



Natural Resource Monitoring at Bryce Canyon National Park



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Sinking Ship.

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 Bryce Canyon National Park.

Vegetation Mapping



Bureau of Land Management's Haywood

Woods' rose.

The NCPN recently completed a multi-year, multi-partner effort to map vegetation at Bryce Canyon NP. This project included gathering aerial photography, collecting initial vegetation-plot data, using the vegetation data to classify vegetation types and write descriptions, writing a vegetation-type key, performing photo interpretation, conducting an accuracy assessment, creating a geodatabase, and writing the final report. The team collected vegetation and environmental data from 408 vegetation classifica-

tion plots, 141 observation points, and 902 accuracy assessment points. A total of 6,056 map polygons representing 49 natural and semi-natural vegetation map classes were developed for the project, which achieved an overall mapping accuracy of 84.2%. These maps will be a valuable resource for use in park management, resource monitoring, interpretive programs, planning, and prescribed fire, and as a baseline for designing ecological studies. All final products were delivered to park staff in July 2011.

Uplands



Uplands monitoring plot.

NCPN uplands monitoring is intended to strike a balance between increasing fundamental understanding of these systems and providing managers with early warning of undesirable change. This protocol measures plant community characteristics, including vegetation and surface cover, density of woody species, canopy closure, and fuels. Through discussions

with park staff, pinyon-juniper woodlands and mixed conifer forests were selected for integrated uplands monitoring at Bryce Canyon NP. In 2010, the NCPN completed the first year of data collection at the park. Network staff returned for a second season of monitoring in 2011.

Landbirds



Bewick's wren.

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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 one plot in pinyon-juniper woodland and two in sagebrush-shrubland at Bryce Canyon NP. The first trend analyses were conducted this year. Although populations 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.

Air Quality



Bryce Canyon NP airshed.

IMPROVE

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 Bryce Canyon NP, the report focused on wet deposition and vis-

ibility monitoring. Based on five-year averages, the park's sulfur levels were estimated to be in good condition, while nitrogen levels were in moderate condition. 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 GPRR goals for deposition and visibility.

Water Quality



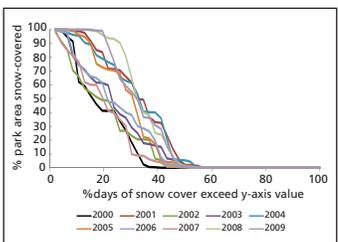
Monitoring at Sheep Creek.

NPS/D. Thoma

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 1,122 comparisons of results against beneficial use standards conducted at four sites in Bryce

Canyon NP, only four (0.6%) exceeded water quality standards or indications of impairment. Standards were exceeded for one constituent category, *E. coli*. These infrequent *E. coli* exceedances do not warrant concern from a human-health perspective. Possible sources of contamination include wildlife, human use, and trespass cattle, which have been an infrequent but reoccurring issue in Bryce Canyon NP.

Land Condition



Annual frequency of days that exceeded a given percent coverage of snow, 2000-2009, Bryce Canyon NP.

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 Bryce Canyon NP, where snowmelt (i.e., the day of the year when snow cover falls below 5.5%) was occurring later 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 Bryce Canyon NP, where addi-

tional efforts include monitoring of climate and land cover/land use.

For more information

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