



Natural Resource Monitoring at Zion National Park



NS/Jonathan Fortner

View from the Watchman.

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 Zion National Park.

Aquatic Contaminants



NS/D. Thoma

North Creek.

In 2010, as part of a special project in cooperation with the Environmental Protection Agency (EPA), the NCPN sampled seven water bodies at Zion 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. While five sample sites had no analyte detections, several analytes were detected in North Creek. Three analytes, all known endocrine disruptors, surpassed a known level of biological concern. Follow-up samples will determine if these analytes are persistent. North 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



Derrick Zobel

Chicory.

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 checklists](#), compiled by contractor Walt Fertig and published in 2012, details these changes. Zion NP has seen the greatest increase of any NCPN park, with 83 new plant taxa since 2007. This increase of 8.5% brings the known and reported park flora to 1,074 taxa.

Modeling Climate Change



NPS/Jim Peaco

Pika.

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 four species of concern in and near Zion NP.

Mapping results showed that potential habitat may increase in quantity for the endangered Shivwits milkvetch, and may increase in quality for the threatened desert tortoise. However, potential habitat will probably disappear for the climate-sensitive American pika. This spatially explicit, local information can help with park management decisions and development of a local adaptation framework for mitigating impacts to species and as changes unfold.

Riparian Systems



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Riparian reach survey.

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. The East Fork of the Virgin River was selected for monitoring at Zion NP. Monitoring began in 2008 and has expanded each year since. To date, three inte-

grated monitoring reaches have been sampled for vegetation and cross-sections of the channel and the location of the thalweg have been surveyed. Network staff installed shallow groundwater-monitoring wells at one of these reaches. In 2011, two reaches were revisited to record changes in vegetation after a December 2010 flood. A total of seven reaches will be monitored throughout the stream. Implementation will continue in 2012, with a fourth reach planned.

Uplands



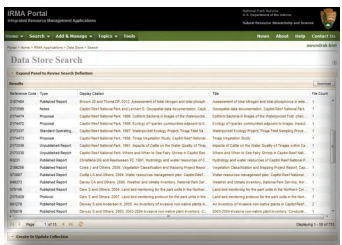
NPS

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 soil stability, hydrologic function, biological soil crusts, and plant community characteristics. Through

discussions with park staff, pinyon-juniper woodlands and Gambel oak shrublands were selected for monitoring at Zion NP. The NCPN implemented monitoring in 2011; network staff will return for a second season of monitoring in 2012.

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](http://science.nature.nps.gov/im/units/ncpn). 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, [106 were linked to Zion NP](http://science.nature.nps.gov/im/units/ncpn). These documents covered topics including hanging garden communities, water quality, and invertebrates.

Additional Efforts

In addition to the projects described in this brief, the NCPN also monitors invasive exotic plants, landbirds, landscape dynamics, land

surface phenology, climate, and water quality at Zion National Park.

For more information

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