



Natural Resource Monitoring at Arches National Park



Park Avenue/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 Arches National Park.

Flora Checklist



Sego lily.

Sheri Hagwood@USDA-NRCS PLANTS Database

In 2008, a revised checklist of the vascular flora of Arches NP was completed. This entailed a thorough review of existing literature, re-examination of specimens from the Arches NP herbarium and other state and national museum collections, and additional field work to corroborate unverified species reports and locate new species. Based on this study, 522 vascular plant taxa have been confirmed or reliably reported as occurring in the

park. Another 50 species formerly considered part of the park flora have now been shown to be falsely reported. Although no plant taxa are federally listed as threatened or endangered, at least 30 are considered species of concern by the state’s natural heritage program. Introduced plants make up 14.4% of the park flora (75 species), of which 6 species are considered noxious weeds by the State of Utah.

Water Quality



Lower Courthouse Wash/NPS

At Arches NP, the NCPN is cooperating with park staff to collect water quality data used to assess condition and trends relative to the Clean Water Act, human health, and ecological function. Salt Wash at Wolfe Ranch consistently exceeds standards for total dissolved

solids due to natural geologic sources. Observations from site visits also note consistent turbidity with very fine grey sediment. Recent data from visits to other sites in Arches NP do not indicate persistent water quality problems.

Landbirds



Juniper titmouse.
©Greg Lavaty

Birds play an important role in the flow of energy through ecosystems because they occupy various levels in the food web. Birds are also sensitive to habitat changes, which make them good indicators of habitat quality. The NCPN is partnering with the Rocky Mountain Bird Observatory (RMBO) to assess breeding bird species trends in three habitats: riparian, pinyon-juniper, and sagebrush-shrubland. The NCPN has monitored one plot in pinyon-juniper woodland and three in low-elevation riparian areas at Arches NP

since 2005, continuing the riparian bird monitoring conducted by park staff during 1993–2004. The NCPN and RMBO will produce the first trend estimates for individual bird species after the 2009 field season, the fifth year of NCPN landbird monitoring. The goal is to be able to detect a population change of at least 3% within 30 years. We currently estimate that we will be able to do this for 52 species, representing more than 90% of all individual birds observed during 2005–2007.

Climate



Snow at Delicate Arch/NPS

The overarching goal of NCPN climate monitoring is to compile and present climate data in a form that helps us to understand the reasons for trends seen in other network vital signs. The NCPN compiles and analyzes climate data from one weather station in Arches NP, which is one of eight NCPN parks that have shown an increase in average maximum annual temperature over the past 28 years

or more. In 2007, maximum and minimum temperatures were generally above average, and snowfall below average, at climate stations across the network. Arches NP climate data for the years 1980–2007 are available in an interactive, graphical format on the NCPN web page. A climate report, produced by the NCPN in 2008, is also available on the network's web page.

Springs and Seeps

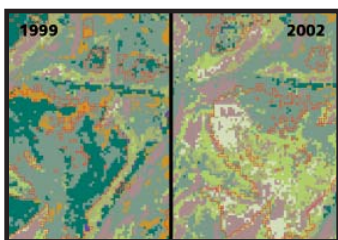


Sleepy Hollow Spring/NPS

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 2008, the NCPN completed the first half of a two-year study investigating the effects of anthropogenic disturbance on aquatic macroinvertebrate communities and habitat quality across a range of impacted springs. The study is being conduct-

ed at more than 30 springs in 6 NCPN parks, including 4 springs at Arches NP. Information from these studies will serve as the basis for selecting future core monitoring parameters and provide metrics for interpreting springs and seeps data. Protocols for monitoring rare plant populations at hanging gardens will be developed in FY 2009–2010.

Land Cover and Land Use



Example fire-effects map.
USDA Forest Service

The composition, configuration, and connectivity of land-cover types determine habitat availability, energy and material flows, and the movement of organisms on a landscape. Changes in landscape structure due to natural and human-caused disturbances can be detected by evaluating imagery representing conditions across many years. Custom algorithms are being refined to unambiguously separate long-term change from seasonal and

annual phenological changes due to variations in weather. These data will provide park managers with a baseline against which to assess future changes in landscape structure and composition; the ability to detect large-scale disturbances in remote areas; and information on land-use activities along park boundaries. A pilot report is expected in May 2009, with protocols and standard operating procedures to follow.

Additional Efforts

The NCPN is continuing to expand ecological monitoring at Arches NP. Protocols for monitoring land condition, upland systems,

and riparian communities are underway and planned for future implementation.

For more information

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