



# Natural Resource Monitoring at Natural Bridges National Monument



Sipapu Bridge.

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## The Northern Colorado Plateau Network

The Northern Colorado Plateau Network (NCPN) covers a geologically and biologically diverse region comprising 16 national parks in four western states. These parks contain desert grasslands, shrublands, forests, caves, large rivers, perennial streams, seeps, springs, and striking geology. Invasive plants, trampling and grazing by livestock, and adjacent land-use activities are some of the most significant threats to NCPN parks. The NCPN is designing and implementing a long-term monitoring program to measure key indicators of ecological integrity, or “vital signs.” Multiple monitoring efforts will help inform managers of the health of park resources and provide early detection of potential problems. This brief describes recent NCPN activities at Natural Bridges National Monument.

## Water Quality



Pool near Owachomo Bridge.

NPS/NM Moran

NCPN water-quality monitoring is made possible through partnerships between the I&M Program, individual park units, the U.S. Geological Survey, and the State of Utah's Division of Water Quality. In 2010, the network published its second biennial report on water quality in NCPN parks, covering the period from January 1, 2006 to December 31, 2009. Of 626 comparisons of results against beneficial use standards conducted at three sites in Natural

Bridges NM, 23 (3.5%) exceeded water quality standards or indications of impairment. Standards were exceeded for four constituent categories—most commonly, nutrients, dissolved oxygen, and metals. However, comparison of observations in light of natural variation and natural weathering processes will serve to improve understanding and protection of these water bodies.

## Riparian Systems



Taking pebble-count measurements.

Integrated riparian monitoring involves the collection of biological and physical measures, such as riparian vegetation, non-native species invasions, streamflow, alluvial groundwater dynamics, and changes in channel form. Credible, efficient monitoring approaches will help the NCPN to assess riparian-system health and provide early warning of system degradation.

In 2010, two reaches were established in Armstrong Canyon and sampled for vegetation. The proposed monitoring plan for Natural Bridges NM includes monitoring five reaches throughout the wash. In 2011, an additional reach was established; channel surveys will be initiated in late fall.

## Landbirds

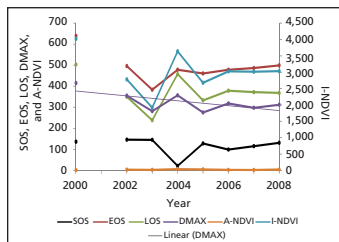


Bewick's wren (©Robert Shantz)

The NCPN is partnering with the Rocky Mountain Bird Observatory to assess breeding bird species trends in three habitats: riparian, pinyon-juniper, and sagebrush-shrubland. In 2010, the sixth year of monitoring was completed, including two plots in low-elevation riparian habitat and one plot in pinyon-juniper woodland at Natural Bridges NM, continuing the riparian bird monitoring conducted by park staff during 1993–2004. The first trend analyses were conducted this year. Although popula-

tions for most species of conservation concern within the NCPN appeared to be stable, Bewick's wren, in pinyon-juniper habitat, and black-billed magpie, in sage-shrubland habitat, appeared to be experiencing significant declines. In addition, the 2010 density estimate for Bewick's wren in low-elevation riparian habitat was the lowest estimated for the six years of the program. Long-term monitoring will continue to be necessary for interpreting population status and trends for avian species of the NCPN.

## Land Condition



Annual phenology metrics, Natural Bridges NM, 2000–2009.

The NCPN and U.S. Geological Survey have developed remote-sensing methods to improve understanding of how broad-scale vegetation condition responds to short-term weather events, long-term climate trends, land use, and geographic position. The satellite-derived Normalized Difference Vegetation Index (NDVI) and snow-cover imagery, available bi-weekly, are used to measure vegetation greenness and snow-covered area through time. In 2011, the NCPN published its first status and trends re-

port on remote sensing of vegetation phenology and snow-cover extent in NCPN parks, covering the years 2000–2009. For those years, the analysis showed one pattern for Natural Bridges NM, where the day of peak greenness (DMAX; black line in chart) was occurring earlier in the year. This pattern should be considered with caution because it is based on a short, 10-year record with one year of missing data. The full report is posted on the network's web site.

## Springs and Seeps



Springs monitoring.

The primary goal for long-term monitoring of springs, seeps, and hanging gardens is to assess trends in key indicators of spring and seep ecosystem health. In 2011, the NCPN published an inventory report on rare-plant populations at hanging gardens in Arches NP and Natural Bridges NM. Results from this inventory are being used for site selection during long-term monitoring. In 2009, the NCPN completed data collection for a two-year study investigating the effects of anthropogenic disturbance on aquatic macroinvertebrate communities

and habitat quality across 40 impacted springs, including 3 springs at Natural Bridges NM. Data suggest that springs are resilient to—and perhaps even adapted to—moderate levels of disturbance, but there is a threshold beyond which negative impacts begin to accrue. Southeast Utah Group (SEUG) staff has reviewed the draft springs monitoring protocol, and site selection is currently underway. A subset of spring-sampling data collected for SEUG water quality monitoring will be incorporated into NCPN springs monitoring.

## Air Quality



Park airshed.

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. The NCPN acquires and analyzes air quality data from existing stations in and near NCPN parks. The network's second air quality report

was produced in 2010. For Natural Bridges NM, the report focused on visibility monitoring, as determined from data obtained at nearby Canyonlands NP. Visibility was estimated to be in moderate condition at the park, and has been improving on clear days. The park is currently meeting its 2009 GPRA goal for visibility.

## For more information

Northern Colorado Plateau Inventory & Monitoring Program  
National Park Service  
P.O. Box 848  
Moab, UT 84532  
435-719-2346  
<http://science.nature.nps.gov/im/units/ncpn/>

