



Natural Resource Monitoring at Dinosaur National Monument



Dinosaur National Monument (NPS)

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 Dinosaur National Monument.

Riparian Systems

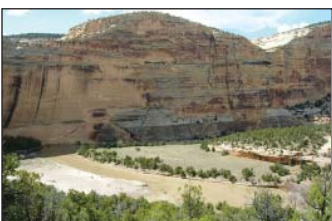


Pilot testing big-river riparian monitoring (NPS)

The NCPN, with the U.S. Geological Survey, is developing a monitoring protocol for big rivers. Three different methodologies are being tested. The first, which incorporates traditional geomorphology and vegetation measurements, will provide information on sites determined to be most susceptible to change. The second method, also focused on specific sites, incorporates ground-based LiDAR to provide extremely detailed information on geomorphol-

ogy and species-nonspecific information on vegetation types. The third method uses aerial LiDAR and multi-spectral imaging to obtain coarse-scale measurements on geomorphology and vegetation for the entire length of river within the park. Two sites, Laddie Park and Whirlpool Canyon, were selected and visited in 2009 to test these methods. Additional field-testing will occur in 2010.

Water Quality



Yampa River (NPS)

In cooperation with the State of Utah and the U.S. Geological Survey, the NCPN monitors water quality on the Yampa and Green rivers in Dinosaur NM. Data are used to determine compliance with the Clean Water Act and for monitoring trends in water quality that may impact visitors and ecological function of aquatic systems. Recent data exhibit elevated iron and

magnesium conditions similar to those historically documented in the Yampa River. Both natural sources and past mining operations within the watershed have been shown to contribute to these elevated loads in the Yampa and its tributaries. No exceedances or indications of impairment were observed on the Green River in 2009.

Landbirds



Black-throated sparrow (©Greg Lavaty)

Birds play an important role in the flow of energy through ecosystems and are sensitive to habitat changes, making them good indicators of habitat quality. 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 five plots in sagebrush-shrubland, four in pinyon-juniper woodland, and three in low-elevation riparian areas at Dinosaur NM. We currently esti-

mate that we will be able to detect a population change of at least 3% within 30 years for 55 species, representing more than 90% of all individual birds observed thus far. To date, only one species is showing a consistent annual decline in NCPN parks: mourning dove, in low-elevation riparian areas. Three species have shown consistent annual increases: black phoebe and black-throated sparrow, both in low-elevation riparian habitat, and dusky flycatcher, in sagebrushland. This trend information is preliminary.

Uplands

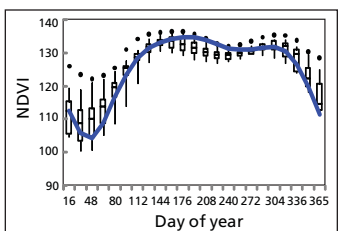


Monitoring plot (NPS)

Sagebrush, grasslands, and, to a lesser extent, pinyon-juniper woodlands were selected for integrated uplands monitoring at Dinosaur NM. This protocol measures soil and site stability, hydrologic function, biotic integrity, and vegetation composition and structure. A three-year pilot study to obtain estimates of variance for key parameters began in 2009, when a total of 35 plots were established and monitored.

These plots will be revisited, and 5 new plots established, in 2010, when the NCPN will return for a second season of pilot monitoring. This information will be used to determine the number of plots necessary to detect trends for long-term monitoring. Pilot sites were selected in a manner that ensures they will be included in the full-scale monitoring design.

Land Condition



Normalized Difference Vegetation Index values for Dinosaur NM in 2009, plotted with historical ranges.

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 patterns, long-term climate trends, land use, and geographic position. Understanding vegetation response enhances understanding of the biological ecosystems and physical processes affected by vegetation productivity and distribution. The Normalized Difference Vegetation Index (NDVI) is a measure of vegetation

greenness, or productivity, derived from the Terra satellite, which images the entire surface of Earth every few days at 250-m resolution. Although the timing of green-up lagged slightly behind the 9-year average, 2009 had one of the most productive mid-seasons in the last 10 years, based on peak seasonal greenness. During most of the growing season, the 2009 curve was generally at or above the 9-year average. However, end of season brown-down occurred earlier than in previous years.

Air Quality



Dinosaur NM airshed (NPS)

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 NCPN parks. The network's first air quality report was produced in 2009. For Dinosaur NM, the report focused on ozone monitoring, which has been

conducted using a portable ozone monitoring station unit there since 2005. Ozone levels at Dinosaur NM were rated in moderate condition, but no trends should be estimated until at least five years of data have been collected. Due to the limited data, it cannot be determined whether the park is meeting its 2008 GPRA goal for ozone.

Additional Efforts

The NCPN is continuing to expand ecological monitoring at Dinosaur NM. A protocol for monitoring land cover/land use is underway and planned for future implementation. The

network also reports on climate monitoring for the park. The park's list of natural resource inventory needs was updated in 2009.

For more information

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