



Natural Resource Monitoring at Canyonlands National Park



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Chesler Park, Needles District.

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 Canyonlands National Park.

Water Quality



NPS/M. Moran

Monitoring ice-covered Salt Creek.

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 2,225 comparisons of results against beneficial use standards con-

ducted at 15 sites in or near Canyonlands NP, 97 (3.7%) exceeded water quality standards or indications of impairment. Standards were exceeded for five constituent categories—most commonly, nutrients, dissolved oxygen, and *E. coli*. The *E. coli* exceedances were likely the result of large discharge events, which can cause episodic water-quality degradation.

Landbirds



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Bewick's wren.

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 pinyon-juniper woodland and three in low-elevation riparian areas at Canyonlands NP, continuing the riparian bird monitoring conducted by park staff during 1993–2004. The first trend analyses were conducted this year. Although popu-

lations 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.

Uplands



Uplands monitoring plot.

This protocol measures soil stability, hydrologic function, biological soil crusts, and plant community characteristics. Through discussions with park staff, grassland and blackbrush shrublands were selected for integrated upland monitoring in Canyonlands NP. Monitoring began in 2006, the first of a three-year pilot

study (2006–2008) to obtain an estimate of the variance in key parameters. The results of a power analysis performed on the three years of pilot data were used to create a full operational sampling design, implemented in 2009. In 2011, network staff completed the sixth year of monitoring at the park.

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 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 12 springs at Canyonlands NP. Data suggest that springs are resilient to—and perhaps even adapted to—moderate levels of dis-

turbance, 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. In 2011, the network will inventory hanging gardens at the Island in the Sky district, with a focus on rare plants.

Air Quality

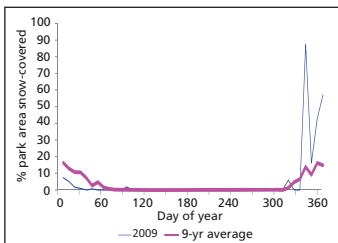


Park airshed.

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. Air quality monitoring at Canyonlands NP includes a full complement of wet and dry deposition, ozone, and visibil-

ity monitoring. Based on five-year averages, the park's levels of nitrogen and sulfur were estimated to be in good condition. Ozone conditions were moderate. Visibility, the most sensitive air quality-related value at the park, was estimated to be in moderate condition, and has been improving on clear days. The park is currently meeting its 2009 GPRA goals for deposition, ozone, and visibility.

Land Condition



Snow-cover extent, 2000–2009 (pink), and 2009 only (blue), Canyonlands NP, 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 report on remote sensing of vegetation phenol-

ogy and snow-cover extent in NCPN parks, covering the years 2000–2009. For those years, the analysis showed three patterns for Canyonlands NP, where the day of first snowfall was occurring earlier in the year, the number of snow-free days was decreasing, and the number of snow-covered days was increasing. These patterns should be considered with caution because they are based on a short (10-year) record. The full report is posted on the network's web site.

Additional Efforts

The NCPN is continuing to expand ecological monitoring at Canyonlands NP, where additional efforts include monitoring of climate,

riparian systems, and land cover/land use. The network is also conducting vegetation mapping at the park.

For more information

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