

Air Quality Monitoring in the Sonoran Desert, Southern Plains, and Chihuahuan Desert Networks

PROTOCOL SUMMARY

Importance

Both the Clean Air Act and the National Park Service (NPS) Organic Act protect air resources in national parks. Park resources affected by air quality include scenery and vistas, vegetation, water, and wildlife. Many parks are designated as Class I areas, receiving the highest protection under the Clean Air Act. Over the past three decades, the National Park Service has developed several internal and cooperative programs for monitoring various measures of air quality.

Three main components comprise the NPS air quality monitoring program: atmospheric wet and dry deposition, ozone, and visibility. To obtain information on air quality, network staff will download data products made available by the various agencies and partners that conduct the actual monitoring (see Table 1). Reporting will summarize the information contained in those data products for specific parks and parameters. Understanding changes in air quality can aid in interpreting changes in other monitored “vital signs” (i.e., ecological indicators) and support evaluation of compliance with legislative and reporting requirements.

Monitoring Questions

Because air quality data collected in national park units are summarized and analyzed for conditions and trends by both the NPS-Air Resources Division (NPS-ARD) and the national programs that conduct the monitoring, it is not the networks’ objective to replicate these analyses. Instead, the objectives are to compile the data summaries performed by these groups and provide them in concise reports to be analyzed in conjunction with other vital signs. Air quality monitoring questions for the networks are:

- What are the conditions and spatial and temporal trends in nitrogen deposition, sulfur deposition, ozone, and visibility-reducing pollutants in network park units?



Tonto National Monument.

- How do ozone, nitrogen deposition, sulfur deposition, and visibility-reducing pollutants vary with associated vital signs (e.g., vegetation community composition, exotic plant status, climate)?

Methods

Field operations consist of weekly visits for inspection, routine maintenance, and sample collection by park staff, and semi-annual maintenance by program specialists. Air quality instruments are generally automated to ensure data consistency and minimize the workload of park staff. Specific details on the field methods used to collect air quality data can be found in the full version of the Southwest Network Collaboration air quality monitoring protocol.

Products, Scope and Schedule

Because the NPS-ARD and its cooperators do not operate on a coordinated reporting schedule for all parameters monitored in network parks, the networks will perform air quality reporting on a periodic, rather than regularly scheduled basis. The networks will produce park-based briefs based on the results and following the release of the NPS-ARD’s annual performance and progress reports (see <http://www.nature.nps.gov/air/who/npsPerfMeasures.cfm>). These briefs will be distributed through the Learning Center of the American Southwest (LCAS; www.southwestlearning.org).

Protocol Implementation

Table 1. Parks where air quality will be monitored.

Park	Parameter (Monitoring agency)			
	Wet deposition (NADP/NTN)	Dry deposition (CASTNet)	Ozone (NPS-GPMP)	Visibility (IMPROVE)
Parks with monitoring stations within their boundaries				
Chihuahuan Desert Network				
Big Bend NP	X	X	X	X
Guadalupe Mountains NP	X	-	-	X
Sonoran Desert Network				
Chiricahua NM	X	X	X	X
Gila Cliff Dwellings NM	X	-	-	X
Organ Pipe Cactus NM	X	-	-	X
Saguaro NP	-	-	X	X
Tonto NM	-	-	-	X
Southern Plains Network				
Capulin Volcano NM	X	-	-	-
Parks with monitoring stations close enough to be reasonably considered representative of the park				
Chihuahuan Desert Network				
Carlsbad Caverns NP	-	-	-	X
Sonoran Desert Network				
Fort Bowie NHS	X	X	X	X
Tumacácori NHP	-	-	-	X
Southern Plains Network				
Bent's Old Fort NHS	X	-	-	-
Fort Larned NHS	-	-	-	X
Pecos NHP	-	-	-	X
Washita Battlefield NHS	-	-	-	X

Data from the nearest possible monitoring stations will be used to monitor air quality parameters in Southern Plains Network parks.

NADP/NTN: National Atmospheric Deposition Program,
 CASTNet: Clean Air Status and Trends Network,
 NPS-GPMP: NPS Gaseous Pollutant Monitoring Program,
 IMPROVE: Interagency Monitoring of Protected Visual Environments

NHP = National Historical Park; NHS = National Historic Site;
 NM = National Monument; NMem = National Memorial;
 NP = National Park; NRA = National Recreation Area



Differences in visibility from Sugarloaf Mountain, Chiricahua National Monument, as captured by cameras installed at an IMPROVE monitoring site there from 1989 to 1995. Top photo represents #1 on a spectrum that measures regional haze; bottom photo represents #9.

Project Contact

Andy Hubbard, Sonoran Desert Network
 andy_hubbard@nps.gov, 520-429-8147