



Natural Resource Monitoring at Capitol Reef National Park



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Cliffs of the Waterpocket Fold.

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 Capitol Reef National Park.

Exotic Invasive Plants



Tree-of-heaven.

Jan Samanek, State Phytosanitary Administration,
Bugwood.org.

Invasive exotic plants (IEPs) represent one of the most significant threats to natural resources in national parks. Exotic plants are able to reproduce prolifically, rapidly colonize new areas, displace native species, and alter ecosystem processes across multiple scales. However, if these invaders are discovered in their early stages, control efforts are likely to cost less and achieve higher success rates than after a species has become more widespread. In 2010, park staff detected eight IEP species on monitoring routes

and transects along 19.4 kilometers of Utah State Highway 24 and Pleasant Creek. Tamarisk, Russian olive, and alfalfa were the most common Priority 1 invasive species found. Tamarisk, tree-of-heaven, and Russian knapweed all have declined along Highway 24 and Pleasant Creek since the last surveys were completed from 2003 to 2005 and control efforts were undertaken by the park. In 2011, the NCPN will expand monitoring efforts to Oak Creek.

Water Quality



Fremont River.

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 1,798 comparisons of results against beneficial

use standards conducted at nine sites in or near Capitol Reef NP, 77 (4.3%) exceeded water quality standards or indications of impairment. Standards were exceeded for six constituent categories—most commonly, nutrients, *E. coli*, and temperature. Concern about potential bacteria sources within the park and the upstream watershed has led to more frequent sampling for bacteria on the Fremont River.

Uplands



Uplands monitoring plot.

Uplands represent the vast majority of land area at Capitol Reef NP, where grasslands have been selected as the ecosystem targeted for integrated upland monitoring. This protocol measures soil stability, hydrologic function, biological soil crusts, and plant community characteristics. Monitoring began in 2007, the first of a

three-year pilot study (2007–2009) to obtain an estimate of the variance in key parameters. The network implemented a full-scale monitoring design based on the results of the pilot study in 2010. In 2011, network staff completed the fifth year of monitoring at the park.

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 Capitol Reef NP, the report focused on visibility monitoring. 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.

Riparian Systems

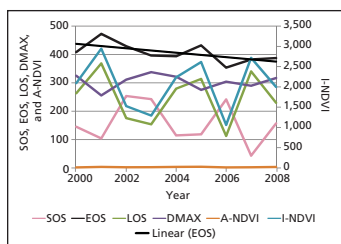


Taking pebble-count measurements.

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 will help the NCPN to assess riparian-system health and provide early warning of system degradation. In 2009, three reaches were established on the Fremont River and sampled for vegetation and geomorphology.

Shallow groundwater-monitoring wells were installed at one reach. The proposed monitoring plan for Capitol Reef NP includes monitoring 10 reaches throughout the stream, with special focus on an abandoned meander that is planned for reconnection to the river system. The three established reaches will be visited again in 2011, to gather baseline data above, within, and below the abandoned meander.

Land Condition



Annual phenology units, Capitol Reef 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 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 Capitol Reef NP, where the end of senescence (EOS; black line in figure) was occurring earlier in the year. This pattern should be considered with caution because it is 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 Capitol Reef NP, where ad-

ditional efforts include monitoring of climate, land cover/land use, and landbirds.

For more information

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