



Natural Resource Monitoring at Natural Bridges National Monument

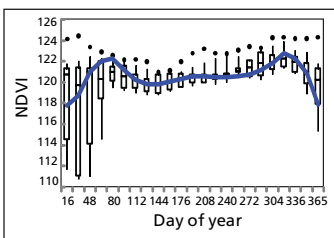


Natural Bridges National Monument (NPS)

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.

Land Condition



Normalized Difference Vegetation Index values for Natural Bridges NM in 2009, plotted with historical ranges.

The NCPN and U.S. Geological Survey have developed remote-sensing methods to study how broad-scale vegetation condition responds to short-term weather patterns, long-term climate trends, land use, and geographic position. Understanding vegetation response enhances knowledge of the biological ecosystems and physical processes affected by vegetation productivity and distribution. The Normalized Difference Vegetation Index (NDVI)

is a measure of vegetation greenness, or productivity, derived from satellite imagery. The timing of green-up in 2009 was consistent with the 9-year average, but showed slightly higher early-season peak greenness. The 2009 curve was generally below average during most of the growing season, before catching up to near-average conditions late in the monsoon season. After that, brown-down was considerably more rapid than in previous years.

Springs and Seeps



Hanging garden (NPS)

In 2009, the NCPN completed data collection for a two-year study investigating the effects of anthropogenic disturbance on aquatic macro-invertebrate communities and habitat quality across a range of 45 impacted springs, including 3 springs at Natural Bridges NM. The information from these studies will serve as the basis for selecting future core monitoring parameters and provide metrics for interpreting

springs and seeps data. Also in 2009, the NCPN initiated an inventory of rare-plant populations at 25 hanging gardens in Natural Bridges NM. Monitoring protocols for springs are scheduled to be developed in FY 2010 and implemented in FY 2011. Protocols for monitoring rare plant populations at hanging gardens will be developed and tested in FY 2010.

Landbirds



Black phoebe (©Greg Lavaty)

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 2009, the fifth 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. We currently estimate that we will be able to detect a population

change of at least 3% within 30 years for 55 species, representing more than 90% of all individual birds observed thus far. To date, only one species is showing a consistent annual decline in NCPN parks: mourning dove, in low-elevation riparian areas. Three species have shown consistent annual increases: black phoebe and black-throated sparrow, both in low-elevation riparian habitat, and dusky flycatcher, in sage-shrubland. This trend information is preliminary.

Water Quality



Owachomo Bridge Spring (NPS)

At Natural Bridges NM, the NCPN is cooperating with park staff to collect water quality monitoring data used to assess condition and trends relative to the Clean Water Act, human health, and ecological function. Since 2006, available data have shown occasional exceedances or indications of impairment for metals, nutrients, and dissolved oxygen at Sipapu Bridge Spring, Owachomo Bridge Spring, and Armstrong Canyon Creek. All three sites had

periodic indications of impairment due to elevated phosphorus concentrations, which appear to be natural in origin. Elevated aluminum concentrations were occasionally observed at Owachomo Bridge Spring and Sipapu Bridge Spring. Low-flow conditions and groundwater recharge sources commonly cause low dissolved oxygen concentrations in park streams. These conditions are natural in origin, and do not warrant concern.

Air Quality



Sipapu Bridge (NPS)

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 NCPN parks. The network's first air quality report was produced in 2009. For Natural Bridges NM, the report focused on visibility monitoring. Based on inter-

polated data from the nearby Canyonlands NP monitoring site, visibility was rated as moderate at Natural Bridges NM. Park visibility is often impaired by light-scattering pollutants (haze), but has been improving on clear days. Visibility has shown no trends on the haziest days. Natural Bridges NM is currently meeting its 2008 GPRA goal for visibility.

Riparian Systems



Upper White Canyon (NPS)

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 degrada-

tion. In 2009, NCPN staff consulted with NPS Southeast Utah Group personnel to develop a monitoring plan: two reaches per year will be monitored in Armstrong Canyon, for a total of five reaches over a five-year rotation. Two reaches will be sampled for vegetation and geomorphology beginning in 2010, with additional reaches planned for implementation in 2011.

Additional Efforts

The NCPN is continuing to expand ecological monitoring at Natural Bridges NM. A protocol for monitoring land cover/land use is underway and planned for future implementation.

The network also reports on climate monitoring for Natural Bridges NM, and the park's natural resource inventory needs list was updated in 2009.

For more information

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