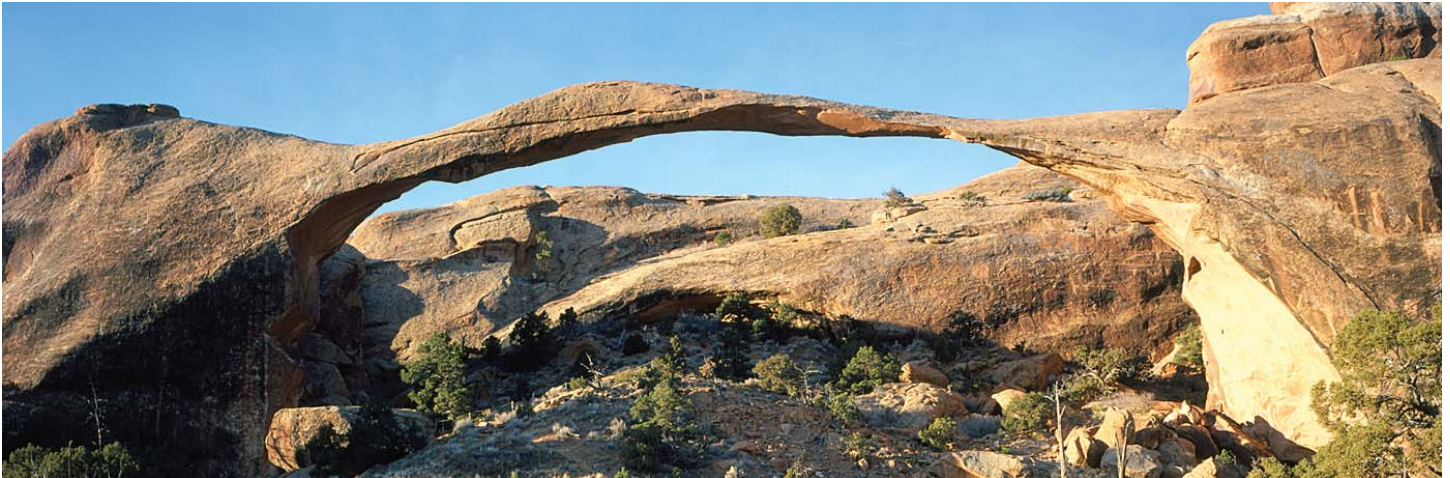




# Natural Resource Monitoring at Arches National Park



Landscape Arch/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.

## Landbirds



Gray vireo/RMBO

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. NCPN data will contribute to the RMBO's

broader, landscape-scale, breeding-bird monitoring program. 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 resource management staff from 1993 to 2004. The NCPN and RMBO will begin to look at trend data in 2009, after five years of data collection.

## Vegetation Mapping



Pinyon-juniper woodland/NPS

The NCPN is continuing work on a multi-year, multi-partner effort to map vegetation at Arches NP. This project has included gathering aerial photography, collecting initial vegetation-plot data, using the vegetation data to classify vegetation types and write vegetation descriptions, writing a dichotomous vegetation-type key, performing photo interpreta-

tion, collecting accuracy-assessment data, creating a geodatabase, and writing the final report. These maps will be a valuable resource for use in park management, natural resource monitoring, interpretive programs, park planning, prescribed fire, and as a baseline for designing ecological studies.

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## Uplands



Uplands/©A.W. Biel

Integrated upland monitoring includes measuring soil and site stability, hydrologic function, biotic integrity, and vegetation composition and structure. To determine the vegetative communities of interest in the monitoring effort, discussions with park staff will begin in 2008, followed by a three-year pilot study

designed to obtain an estimate of the variance in key parameters. The information gathered will be used to determine the number of plots necessary for long-term monitoring. Pilot sites will be selected in a manner that ensures they will be incorporated into data analysis in the future, full-scale monitoring program.

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## Water Quality



Water quality sonde/NPS

At Arches NP, 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. Monthly monitoring visits between January 2005 and January 2007 indicated that 4 of 7 sites sampled did not meet state standards for secondary contact and warm water game fish species. Low dis-

solved oxygen and high total phosphorus concentrations were the most common problems. Although these conditions often indicate eutrophication or deterioration in water quality, in Arches they may occur naturally due to low flow and warm temperatures in summer, and the presence of phosphorus-bearing minerals in the watersheds. A closer examination of conditions in the watershed is warranted.

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## Species Lists



Great Basin spadefoot toad/NPS

The NCPN has completed NPSpecies certification at Arches NP for six taxonomic categories—birds, mammals, reptiles, fish, amphibians, and vascular plants—and has posted the results on its website. An interactive application allows users to select a desired taxonomic category and an alphabetic sort function (i.e., by common name, scientific name, or family-scientific name). Additionally, users can search

by park, by status of the species in the park (e.g., present, historic, unconfirmed), and by individual species—allowing users to query, for example, does Arches NP have a verified report of a Great Basin spadefoot toad? The resulting species list can be downloaded into an Excel spreadsheet for use by the public, park staff, or park cooperators.

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## Climate



Snow at Delicate Arch/NPS

Climate plays a crucial role in regulating biological and physical processes; rainfall and temperature are the primary factors that limit an ecosystem's structure and function. The NCPN compiles and analyzes climate data from an existing weather station in Arches NP. Over the past 26 years, Arches NP has shown an increase in average annual maximum tem-

peratures. In 2006, Arches NP received 13 inches of precipitation and had average annual maximum and minimum temperatures of 72 and 42 degrees, respectively. Arches NP climate data is available for the years 1980–2006 in an interactive, graphical format on the NCPN webpage.

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## Future Projects

The NCPN is continuing to expand ecological monitoring at Arches NP. Protocols for monitoring aquatic macroinvertebrates; land condition; land cover and land use; integrated riparian communities; springs, seeps, and

hanging gardens; invasive exotic plants; and human demographics and development are underway and planned for future implementation.

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## For more information

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