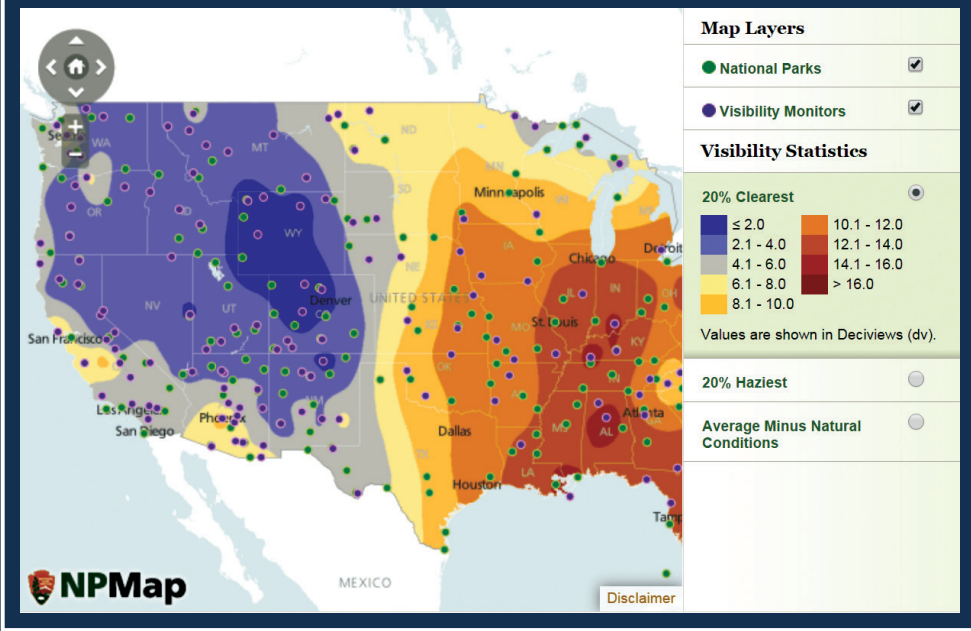
This table summarizes conditions and trends for ozone, visibility, nitrogen, and sulfur. Monitoring data and risk assessments are used to identify the air quality condition status in each category as good, or of moderate or significant concern. Trends are calculated from data collected over a ten-year period at on-site or representative nearby monitors where available. more >>

