



Natural Resource Monitoring at Bryce Canyon National Park



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Bryce Canyon.

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 species, 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.

Aquatic Contaminants



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Yellow Creek drainage.

In 2010, as part of a special project in cooperation with the Environmental Protection Agency (EPA), the NCPN sampled three water bodies at Bryce Canyon NP for contaminants of emerging concern (those that have not traditionally been tested for during water quality sampling and may not be adequately cleansed by current wastewater treatment methods). Samples were analyzed at an EPA lab for evidence of pesticides and wastewater indicators, including manufacturing byproducts and agricultural

and human waste contaminants. In preliminary results, several analytes were detected in Sheep and Yellow creeks. Carbaryl (an insecticide) and the human hormone estrone surpassed a known level of biological concern at the latter site. Follow-up samples will determine if these analytes are persistent. Yellow Creek will be re-sampled in 2012, and additionally tested for the presence of pharmaceuticals and personal care products. The network will publish final results from this work at a later date.

Flora Update



Lindsey Koepke@USDA PLANTS Database

Red elderberry.

In 2008–2009, the NCPN published an annotated checklist of vascular plant species for each network park. Since that time, nearly 700 changes have been necessary to keep up with new research, due to the discovery of new species and changes to park status and existing nomenclature. For instance, 432 new vascular plant species have been added to the park floras and the status of another 102 species has been changed. An [addendum to the original check-](#)

[lists](#), compiled by contractor Walt Fertig and published in 2012, details these changes. Bryce Canyon NP has seen an increase of 41 new plant taxa since 2007, an increase of 7% that brings the known and reported park flora to 628 taxa. Among the new species are two non-native taxa: blue mustard (*Chorispora tenella*) and bulbous bluegrass (*Poa bulbosa*). The latter species is rapidly expanding in southern Utah and can be extremely invasive.

Modeling Climate Change



NPS/Patricia Hamilton

Bristlecone pine.

Changes in climate will affect some species more than others; what is not known is which ones, how much, and where. To better understand these questions, the NCPN cooperated with Dr. Henry Shovic, of Montana State University, to examine species distribution models, local spatial data, historical climate data from local weather stations, and climate projections in order to determine the location and quality of present and future potential habitat for bristlecone pine, a species of concern at Bryce Canyon NP.

Mapping results showed that present bristlecone pine habitat may remain stable, and additional potential physical habitat is present. Because that potential habitat is presently occupied by other species, however, it is not clear how much habitat might actually be available for bristlecone migration. This project developed a baseline of information that can help with park management decisions and be used to help develop future models of bristlecone habitat.

Data Management Review



Data management is one of the NCPN's most pivotal tasks. In 2011, the network completed a review of its data management practices as part of a program-wide assessment facilitated by the national I&M Program. The goal of the review was to evaluate current practices and identify areas for improvement. In collaboration with network staff, the NCPN data manager completed a comprehensive self-assessment consisting of more than 200 questions spanning 12 categories. The review identified several areas

of strength for the NCPN, including databases, data distribution, quality assurance/quality control, and data management roles/responsibilities. The network will share its expertise in these areas with other networks as needed to help them make improvements. Two main areas needing improvement were also identified: data documentation and water quality data management. The NCPN will work with the national I&M Program and other networks to make improvements in these areas.

Uplands



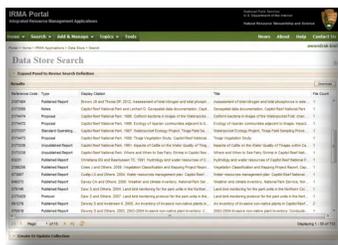
NPS

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. The NCPN implemented monitoring in 2010, and network staff returned for a third season of monitoring in 2012. [Annual reports](#) of upland monitoring are available at the network's web site.

IRMA Data Store



Looking for something? The Integrated Resource Management Applications (IRMA) portal is your web-based "one-stop shop" for documents, data sets, and other types of NPS natural and cultural resource information. In 2011, the NCPN received funding from the national I&M Program to upload digital files to the [IRMA Data Store](#). Overall, a total of 370

digital files were uploaded. About half of those documents were already in digital form; the other half had to be scanned from hard-copy documents. Of the 370 documents uploaded, [70 were linked to Bryce Canyon NP](#). These documents covered topics including water quality, springs, and macroinvertebrates.

Additional Efforts

In addition to the projects described in this brief, the NCPN also monitors climate, landscape dynamics, water quality, air quality, land-

birds, and land surface phenology at Bryce Canyon National Park.

For more information

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