



Natural Resource Monitoring at Black Canyon of the Gunnison National Park



Gunnison River.

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 Black Canyon of the Gunnison National Park (BLCA).

Water Quality



Gunnison 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 1,058 comparisons of results against beneficial use standards conducted at three sites in Black

Canyon of the Gunnison NP, only 73 (4.6%) exceeded water quality standards or indications of impairment. Standards were exceeded for two constituent categories: metals and *E. coli*. Persistent *E. coli* exceedances at Red Rock Canyon are of some concern. More frequent sampling at the Red Rock Canyon monitoring site may be desired if routine sampling continues to record *E. coli* exceedances.

Riparian Systems



East Portal.

The NCPN is developing a big-river monitoring program that will help to determine the effects of the recently decreed BLCA reserve water right for the Gunnison River. This decree has resulted in a new era of management and flows for the river. Because of the park’s extreme topography, only three locations are logistically feasible for monitoring. With the benefit of a technical assistance request, we will develop a hydraulic model and implement pilot monitoring at the East Portal site in 2011. Re-

connaissance will also be done to evaluate and possibly establish monitoring locations at Red Rocks. The third site, Warner Point, is a U.S. Geological Survey (USGS) long-term research station that will only be monitored every 5–10 years, as it is only accessible via helicopter. A scheduled joint USGS–NCPN trip for 2011 was postponed due to extremely high water levels. Efforts will be made to sample Warner Point and re-visit East Portal in 2012.

Vegetation Mapping

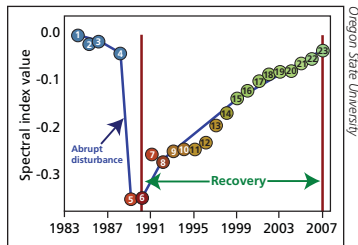


Woods' rose.
Bureau of Land Management/S. Hagwood

The NCPN recently completed a multi-year, multi-partner effort to map vegetation at Black Canyon of the Gunnison 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 112 vegetation classification plots, 16 observation

points, and 762 accuracy assessment points. A total of 3,270 map polygons representing 35 natural and semi-natural vegetation map classes were developed for the project, which achieved an overall mapping accuracy of 83.8%. 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 June 2011.

Land Cover and Land Use



Spectral index showing landscape disturbance and recovery over time.

The composition and connectivity of land-cover types determine habitat availability, energy and material flows, and the movement of organisms on a landscape. Disturbance-based changes in landscape structure can be detected by evaluating imagery representing conditions across many years. Using a time series of remotely sensed imagery collected annually from Landsat satellites, it is now possible to determine spatial extent, rate, direction, duration, and relative magnitude of vegetation-cover change for some ecosystems. Detectable changes include both rapid and gradual change

due to fire and drought stress, as well as growth and recovery processes. Cooperators at Oregon State University have analyzed 25 years of Landsat imagery and developed new analysis techniques for arid ecosystems. Pinyon-juniper dynamics at Dinosaur NM are currently being examined; after this work is complete, we will determine the utility of applying these techniques at other NCPN parks. We are also evaluating this technology for application to riparian ecosystems and grazed versus ungrazed environments.

Landbirds

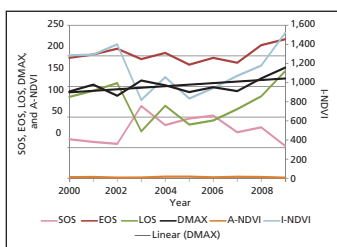


Bewick's wren (©Robert Shantz)

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 one plot each in sagebrush-shrubland and pinyon-juniper woodland at BLCA. 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.

Land Condition



Annual spring phenology metrics, Black Canyon of the Gunnison 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 Black Canyon of the Gunnison NP, where the day of peak greenness (DMAX; black line in figure) 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 also monitors climate, invasive plants, uplands, and air quality at Black Canyon

of the Gunnison NP.

For more information

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