Summary Table

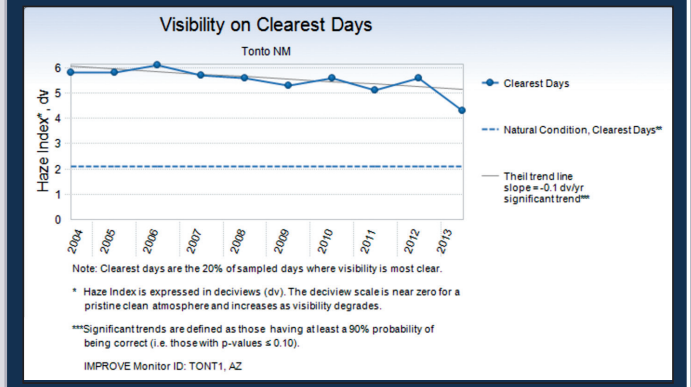
2013 Air Quality Summary

Air Quality Indicator	Specific Measure	Condition Status/Trend*	Rationale
Ozone	Human Health: Annual 4th-highest 8hr concentration		**Condition:** Human health risk from ground-level ozone warrants moderate concern at Saguaro NP. This status is based on NPS Air Resources Division benchmarks and the 2009–2013 estimated ozone of 70.9 parts per billion (ppb). **Trend:** For 2004–2013, the trend in ozone concentration at Saguaro NP remained relatively unchanged (no statistically significant trend) (AQS Monitor ID: 040190021, AZ). **Confidence:** The degree of confidence at Saguaro NP is high because there is an on-site or nearby ozone monitor.
	Vegetation Health: 3-month maximum 12hr W126		**Condition:** Vegetation health risk from ground-level ozone warrants significant concern at Saguaro NP. This status is based on NPS Air Resources Division benchmarks and the 2009–2013 estimated W126 metric of 14.7 parts per million-hours (ppm-hrs). The W126 metric relates plant response to ozone exposure. A risk assessment concluded that plants in at Saguaro NP were at low risk for ozone damage (Kohut 2007; Kohut 2004). See list of ozone-sensitive plant species. **Trend:** For 2004–2013, the trend in the W126 metric at Saguaro NP remained relatively unchanged (no statistically significant trend) (AQS Monitor ID: 040190021, AZ). **Confidence:** The degree of confidence at Saguaro NP is high because there is an on-site or nearby ozone monitor.
Visibility	Haze Index§		**Condition:** Visibility warrants moderate concern at Saguaro NP. This status is based on NPS Air Resources Division benchmarks and the 2009–2013 estimated visibility on mid-range days of 6.9 deciviews (dv) above estimated natural conditions." **Trend:** For 2004–2013, the trend in visibility at Saguaro NP improved on the 20% clearest days and improved on the 20% haziest days (IMPROVE Monitor ID: SAGU1, AZ). The Clean Air Act visibility goal requires visibility improvement on the 20% haziest days, with no degradation on the 20% clearest days. **Confidence:** The degree of confidence at Saguaro NP is high because there is an on-site or nearby visibility monitor.
Nitrogen	Wet Deposition		**Condition:** Wet nitrogen deposition warrants significant concern at Saguaro NP. This status is based on NPS Air Resources Division benchmarks and the 2009–2013 estimated wet nitrogen deposition of 3.6 kilograms per hectare per year (kg/ha/yr). Ecosystems in the park were rated as having very high sensitivity to nutrient-enrichment effects relative to all Inventory & Monitoring parks (Sullivan et al. 2011c; Sullivan et al. 2011d). Nitrogen deposition may disrupt soil nutrient cycling and affect biodiversity of some plant communities, including arid and semi-arid and grassland. **Trend:** No trend information is available because there are not sufficient on-site or nearby deposition monitoring data. **Confidence:** The degree of confidence at Saguaro NP is medium because estimates are based on interpolated data from more distant deposition monitors.
Sulfur	Wet Deposition		**Condition:** Wet sulfur deposition warrants moderate concern at Saguaro NP. This status is based on NPS Air Resources Division benchmarks and the 2009–2013 estimated wet sulfur deposition of 1.6 kilograms per hectare per year (kg/ha/yr). Ecosystems in the park were rated as having high sensitivity to acidification effects relative to all Inventory & Monitoring parks (Sullivan et al. 2011a; Sullivan et al. 2011b). Acidification effects can include changes in water and soil chemistry that impact ecosystem health. **Trend:** No trend information is available because there are not sufficient on-site or nearby deposition monitoring data. **Confidence:** The degree of confidence at Saguaro NP is medium because estimates are based on interpolated data from more distant deposition monitors.

The ARD Air Atlas provides national maps of ozone, visibility, and deposition condition. Users can zoom in on areas of interest. Live data show current air-quality conditions at more than 30 parks, including Chiricahua National Monument.

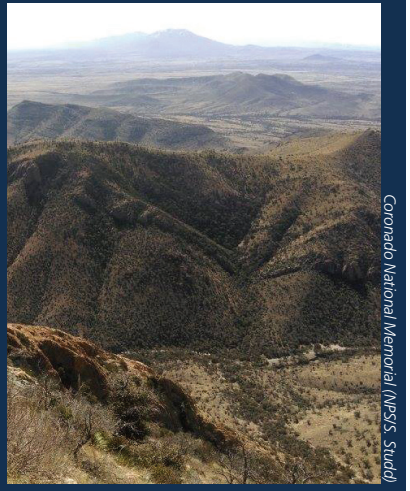


For many parks, far more information is available—including graphs showing 10-year and long-term trends in ozone, visibility, and deposition. In the past, users had to go to the websites of the programs that collect the air-quality data to obtain these charts. It is now possible to get them directly from ARD.



The website also hosts many other resources—from interactive simulations of various haze levels to conceptual diagrams of the nitrogen cycle to general information about air pollution and the laws and policies that address it. Links to studies and publications are also available.

The wealth of information provided by the site, and its user-friendly interface, make it easy for park managers and members of the public to find the answers they need about air quality in the national parks. Questions that can't be answered at the website may be directed to the Sonoran Desert Network or the NPS Air Resources Division.



Coronado National Memorial (NPS S. Studd)